Commentary

INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support): summary and future directions

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Summary
This supplement presents the foundational elements for INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support). As explained in the overview article by Swinburn and colleagues, INFORMAS has a compelling rationale and has set forth clear objectives, outcomes, principles and frameworks for monitoring and benchmarking key aspects of food environments and the policies and actions that influence the healthiness of food environments. This summary highlights the proposed monitoring approaches for the 10 interrelated INFORMAS modules: public and private sector policies and actions; key aspects of food environments (food composition, labelling, promotion, provision, retail, prices, and trade and investment) and population outcomes (diet quality). This ambitious effort should be feasible when approached in a step-wise manner, taking into account existing monitoring efforts, data sources, country contexts and capacity, and when adequately resourced. After protocol development and pilot testing of the modules, INFORMAS aims to be a sustainable, low-cost monitoring framework. Future directions relate to institutionalization, implementation and, ultimately, to leveraging INFORMAS data in ways that will bring key drivers of food environments into alignment with public health goals.

Keywords: Benchmarking, food environments, non-communicable diseases, obesity prevention.

Introduction
This supplement presents the foundational elements for INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support) (1). INFORMAS is a global network of public-interest organizations and researchers that has committed to filling a critical gap in the global endeavour to reduce obesity, diet-related non-communicable diseases (NCDs) and their related inequalities. The focus is on food environments: ‘the collective physical, economic, policy and sociocultural surroundings, opportunities and conditions that influence people’s food and beverage choices and nutritional status’ (1). The gap to be filled by INFORMAS relates to the current absence of a comprehensive system for monitoring and benchmarking key aspects of food environments that impact on the healthiness of population diets, as well as the public and private sector policies and

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actions that influence those food environments, within countries and over time. The need to shift food consumption patterns in ways that avoid or reduce risks of developing obesity, cardiovascular diseases, type 2 diabetes and cancer is indisputable (2–5). A vision of what success would look like in this respect has been widely agreed by international organizations, expert panels, professional societies and civil society organizations concerned with obesity and NCD prevention, and commitments of national governments to taking action to improve diets were affirmed in a landmark United Nations General Assembly resolution in 2011 (6). The lack of a system for monitoring food environments and associated effects on population diets, and effects of public and private sector policies on food environments, is a major hindrance to determining what needs to be done and whether progress is being made, and it precludes an ability to hold those responsible accountable when actions are not taken or are insufficient. Such a system will be complementary to World Health Organization (WHO) efforts to monitor health outcomes (NCD mortality and morbidity), health risk factors (including obesity) and national system responses (7).

The lack of a system for monitoring NCD-related aspects of food environments is in contrast to the situation for tobacco. Tobacco control has been the focus of global monitoring systems for some time (8). The monitoring of food environments is much more complex than for tobacco for several reasons – not the least of which is that tobacco consumption is both non-essential and clearly harmful to health. Food is both essential and, on balance, beneficial to health. Food environments are, therefore, defining aspects of living and working environments. Food supply and demand dynamics are affected by instinctive physiological drivers and engrained social and cultural patterns that are more powerful than drivers of tobacco consumption, and are universal and enduring over the life course.

The agricultural and industrial systems that define food environments are then necessarily major global economic systems that must be reshaped and refocused rather than diminished or phased out, as might occur for tobacco. Food and nutrition policy and regulatory environments, and related data collection systems, have been developed primarily to assess the ability of food systems to ensure microbiological and chemical food safety, food sufficiency and nutrient adequacy (9). Monitoring of food environments from an obesity/NCD perspective should not be insensitive to these factors, but needs to prioritize a focus on factors that result in unbalanced dietary patterns with respect to intake of energy, plant vs. animal foods, and specific types of fats and carbohydrates. Taking the obesity and NCD perspective creates a challenging contest on both sides of the supply and demand equation. It alters expectations for what the food supply should look like in ways that directly oppose the current policies and practices of the global business that has come to be known as ‘Big Food’ (10), with all that this implies for the potential for opposition from well-funded commercial interests. It also alters expectations for how people should eat and feed their children, and about the meanings of food in social processes and systems, with implications for the ability to mobilize public support for positive policies and actions. INFORMAS is motivated by the conviction, supported by experience with other complex public health issues, that monitoring and benchmarking are necessary to create the levels of awareness and accountability that are needed to move the obesity and NCD prevention agenda forward by providing objective data that can effectively reach the several audiences to whom it will be relevant.

