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# Benchmarking as a Public Health Strategy for Creating Healthy Food Environments: An Evaluation of the INFORMAS Initiative (2012–2020)

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## Keywords

food environments, benchmarking, nutrition, accountability

## Abstract

Diet-related noncommunicable diseases (NCDs) and obesity are the leading contributors to poor health worldwide. Efforts to improve population diets need to focus on creating healthy food environments. INFORMAS, established in 2012, is an international network that monitors and benchmarks food environments and related policies. By 2020, INFORMAS was active in 58 countries; national government policies were the most frequent aspect benchmarked. INFORMAS has resulted in the development and widespread application of standardized methods for assessing the characteristics of food environments. The activities of INFORMAS have contributed substantially to capacity building, advocacy, stakeholder engagement, and policy evaluation in relation to creating healthy food environments. Future efforts to benchmark food environments need to incorporate measurements related to environmental sustainability. For sustained impact, INFORMAS activities

will need to be embedded within other existing monitoring initiatives. The most value will come from repeated assessments that help drive increased accountability for improving food environments.

## 1. INTRODUCTION

### 1.1. Drivers of Unhealthy Diets and Obesity

Unhealthy diets and obesity are the leading contributors to poor health worldwide (3, 48). Moreover, prominent socioeconomic inequalities can be found in the distribution of dietary risk factors and associated noncommunicable diseases (NCDs) (15, 66). Increased supply, distribution, and marketing of ultra-processed foods (45) that are often high in salt, sugar, saturated fat, or energy, alongside strong economic forces driving consumption and growth, have been recognized globally as key drivers of unhealthy diets, obesity, and their associated inequalities (71).

A wide spectrum of interventions have been identified to address unhealthy diets and obesity, ranging from individually focused behavioral programs and medical interventions to policy interventions targeting the systemic and environmental drivers of unhealthy diets (24, 87, 88). As part of a comprehensive societal response, there is global consensus that societies need to transition away from unhealthy food environments towards healthy food environments (68), in which the foods, beverages, and meals that contribute to a healthy diet are widely available, affordably priced, and widely promoted and availability, accessibility, and marketing of unhealthy foods are substantially reduced (71).

Transitions to healthy food environments will need to be predominantly government led, including comprehensive regulations to restrict the marketing of unhealthy foods to children, improved health-related food labeling, and fiscal policies to better incentivize consumption of healthier foods and disincentivize consumption of unhealthy foods (68). Evidence of the effectiveness and cost-effectiveness of such policies to improve the healthiness of food environments is growing (5, 35, 58). In addition, policies that are targeted at creating healthy food environments are likely to have a more equitable impact than interventions focused on individual behavior change (53). Despite strong evidence of the burden of diet-related disease and potential effective and cost-effective solutions, as well as consistent and urgent calls from health experts and public health organizations for multisectoral, multicomponent actions to improve diets (52, 87), government and societal efforts have generally fallen short of recommendations (24, 56). There has been a particular lack of action with respect to the implementation of a comprehensive set of recommended policies to create healthier food environments (24, 56). However, over the last decade, more countries have started implementing policies focused on specific aspects of food environments, with growing implementation of sugar-sweetened beverage taxes and front-of-pack labeling regulations (7, 29, 92).

### 1.2. Benchmarking for Assessing and Stimulating Nutrition-Related Policy Changes

The need for stronger and more comprehensive actions to improve the diets of populations and reduce their related inequalities has led to a focus on increasing the accountability of the major stakeholder groups, including through rigorous monitoring of the characteristics of food environments related to obesity and diet-related NCDs and through benchmarking of relevant policies and actions of governments and the food industry (67). Originating in the private sector, benchmarking was initially a form of reverse engineering, whereby organizations compared characteristics, functionality, and performance of competitor products to develop best practices

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**Food environments:** the collective physical, economic, policy, and sociocultural surroundings, opportunities, and conditions that influence people's food and beverage choices

**Healthy food environments:** environments in which foods and beverages that contribute to a healthy diet are widely available, affordably priced, and widely promoted

**Unhealthy food environments:** environments in which energy-dense, nutrient-poor foods are readily available, highly promoted, and relatively cheap

**Ultra-processed foods:** formulations of ingredients, mostly of exclusive industrial use, typically created by series of industrial techniques and processes

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(32). Over time, the concept of benchmarking evolved to also include comparisons of processes, policies, and strategies (18, 32).