The effort to institute food environment monitoring at this level comes at a good time. There is currently widespread support and some momentum in policy circles for NCD control initiatives that include dietary targets (3,4,6,11,12), and there is increasing alignment and convergence of NCD policy directions with food and agricultural policy interests in the food and nutrition and environmental sustainability arenas (13–15). The creation of strong links with developments in agricultural policy reform is especially critical given the importance of food production within food systems. INFORMAS does not currently propose to directly assess the agricultural domain, but the impacts of agricultural production policies as well as food import and export policies will be reflected in country context assessments.

The lead article in this supplement provides an overview of the INFORMAS rationale, objectives, outcomes, principles and general framework for monitoring, benchmarking and supporting policies and actions to create healthy food environments (1). This summary highlights key elements of the specific proposals for implementing the framework, and provides a picture of what future success for INFORMAS would mean.

INFORMAS framework and module structure

As described in the overview article in this supplement (1), the INFORMAS framework is based on a three-layer structure with modules designed to answer specific research questions. The 10 INFORMAS modules focus on assessment of policies and actions of public and private sector organizations, seven key aspects of food environments – food composition, labelling, promotion, provision in public settings, retailing, prices, and food-related impacts of trade and investment agreements – and population diet quality as an outcome. The outcome modules other than population diet quality (i.e. physiological and metabolic risk factors, and health outcomes) reflect assessments that are ongoing or under development by the WHO (16).
The process of developing modules was greatly facilitated by a strategy in which teams of scholars with the requisite expertise and interest were recruited to take on responsibility for developing the different modules, while also asking them to consider a pre-specified substructure that would provide some consistency and permit integration and linkages across modules (1). The substructure was also intended to guide design and implementation of data collection approaches in ways that would allow for flexibility and tailoring to content while adhering to certain guidelines. Substructure guidance was as follows:

- Take contextual factors, such as infrastructure, resources and capacity, population characteristics, lifestyle issues, political system and potential constraints for monitoring into account for participating countries;
- Consider stakeholder needs and actionable pathways when setting priorities for indicators to be assessed;
- Strive for applicability to a wide range of countries, and consistency over time within countries and between countries in order to enable valid comparisons;
- Strive for simplicity in order to be affordable for all countries to conduct on a regular basis;
- Build in strong feedback loops for translating data collected back to policy-makers along with suggestions for practical, achievable steps to make improvements;
- Use a step-wise framework outlining what would be done in the ‘minimal’ (step 1), ‘expanded’ (step 2) and ‘optimal’ (in the sense of the most desirable) (step 3) approaches with respect to decisions such as indicator selection, data sources, stratification and representativeness of sampling.

Highlights of the proposed monitoring framework

Ten articles in this issue present proposed approaches for each module (9,17–25). Each article reviews prior experience with monitoring in the respective domains and proposes approaches to assessing the relevant contexts, sampling elements to be assessed, data collection methods and indicators, and guidance regarding how the data would be analysed and interpreted. Most teams were able to use the recommended step-wise approach, and identify stages or increments with progressive levels of complexity and comprehensiveness. Key features of the proposals are summarized in Table 1.

Conceptual frameworks, processes, rating schemes and standards of good practice were identified in published form and incorporated or were developed as needed. For example, the module assessing public sector policies and actions culminates in a rating process that is based on a previously used Australian model (17). The food composition module proposes a digital, crowd-sourcing approach that is being used in Australia to amass a food composition database of the more than 30,000 food products for sale there (19). The food labelling module takes advantage of internationally recognized definitions in Codex Alimentarius (20), but expands on current practice in labelling regulation by developing a taxonomy to guide capture of additional details that are important for sensitivity to obesity and NCD risk. The population diet quality module draws on existing sources of country-level data on food availability, acquisition and individual food consumption, and explores the usefulness of existing diet quality indicators for the purpose of INFORMAS (9).

All of the modules are affected by certain common challenges or limitations, of which some are inherent to content and processes involved. These include:

- The need to rely on reported rather than objectively measured data for some indicators;
- Difficulty comparing data across countries when collected with a country-specific approach;
- Limitations on the availability or quality of data, overall or for particular subgroups or areas; this is highly relevant to the ability to address equity issues;
- The need to allow standards to evolve, even when they currently exist, to keep pace with more demanding expectations as progress is made;
- Inadequate frequency of data collection to support the desired regular assessments of progress;
- Lack of access to proprietary data about the policies and practices of food companies.

Some of the modules are further affected by particular gaps in the extent of prior experience or resources. For example, methods and resources for assessing children’s exposure to marketing of unhealthy foods are much less well developed for new media (i.e. websites and other digital channels) compared to the wealth of experience and well-developed protocols for assessing exposure through television (21). Tools and data sources for assessing and tracking variations in point of purchase food prices are sorely lacking, and some data that would be potentially useful are not available in a sufficiently disaggregated form to allow for analyses according to the healthiness of specific products (24). Standard approaches for pricing diets are underdeveloped for whole dietary patterns – which are the indicators of most relevance to outcomes (24). Assessments of impact of trade and investment agreements on food environments and health are inherently political and politically sensitive (25), and a relatively unexplored area of research. In addition, some of the modules aim to build new indices, ideally with global applicability (e.g. the Government Healthy Food Environment Policy Index for the public sector module (17); an appropriate diet quality index for the diet quality module (9)) and those will have to be thoroughly tested before broad implementation.
Table 1  Summary of INFORMAS monitoring approaches and implementation considerations for each module