In the public health context, benchmarking can facilitate change in a number of ways. First, benchmarking can be used to identify best performers (i.e., benchmarks) against which others can be assessed (49). The outputs of the benchmarking process can be used to encourage competition-driven change as well as sector-wide reform (e.g., if performance is universally below the benchmarks). Second, the process of benchmarking can be used to engage with key stakeholders regarding the issue at hand, promote a shared understanding of the benchmarks and priority focus areas, and assist in focusing the attention of decision makers (18). Third, the data generated through benchmarking can be applied in multiple ways and can facilitate further learning. For example, the monitoring data generated by repeated benchmarking can be used to analyze trends over time, examine associations with relevant health outcomes, and evaluate policy changes. Fourth, analysis of the structures, strategies, policies, and processes that contribute to both strong and weak performance against benchmarks can provide valuable insights into how and why performance differs across settings and actors (51). These insights can be used to facilitate performance improvements at an organizational level (51). Analysis of reasons underpinning differences in performance can also help to identify sector-wide facilitators of and barriers to success that can be applied to other sectors (44).

Several accountability and benchmarking initiatives have been developed in the area of public health, including those for tobacco control (2, 4), breastfeeding (63), and alcohol (89). The American Lung Association's State of Tobacco Control report series is one example of a comprehensive and ongoing program designed to encourage policy change through assessment and monitoring of government policy action. Since 2003, the annual report has assessed federal and state governments on a range of tobacco control measures including funding, smoke-free legislation, tobacco taxes, smoking cessation services, and public education (4). In the area of food and nutrition, several benchmarking initiatives have been developed in the last decade; most focus on the performance of major food companies. These include the Access to Nutrition Initiative (ATNI), which assesses the nutrition-related policies, disclosure practices, and performance of the largest global food and beverage manufacturers (1); Oxfam's Behind the Brands, which focuses on the agricultural sourcing policies of the largest global food and beverage manufacturers (<https://www.behindthebrands.org/>); and the World Benchmarking Alliance, which aims to measure company action in relation to the United Nations (UN) Sustainable Development Goals (SDGs) (91). The newly developed Food Systems Dashboard, launched in 2020, aims to bring together available data to provide comprehensive descriptions of food systems globally (22).

The Food Systems Dashboard includes more than 150 indicators that measure components, drivers, and outcomes related to food systems at the country level. These indicators include several focused on food environments, such as aspects of food availability, food affordability, and selected nutrition policies; however, for many important indicators related to food environments (e.g., nutritional quality of food supply, marketing, food retail), there are no comprehensive data sets available across a large number of countries.

Despite the growing number of initiatives that currently utilize benchmarking for public health promotion and policy, there has been very limited evaluation of the contribution of benchmarking initiatives to desired public health-related changes (8). Moreover, published reflection on what contributes to the success or failure of monitoring and benchmarking initiatives in the area of public health has been minimal (10, 36). Nevertheless, the long-running nature of several public health-related benchmarking initiatives and the ongoing proliferation of benchmarking schemes indicate that these strategies are likely perceived as a potentially valuable mechanism for change (8, 67).

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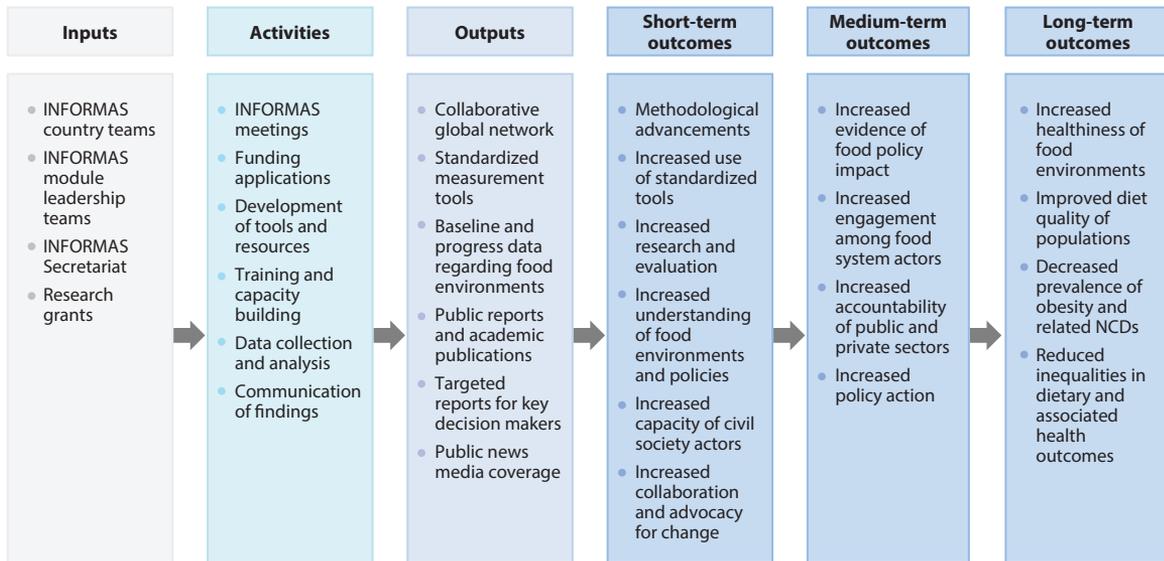
**Accountability:**

involves one actor answering to another, who is empowered to assess how the former fulfills obligations to achieve specific goals (31)

**Benchmarking:**

a continuous process of comparing, identifying, and adapting best practice with the aim of improving performance

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**Figure 1**

Overview of logic model for INFORMAS, indicating planned inputs, activities, outputs, and expected outcomes.

### 1.3. The INFORMAS Initiative for Monitoring and Benchmarking Food Environments and Related Policies

#### INFORMAS:

International Network for Food and Obesity/noncommunicable diseases Research, Monitoring and Action Support

Established in 2012, INFORMAS (International Network for Food and Obesity/noncommunicable diseases Research, Monitoring and Action Support) is a global network of public-interest organizations and researchers that aims to monitor, benchmark, and support public sector and private sector actions to create healthier food environments and reduce obesity, NCDs, and their related inequalities (68).<sup>1</sup> The logic model for INFORMAS is presented in **Figure 1**, with further details available in **Supplemental Table 2**. The logic model articulates how INFORMAS seeks to strengthen the accountability of governments and the private sector for their roles in addressing unhealthy diets and obesity and, in so doing, to stimulate recommended policy changes. The proposed mechanisms by which INFORMAS is designed to generate change are (a) the development and maintenance of a well-connected and growing global network of researchers; (b) standardized tools, methods, and benchmarking indicators that are broadly applied; (c) increased engagement between key actors in ways that work toward common goals; and (d) wide dissemination of findings in order to communicate progress on improving the healthiness of food environments between countries and over time (68). The overarching INFORMAS monitoring framework (see **Supplemental Table 3**) is composed of two process modules that focus on monitoring policies and actions of the public sector and private sector, respectively; seven impact modules (food composition, food labeling, food promotion, food provision, food retail, food prices, and food trade and investment) related to the monitoring of key characteristics of food environments; and three outcome modules (population diet, physiological and metabolic risk factors, and health outcomes) that focus on relevant population outcomes. Activities conducted under each module are guided by module leadership teams and standardized protocols that can be adapted to the relevant country context. Within each module, there are minimal and more optimal approaches to data collection to

<sup>1</sup>Refer to **Supplemental Table 1** for organizations involved in undertaking activities related to INFORMAS.

allow the level of implementation of a particular module to vary on the basis of available resources and feasibility in the local context (68).

The aims of this article are to summarize the implementation of INFORMAS since its inception, evaluate the impact that INFORMAS has had, and extract key lessons learned and opportunities to improve.

## 2. GLOBAL IMPLEMENTATION OF INFORMAS

As of June 2020, INFORMAS comprised researchers and public health practitioners from more than 85 institutions from 58 countries conducting research to assess several aspects of food environments (see **Supplemental Table 1**). INFORMAS activities related to a mix of high-income ( $n = 25$ ), middle-income ( $n = 26$ ), and low-income ( $n = 7$ ) countries. **Figure 2** summarizes the INFORMAS modules completed or in progress in each country as of June 2020. In some countries, selected modules had been repeated multiple times. For example, the Healthy Food Environment Policy Index (Food-EPI), which forms part of the public sector module to assess government implementation of recommended policies for creating healthier food environments (69), had been conducted three times in New Zealand (2014, 2017, 2020). In addition, several countries (e.g., Australia, Canada, Chile, Mexico, New Zealand) had established food composition monitoring systems to investigate the nutritional content of food products annually.

The public sector module was the most frequently implemented module across countries: 15 countries completed the assessment of government policies to support healthier food environments using the Food-EPI approach, and a further 24 countries were in the process of conducting or planning assessments as of June 2020. The public sector module was often the first INFORMAS module implemented in countries owing to its immediate policy relevance. A key feature of the Food-EPI process is that it involves strong engagement with public health experts and government policy makers as part of the benchmarking process. The detailed collection of evidence of food environment policy implementation served to allow other INFORMAS modules to be prioritized for implementation at a later stage.

As of June 2020, four countries (Australia, Canada, Malaysia, and New Zealand) had assessed the nutrition commitments of food companies using the BIA-Obesity (Business Impact Assessment–Obesity and population nutrition) approach as part of the private sector module (62). In addition, the component of the private sector module that monitors the corporate political activity of food companies had been implemented in several countries (including Australia, Fiji, France, South Africa, and Thailand) (40–42). Further assessment of companies' performance in relation to nutrition issues, such as reformulation and marketing, requires access to detailed food supply and marketing data, so scale-up of these components of the private sector module is likely to be less feasible in lower-resource settings.

The most commonly implemented impact modules were food promotion, with a predominant focus on monitoring television advertising; food composition; and food labeling. The remaining food environment modules had been less widely applied. The outcome modules had not been a focus of INFORMAS monitoring activity because several other global- and country-level initiatives have focused on nutrition and health outcomes, such as the Global Burden of Disease initiative (<http://www.healthdata.org/gbd>) and the Global Dietary Database (<https://www.globaldietarydatabase.org/>).