| INFORMAS® module (source article) | Approach | Implementation considerations
|-----------------------------------|----------|-----------------------------|
| **Public sector policies and actions (17)** | • A ‘Government Healthy Food Environment Policy Index’ (Food-EPI) | • The process for assessing government policies and actions draws on experience with a method used to rate government action on obesity prevention in Australia. However, further extensive testing is needed to operationalize the Food-EPI.
| | • Independent monitoring of government policies and actions to improve the healthiness of food environments | • Policy implementation in countries with decentralized policy environments, i.e. differences at local, state and national levels, will be more difficult to assess and will demand greater efforts.
| | • Monitoring will involve a series of steps to describe the country context; identify and collect relevant policy documents; engage with government officials to validate the information gathered; convene independent experts to rate the level of policy implementation in each domain; create a summary score; and provide feedback of results to government officials and other stakeholders | • In some domains, there are no agreed good practice statements to support ratings.
| **Private sector policies and practices (18)** | • Relevant stakeholder groups in each country will select a sample of 15–25 private sector organizations of interest based on high prominence in the country’s food environment | • Theoretically defined good practice statements will change over time to reflect stricter or more refined expectations, and will evolve into best practices or benchmarks.
| | • Three-step typology for levels of data collection for each organization (based on feasibility): | • Relying on publicly available policies only may be misleading.
| | • Step 1: Publicly available, nutrition-related policies; interviews of organizational representatives where possible | • Step 2 is potentially expensive if sales data are used, and will suffer from lack of access to proprietary data. Economies may be possible through use of data from other INFORMAS modules.
| | • Step 2: Objective data on nutrition composition of products, extent and nature of promotion of foods to children, nutrition labelling practices, availability and affordability of products – incorporating sales data, where available | • Differences in impact of private sector policies or practices on socially disadvantaged groups may be very important within countries, and should be assessed when possible.
| | • Step 3: Additional data on other practices that influence food policy and action in an organization’s interest, such as political lobbying and sponsorships | • Practices in step 3 may be covert or at least difficult to document systematically and representatively.
| **Food composition (19)** | • A comprehensive, non-proprietary data set of food composition through large-scale data collection and analysis of the composition of foods available in the country will be created in a four-stage process: 1. Document key statutory, commercial and cultural factors influencing the food supply in the country context using existing records and discussions with stakeholders. 2. Characterize the relative contributions of different food types and sources to population food intake, e.g. numbers and types of different retail outlets; consumption levels of foods grown at home vs. packaged or prepared foods bought in different types and sizes of retail food establishments. 3. Select a sample of retail food outlets that capture the breadth of products available in the country, and collect data on food composition of all foods available in these outlets. 4. Validate the nutritional information collected against direct chemical analyses of a sample of food products | • Understanding the food supply context is critical for setting priorities about how to sample foods, and how to focus data collection to provide information most likely to foster desirable policy changes.
| **Food labelling (20)** | • Core to this approach is a new taxonomy that goes beyond Codex Alimentarius definitions to differentiate the following labelling components: ingredient list, nutrient declarations, supplemental nutrition information, nutrition claims and health claims | • Digital data collection through crowd sourcing greatly increases feasibility, e.g. the Australian FoodSwitch application.
| | • Three-step typology for sampling of products, selection of nutrients to monitor and labelling context: 1. Sampling the food supply based on decisions about what types of foods and stores to survey; step 1 would be for selected food categories in selected retail outlets 2. Specific nutrients and food components to monitor for label information; step 1 would involve only nutrients recommended by Codex Alimentarius for mandatory labelling | • Sales volume data, if available, would enhance understanding of the importance of different food sources.
| | • Labelling context, e.g. type of product, presence or absence of ingredients of interest and presence or absence of various types of nutrient declarations or claims or health claims; step 1 would mean less detailed information on each component | • Most likely to foster desirable policy changes.
| | • Applicable national or international labelling regulations provide the basis for specifying indicators and targets | • This initial approach covers only labelling on food packaging and only foods sold in retail stores.
| | | • Not all components of the taxonomy are covered in Codex Alimentarius; new definitions created for INFORMAS have not been accepted as standard and need to be tested.
| | | • The taxonomy does not account for the type of labelling, i.e. whether verbal, numerical or graphic.
| | | • The same label terms have different meanings in different country settings.
| | | • The approach does not consider the accuracy or validity of the label information or claim.
| | | • Data collection could be tied to methods used to collect food composition data (19)
### Table 1 Continued