## 3. IMPACT OF INFORMAS

To evaluate the impact of INFORMAS activities over the period 2012–2020, we reviewed outputs generated by INFORMAS activities up to June 2020 and consulted with INFORMAS module

Supplemental Material >

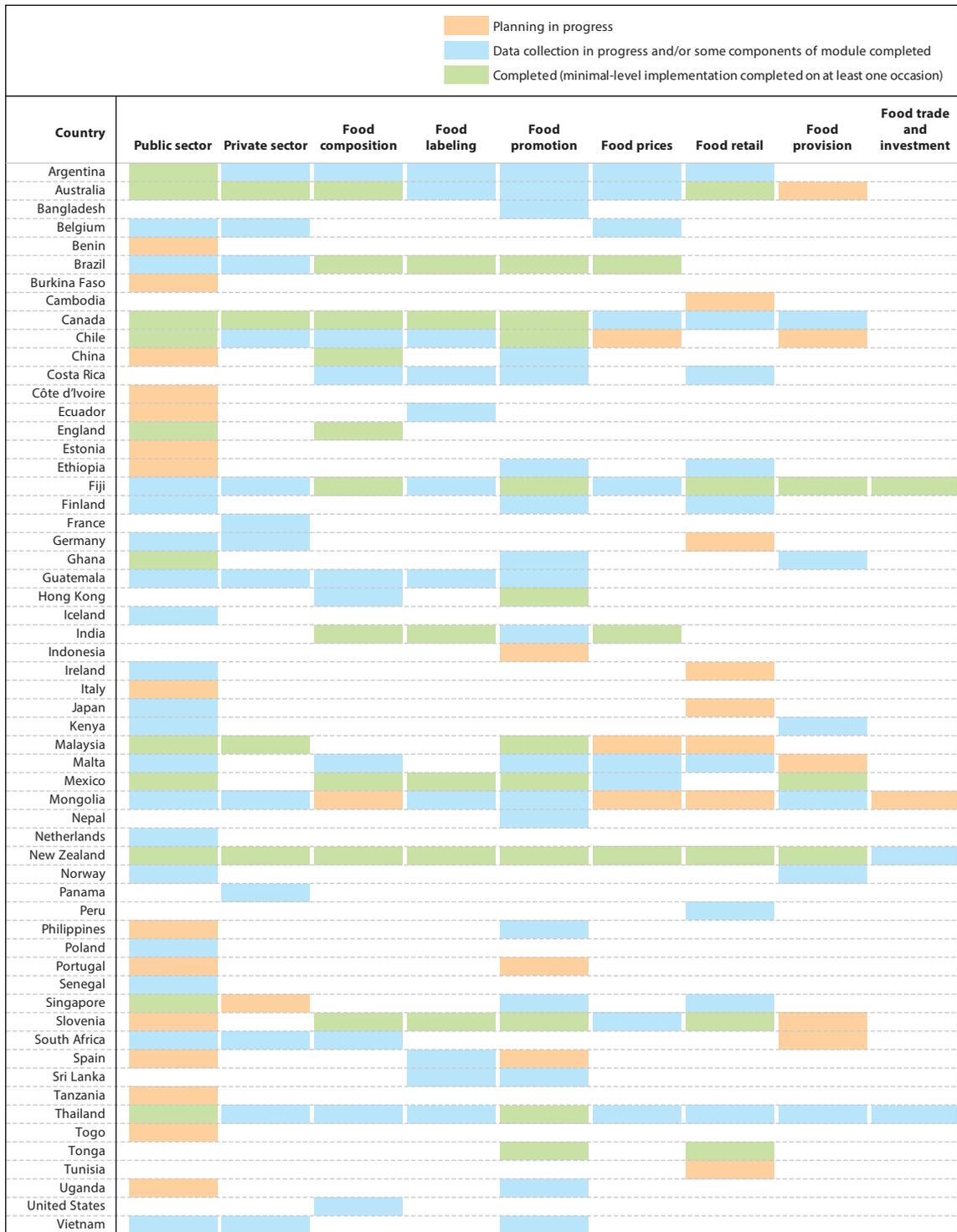


Figure 2

INFORMAS modules completed or in progress as of June 2020, by country.

leaders and country-level representatives in 2020 regarding lessons learned through the process of conducting INFORMAS-related activities. The insights gained were assessed against the short- and medium-term outcomes in the INFORMAS logic model (**Figure 1**) and are presented below in the following themes: methodological advancements; capacity building; accountability and advocacy; and policy development, implementation, and evaluation.

### 3.1. Methodological Advancements

The predominant methodological advancement for INFORMAS was the development of standardized approaches for measuring specific components of food environments as part of each of the nine process and impact modules. These standardized approaches were designed to focus monitoring efforts on the indicators deemed most policy relevant and most important for influencing population diets, while enabling comparisons between countries and over time (68). While INFORMAS protocols were also designed to be adapted to suit the context within each country, implementation of each approach nevertheless included adequate standardization and sensitivity to enable comparison and differentiation between countries. As such, several multicountry studies using INFORMAS protocols had been conducted, including an 11-country study comparing the level of implementation of relevant government policies (78), a 22-country study of children's exposure to unhealthy food and drink marketing (30), a 14-country study of sodium levels of food sold in Latin America (6), and a 12-country study of the healthiness of packaged foods (21).

Within specific modules, important methodological advancements were made to the approaches originally specified. In the public sector module, some countries implemented the Food-EPI at the province, state, or city level (Canada, Australia) (57, 76), and other countries (Thailand, Malaysia, Mexico) incorporated a self-assessment by policy makers (78). These modifications increased policy relevance and the level of engagement with key actors. In the private sector module, two new protocols (43, 62) for assessing food companies were developed that built on the foundation of the monitoring approach specified when INFORMAS was established (61). Two new methods were also developed in relation to food pricing: the nationally standardized tool, Healthy Diets ASAP (33); and DIETCOST (84), which allows measurement of the distribution in the cost differential between current and healthy household diets for a range of scenarios related to diet composition, prices, and policies. In the area of food retail, a new protocol for assessing supermarket in-store environments was developed and applied in New Zealand (83) and Australia (64). Despite the wide scope of methods developed by INFORMAS, food environments are complex and change continually in response to market innovations, and, as such, opportunities exist to expand and further develop protocols to incorporate relevant elements such as environmental sustainability, marketing practices on social media, and assessment of corporations' market power.

### 3.2. Capacity Building

INFORMAS contributed substantially to capacity building in relation to efforts to create healthier food environments. Among academics, INFORMAS significantly increased capacity related to monitoring food environments among established and emerging researchers. More than 20 PhD students, 25 Master's students, and several students from other degree programs across 15 countries had completed or were completing research utilizing INFORMAS modules. Having existing protocols in place, with global-level support structures, proved attractive for Master's students and provided PhD students with rigorous starting points and opportunities on which to build their research. More than 50 early- and mid-career researchers had also conducted research related to INFORMAS. Institutions involved in INFORMAS, such as the Institute of Nutrition and Food Technology (INTA) at the University of Chile, where no food environment research had previously been conducted, could now be considered world leaders in the area.

A wide range of funders had supported researchers in building knowledge related to food environments using INFORMAS approaches (see **Supplemental Table 4**). In high-income countries, funding had come largely from government sources, with additional support from philanthropic funders. In low- and middle-income countries (LMICs), where there were typically fewer local funding opportunities, most INFORMAS-related funding came from overseas development aid for research [e.g., the Canadian International Development Research Centre (IDRC)] or from international donors (e.g., Bloomberg Philanthropies), or the funding was part of multicountry studies supported by research funders in high-income countries. IDRC, in particular, was a stand-out supporter of food environments research using INFORMAS tools in LMICs (26). Most grants for INFORMAS were relatively small in size (less than US\$100,000); the process of preparing each funding application relied on extensive support from INFORMAS module leaders. It proved difficult to secure dedicated funding for the infrastructure support systems (e.g., training, advice, protocol management, networking, communications, and database maintenance) needed to help researchers in LMICs largely because the international funders who supported studies in LMICs were reluctant to fund the support systems, which were based in high-income countries. Nevertheless, efforts to build expertise and capacity in those countries (e.g., Mexico, Chile, Malaysia, and Ghana) with more experience related to INFORMAS helped to create some regional support capacity for LMICs.

The highly collaborative focus and inclusive approach of INFORMAS were important for building research partnerships to advance and share knowledge. Strong regional networks were created, especially in Latin America, Asia, Australasia, Europe, and Africa. For example, the Policy Evaluation Network (PEN) and the Horizon 2020 STOP project explicitly used INFORMAS modules and networks as part of establishing and formalizing collaborations to monitor and evaluate food and physical activity environment policy implementation across Europe (27). See the sidebar titled The Africa Food Environment Research Network.