| INFORMAS® module (source article) | Approach | Implementation considerations |
|----------------------------------|----------|------------------------------|
| **Food promotion (21)** Monitoring and benchmarking promotion of foods and non-alcoholic beverages to children | • Promotional aspects include amount of exposure and ‘power’ of the promotion. Context assessment would identify the prevalence of various types of media**, their relative prominence in the environment, usage patterns, ongoing databases or monitoring systems that might be relevant, potential data collection resources, and the existence and quality of regulations or voluntary codes of good practice.  
• Three-step typology for sampling of media, time periods and sites, demographic groups and detail of food product classification:  
  - Type of media and promotional aspect; step 1 would sample only one medium of promotion (e.g. television) and a limited number of promotional techniques  
  - Time period and site(s) sampled; step 1 would collect data only for the most representative time periods, locations, and sites and only on selected occasions  
  - Target demographic group; step 1 would focus on younger children’s exposure  
  - Food classification approach; step 1 would use a standardized food product classification | • Aspects of marketing other than promotion (products, availability and price) are covered by other modules  
• Use of a food rather than nutrient-based system for classifying products is recommended  
• Timing of data collection and sampling should account for seasonal and regional variations in consumer behaviour/marketing  
• Data from several localities and regions can be substituted when national data are lacking  
• Data sharing across countries may help identify problematic cross-border media exposure (e.g. through satellites and websites) |
| **Food provision (22)** Monitoring foods and beverages provided and sold in public settings | • Focus on schools to take advantage of extensive experience with development of standards for and monitoring of school foods  
• Contextual considerations include obtaining a complete picture of key nutritional considerations other than obesity/NCD risk, e.g. important micronutrient issues  
• Two components of data collection:  
  - Component I: compiling information on existing policies  
  - Component II: evaluating quality of foods provided against standards  
• Three-step typology for sampling sites and settings and selecting data sources and indicators:  
  - Sampling sites; step 1 would collect data for the most representative locations/sites  
  - Choice of settings; step 1 would focus only on primary and secondary schools (not day cares or pre-schools)  
  - Data sources; step 1 would rely on self-reported data from schools or caterers via telephone and Internet  
  - Indicators; step 1 would collect data only from jurisdictions with nutrition standards or guidelines, and only for two indicators. | • Guidance is provided for adaptation to day care or pre-school settings, universities, hospitals, workplaces and prisons  
• Support from stakeholders will be needed to justify use of public funds for monitoring; monitoring in some settings may be amenable to partnerships with private sector stakeholders  
• Relevance will vary depending on per cent of population consuming meals from institutional sources  
• Assessment is easier when food provision is from centralized sources  
• Availability and type of standards are important; nutrient-only standards may be problematic |
| **Food retail (23)** Monitoring the availability of healthy and unhealthy foods or non-alcoholic beverages in retail food environments | • Monitoring community food environments related to type***, availability and accessibility of retail food outlets in communities  
• Context assessment includes relevant government regulations or industry codes of practice, identifying types of food outlets that are dominant or scarce, and the existence of relevant evidence or data resources (e.g. valid lists of food outlets) and technology (geocoding outlets in geographical information systems)  
• Monitoring consumer food environments relates to availability and location of food products within these outlets  
• Three-step typology for sampling locations or sites: types of outlets, dimensions of the retail food environments, and foods:  
  - Sampling locations/sites; step 1 would collect data for the most representative locations/sites  
  - Types of retail outlets settings; step 1 would collect data only for one type of outlet located within the community food environment, such as supermarkets  
  - Dimensions of food environments; step 1 would assess density of different types of retail outlets as a count per geographic area/population and availability of key food categories as linear shelf space  
  - Foods: step 1 would assess fresh fruits and vegetables and energy-dense, nutrient poor foods | • Assessment of policy actions between rounds of data collection is recommended, e.g. adoption or removal of zoning restrictions or incentives with respect to locating retail food establishments  
• Geographically defined community environments may not align with the effective food environment for consumers who live in the pre-defined area because where people shop varies according to many factors  
• Lists of food outlets commonly used to identify retail food locations in this type of research may be inaccurate or out of date  
• Although methods and instruments for data collection on retail food environments are available for high-income countries, there is little or no experience with data collection for low- and middle-income countries |
| **Food prices (24)** Monitoring retail food prices for healthy and unhealthy foods or whole diets, and affordability of those diets | Focus on monetary costs of food in retail settings. Consider regulatory and policy environments relevant to food prices, including taxation and subsidization, the structure of food pricing and price stability. A three-step data collection approach would seek to identify:  
Step 1 – price differentials of the prices (including any tax components) for healthy and unhealthy products at level of individual foods;  
Step 2 – price differentials for healthy and unhealthy diets (including any tax components);  
Step 3 – add median household income to data from step 2 in order to calculate the affordability of healthy or unhealthy diets. | • No attempt to account for costs associated with time and resources for food preparation or for transportation from the store  
• A standard approach for identifying healthy and unhealthy foods, and for constructing market baskets for healthy and unhealthy diets, must be developed in order to know what foods to sample and how to analyse the price data  
• Some data that would potentially be useful would require disaggregation in order to support monitoring of food prices that can be differentiated on their health-related characteristics  
• Data collection for this module can be tied to data collection for food composition (19) and food labelling (20) |
Communications and knowledge exchange

A wide array of leaders, decision makers and other influential stakeholders in governments, private sector organizations, academic organizations, international agencies, non-governmental organizations and the public at large will be potential INFORMAS audiences or end-users (26). Communicating effectively with these audiences is a core part of the monitoring strategy – to guide data collection priorities, convey findings and motivate their use, to learn about ways that findings are used to support action and the results of any actions taken.