The findings from INFORMAS studies were widely disseminated as part of efforts to increase knowledge of food environments among the wider public health research and practitioner community. Dissemination efforts included more than 115 peer-reviewed journal articles that have explicitly used or described INFORMAS methods. In high-income countries, several reports aimed at policy makers were also produced, such as report cards of food company policies in

## THE AFRICA FOOD ENVIRONMENT RESEARCH NETWORK

The increasingly obesogenic food environments in Africa and the increasing rates of obesity and other diet-related diseases have called for interventions that create healthier food environments. However, capacity gaps have been identified as barriers. The Africa Food Environment Research Network (FERN), created as part of the MEALS4NCDs project (<https://www.meals4ncds.org/en/>), aimed to address these capacity gaps by providing training for African researchers on INFORMAS approaches that had been adapted for the local context. The training was implemented through a series of meetings involving the MEALS4NCDs team and partners; food environment researchers; nutrition and health policy experts; and other stakeholders from academia, government, and civil society. The FERN meetings also aimed to foster collaboration and sharing of experiences, best practices, methodologies, challenges, and opportunities for improving food environments. By 2020, with support from INFORMAS module leaders (public sector, food promotion, food provision), FERN meetings had facilitated implementation of these protocols in Africa, including Food-EPI (in Ghana and Kenya), food promotion (in Ghana), and food provision (in Ghana) with several additional projects planned. As part of FERN, a team from Senegal focused on scaling up food environment research and practice in French-speaking regions, while the MEALS4NCDs project focused on English-speaking regions.

Australia, Canada, and New Zealand (60, 77, 79). The National Institute of Public Health of Mexico (INSP) developed a series of infographics to facilitate communication of the results of INFORMAS studies with high-level policy makers and the public (46). In addition, several public events were held by INFORMAS to build knowledge related to food environments and policies. These events were attended by a wide range of key food system actors, including policy makers, researchers, public health practitioners, and food industry representatives. Some examples included dedicated forums in Ghana on the healthiness of food environments (75) and a 2019 food industry forum in Malaysia to coincide with the launch of the BIA-Obesity results (47). Despite these publications and events, dissemination was not universally strong across INFORMAS-related activities, particularly because available funding did not typically extend far enough to cover extensive knowledge exchange activities. Experience is evolving on how to convert the INFORMAS monitoring approach, which involves high local-level engagement of actors, into stronger policy action. The most promising approach is that taken by the projects funded by Bloomberg Philanthropies, whereby monitoring research is coupled with substantial investments in communications and advocacy strategies to achieve policy change (19).

### 3.3. Accountability and Advocacy

INFORMAS contributed in several ways to efforts to increase accountability for actions taken to create healthy food environments (36). These contributions were made primarily by providing evidence to establish objectives and performance standards for governments and multiple sectors of the food industry (food and beverage manufacturers, quick-service restaurants, and supermarkets), as well as by collecting and sharing evidence of performance against those standards. Refer to **Supplemental Table 5** for further analysis of the contribution of INFORMAS to accountability processes.

Multiple communication channels were utilized to promote INFORMAS findings and advocate for policy change. The media was a key vehicle for advocacy; the release of results from INFORMAS studies often gained substantial coverage in public news media, thereby elevating the profile of the need for healthy food environments. As an example, in Australia, the BIA-Obesity project was granted a prestigious public health award for research translation, primarily in recognition of the enormous national-level media coverage that the initiative generated (23). Direct advocacy to government was also used, including written communication to key decision makers. In one such example from Canada, Food-EPI results were used in a joint letter from three major public health organizations to government policy makers to advocate for policy action to create healthier food environments (16). The evidence generated from INFORMAS was also integrated into responses to calls for public comment (consultations) on proposed government food and nutrition policies. In New Zealand, for example, evidence generated by INFORMAS was used as part of multiple public health submissions to the Advertising Standards Authority review of marketing to children and the government review of the Health Star Rating food labeling scheme (70).

In some countries, INFORMAS studies led to the creation of new advocacy coalitions dedicated to improving food environments. These initiatives were closely linked with INFORMAS and utilized evidence generated from INFORMAS studies to advocate for policy change. For example, in Ghana, the MEALS4NCDs project (which focuses on measuring the healthiness of children's food environments) was launched following the findings and recommendations of the public sector module (<https://www.meals4ncds.org/en/>). Similarly, in Costa Rica, the lack of evidence and action on food environments led to the creation of a new nongovernment organization (NGO), Costa Rica Saludable, which is closely linked with the INFORMAS country team in Costa Rica. See the sidebar titled Comprehensive Assessment of Food Environments in New Zealand.

Supplemental Material >

## COMPREHENSIVE ASSESSMENT OF FOOD ENVIRONMENTS IN NEW ZEALAND

In 2014, funding was secured for the development, pilot testing, and implementation of all INFORMAS modules in New Zealand and for providing support to other countries to begin implementation. The funding created the research capacity for this research (including three research fellows, three PhD students, and four Master's students). Key outputs (28 peer-reviewed journal articles and 6 research reports) included detailed protocols for several modules, with the results pulled together into a comprehensive report on the state of food policies and environments in New Zealand (80, 81). By 2020, the Food-EPI study had been conducted three times, providing gains in the efficiency of data collection and added value as a time series. The process of conducting the research resulted in engagement with more than 100 others from academia and NGOs as well as key policy makers. Thus, the process of conducting this research was in itself of value by creating relationships and joint ownership of the findings. Several regional health organizations and NGOs reported using the data for monitoring and evaluation purposes. The six research reports were used as part of advocacy efforts to gain traction with the public, through the media, and directly with ministers.

### 3.4. Policy Development, Implementation, and Evaluation

INFORMAS activities led to strong engagement with policy makers; several country-level researchers noted that INFORMAS studies strengthened relationships with policy makers and provided opportunities for direct discussions with senior decision makers within government. This strengthening of relationships was driven particularly by the Food-EPI process, which includes close engagement with policy makers at multiple stages.

While policy makers were highly engaged in the countries where INFORMAS modules had been implemented, there were fewer examples of INFORMAS studies contributing directly to policy change. This limited direct influence is to be expected because evidence, such as that generated through INFORMAS, is almost always necessary but not sufficient to drive policy change (25), so contribution to policy change is difficult to discern. This difficulty is compounded by the complexity of government policy processes, which are highly political and often heavily influenced by powerful food industry stakeholders (11). Nevertheless, INFORMAS assessments provided valuable baseline data about the level of policy inaction and the unhealthiness of food environments. We also found several examples of INFORMAS activities informing policy development. In Brazil, information from food composition and food labeling modules contributed to the government's justification for a ban on *trans* fatty acids (55). In Pacific Island countries and territories, the public sector module informed the development of the Pacific Monitoring Alliance for NCD Action (MANA) to monitor the implementation of policies and legislation aimed at reducing NCDs (50, 72). In Australia, INFORMAS data on food prices was important in retaining existing tax exemptions on basic healthy foods (where fresh fruit and vegetables are exempt from the 10% goods and services tax that applies to most other goods) as part of a government policy review (34). See the sidebar titled Contributing to Food Policy Change in Thailand.

The information gathered on food environments and policies through INFORMAS provided essential data to enable evaluation of implemented policies. For example, food composition data was used to monitor public-private salt reduction initiatives in Costa Rica (85) and Australia (73) and to evaluate the impact of the Health Star Rating system on reformulation in New Zealand (39) (see the sidebar titled Assessment of New Food Environment Regulations in Chile). In Mexico, INFORMAS data was used to evaluate food marketing regulations and will be used to evaluate the recently announced nutrition warning labels (86). INFORMAS data were also used to identify

## CONTRIBUTING TO FOOD POLICY CHANGE IN THAILAND

Over the period 2014–2017, a research team situated in the International Health Policy Program (IHPP) within the Ministry of Public Health in Thailand completed nine modules of INFORMAS (public sector policies and actions, private sector policies and actions, food composition, food labeling, food promotion, food provision, food retail, food prices, food trade, and investment). The research team reported that data generated from this research played an important role in strengthening national food environment policy and implementation in Thailand. For example, the data on sugar content in beverages obtained from the food composition module were used as part of efforts to advocate for the Thailand sugar-sweetened beverages tax (implemented in 2017). The findings from the food promotion and food retail modules were used to advocate for improved food marketing policy in Thailand, a process that was ongoing as of 2020. Indicators related to food composition and food labeling had recently been incorporated into a routine government-led monitoring system that is governed by a cross-sectoral working group. It had proved challenging to secure sustained funding for implementation of other modules, although ad hoc research projects related to other areas of INFORMAS, such as food provision and food retail, were being conducted.

limitations of implemented policies, such as a New Zealand evaluation of the inadequacy of the industry self-regulatory code on food marketing (65, 82). As more policies are implemented over time, there will be further opportunities to evaluate the effectiveness of different approaches.

## 4. KEY LESSONS LEARNED AND FUTURE DIRECTIONS FOR INFORMAS

INFORMAS had expanded organically since the network was established in 2012, with activities spanning 58 countries by June 2020. This growth increased the available data describing food environments globally, expanded capacity for food environments research, and helped increase advocacy for change. The combination of rigorous, scientific methods; flexibility to adapt standardized approaches to local contexts; a strong focus on engagement with decision makers as part of INFORMAS activities; and structures that promote collaboration and capacity building served to encourage widespread uptake of INFORMAS modules.

## ASSESSMENT OF NEW FOOD ENVIRONMENT REGULATIONS IN CHILE

In June 2016, in response to high rates of obesity and diet-related diseases (9), Chile implemented the national Food Labeling and Advertising Law (14). The law is a comprehensive set of policies that regulate the food environment, including the mandatory use of front-of-package warning labels on unhealthy packaged foods (54), prohibition of marketing of unhealthy foods to children, and prohibition of promotion and selling of unhealthy foods in preschool and school settings. The INFORMAS–Chile project was started in Chile in 2015, collecting information annually on the food composition of more than 15,000 packaged foods and analyzing marketing on food packages and television (28). Accordingly, the project provided baseline and follow-up data to analyze the impact of the implementation of the Labeling Law (12, 13, 37, 38). The food environment data were also linked to behavioral data (including dietary behaviors) from preschoolers and adolescents in two longitudinal cohort studies, which allowed investigators to assess the impact of food environment changes on individual behavior (17). Data collected using INFORMAS protocols were actively shared with policy makers and other key stakeholders in Chile and several other countries (e.g., Mexico, Canada, Israel, Brazil) that were discussing the implementation of similar policies.