The communications strategy for INFORMAS will use multiple, audience-tailored and targeted approaches to dissemination of findings about key processes and impacts, and make both source data and analyses publicly available to foster transparency and credibility. As described in
the article by Brinsden et al. (26), these approaches are consistent with insights from a scan of strategies used to disseminate performance indicators in various fields of public health. Of interest, although a rating/benchmarking approach such as that proposed for INFORMAS is quite common, the follow-through to evaluate uptake and resulting impacts is not common. INFORMAS communications will be bidirectional, iterative and results oriented.

Implications and future directions

Development of the INFORMAS methodology required initial and then much more detailed deconstruction of the ‘food environment’ into measurable components and inter-relationships. In this sense, the INFORMAS framework is both a situation analysis and a research and policy agenda with respect to food-related drivers of obesity and NCDs. The overarching implication is that if we are serious about reducing obesity and other diet-related NCD risks, we will have to become serious about characterizing the food environments that influence these risks in ways that can catalyse positive changes in the food sector. In this case, the ‘we’ refers to potential influential end-users of INFORMAS who are most committed to or accountable for the reduction of obesity and NCDs, or who are motivated to contribute to the effort to avoid losses of financial or political capital. These stakeholders include national governments, international agencies, academic centres or research teams, certain civil society organizations, including advocacy organizations (27), and some parts of the private sector (18,26).

The development of INFORMAS is aspirational in that it is based on the need for a global monitoring and benchmarking system with the expectation that setting out the agenda and using the best available approaches will increase awareness of specific data needs and lead to improvements in data availability and quality over time. We expected, and have observed, that some modules would be more amenable than others to robust specification, but we did not deliberately constrain the framework by a priori determinations that some areas would be too complex or difficult. Instead, we considered that starting somewhere would be better than leaving important questions unasked, and that using a step-wise approach helps with delineating the current possibilities as well as challenges and future opportunities.

The success of INFORMAS will depend on our ability to overcome some key challenges. One challenge for INFORMAS is to be convincing, particularly to potential funders in both the near and long term, about the need to continue to collect data, and to become institutionalized. This requires overall coordination and module-specific implementation activities – beginning with formal protocol specification and piloting, testing the framework by implementing the set of models in trial sites, as well as translating and disseminating the evidence to potential end-users (26). Once underway, a related challenge is that of proving to key change agents that INFORMAS is useful, i.e. by providing data that integrate well across domains of the framework, will link directly to questions for which influential stakeholders need answers and generally provide evidence users are looking for with respect to a specific case. INFORMAS must also be timely and keep current with issues as they evolve. Further challenges include building the capacity in many low- and middle-income countries to undertake this monitoring and advocacy work, and exploring how sustainability and equity dimensions could be incorporated into measures of the healthiness of food environments, where appropriate.

Ideally, the situation 10 years from now would show routine INFORMAS monitoring in place in most countries, at a rudimentary (step 1) level at least, with representative countries having the full set of ‘minimal’ (step 1) data and some having ‘expanded’ or ‘optimal’ levels of monitoring as described in the respective modules. A regular frequency of data collection and progress reporting would be adopted. Extensive uses of the data would be identifiable in various documents and case examples. Protocols would be more refined and more feasible. The entire system would be institutionalized and a program of systems-oriented analyses would be undertaken to paint pictures of progress in improving food environments for obesity and NCD prevention at global as well as country and regional levels. True success will arrive when INFORMAS data are linked to data on obesity and NCD outcomes to identify what is working and not working, as well as evaluate critical pathways for priority interventions.

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Conflicts of interest

The author declares that she has no competing interests.

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