Although INFORMAS activities were designed to require low levels of resources, in reality, implementation of the full suite of modules and indicators requires substantial investment. In fact, New Zealand was the only country that had implemented all INFORMAS modules, and only a limited number of those had been repeated over time. The development of each INFORMAS module envisaged that a stepped approach would be used, whereby countries began with the minimal approach and then expanded to the optimal approach within each module. However, implementation did not play out as planned; most countries typically selected only a small number of modules for implementation and adopted only the minimal approach within those modules. This finding reflects the fact that optimal approaches rely on detailed data that are typically more expensive and more burdensome to collect. Nevertheless, the flexibility of the INFORMAS approach meant that low-resource settings were able to select particular protocols or subcomponents of modules to suit available resources. For example, monitoring of television advertising was frequently selected because it was usually considered more feasible and policy relevant than monitoring of outdoor advertising. In addition, some protocols can be applied in smaller areas rather than nationwide. While the resultant data may not be representative, they provided a starting point and a vehicle for capacity building.

An important future direction for INFORMAS is to conduct repeated studies. Studies were already being repeated for selected aspects, such as food composition. Repeated studies across multiple modules will provide data about how food environments change over time, which could be used to evaluate the impact of policy change. The continued monitoring of food environments will also help keep public and private sector actors accountable and support public health advocacy in areas of inaction. Moreover, repeated food environment studies may enable multilevel ecological studies of policies, environments, diets, obesity and other risk factors, and morbidity/mortality.

Within existing modules, several areas require further development. A number of recent reviews (20, 59, 74) of issues in measuring the healthiness and sustainability of food environments have found that existing measures of food environments are typically too narrow in scope and do not adequately account for how people are exposed to, and interact with, food environments. Accordingly, composite measures of the healthiness of food environments, informed by actual usage patterns, need to be developed and consistently applied, supplemented by qualitative data on people's experiences of food environments (20, 59). In complex food environments, such as local activity centers (e.g., high streets and markets) and university campuses, indicators for benchmarking may need to be developed that draw on data related to multiple modules of INFORMAS, such as food composition, food labeling, food promotion, food prices, and food provision. Moreover, in the area of food retail, existing INFORMAS protocols are most applicable to high-income countries and specific settings such as supermarkets. To increase relevance to many LMICs, these methods will need to be tailored to apply to other food retail settings such as informal markets and mobile vendors. All areas of INFORMAS critically need to explore the potential to incorporate indicators relevant to environmental sustainability of food environments and food systems (71).

Continued evaluation of INFORMAS activities will be important in refining processes and tools. There remains minimal formal evaluation of benchmarking approaches to support policy change or improvements in population health in part because the complexity of both policy processes and the etiology of nutrition-related diseases makes it difficult to assess the contribution of individual initiatives or processes. Although this complexity will remain, researchers must continue to (a) document stories and identify drivers of both success and failure; (b) engage with policy makers to understand how best to intervene in policy processes to support recommended policy implementation; (c) focus on strengthening accountability mechanisms; and (d) build consensus so that collective voices are amplified.

The value generated by INFORMAS activities and the networks established as part of INFORMAS is likely to increase the uptake of INFORMAS in the future. For this uptake to be accelerated and sustained, it will be important for INFORMAS activities to be incorporated with other monitoring initiatives. Some aspects of INFORMAS (e.g., monitoring of food composition and food marketing) could be incorporated into existing UN-level monitoring frameworks, such as the World Health Organization NCD Global Monitoring Framework (90). INFORMAS could also complement new monitoring initiatives, such as the Food Systems Dashboard (22), in which information on food environments and policies is currently very limited. Other potential ways to increase the sustainability of INFORMAS include the use of crowdsourcing approaches for data collection and analysis, increased use of existing data sets (e.g., food price index and household budget surveys), and access to data sources (e.g., food and beverage sales data) that are not currently readily available in the public domain.

## 5. CONCLUSION

INFORMAS has resulted in the development and widespread application of standardized methods for assessing the characteristics of food environments. The activities of INFORMAS have contributed substantially to capacity building, advocacy, stakeholder engagement, and policy evaluation in relation to creating healthy food environments. For sustained impact, INFORMAS activities will need to be embedded within other existing monitoring initiatives or will need to use less burdensome data collection methods. The most value will come from repeated assessments that help drive increased accountability for change. With the addition of indicators related to environmental sustainability, INFORMAS-based monitoring could provide a platform for collaborations across groups advocating for healthy and sustainable food environments.

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Supplemental Material >

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