FOOD SYSTEMS MODELING:
Mexico Case Study

wbcsd

FReSH

1. Introduction

Food systems are not performing well today: 800 million people worldwide are hungry, two billion people are deficient in essential vitamins or minerals, and two billion people are overweight or obese. Furthermore, food systems are driving environmental impacts such as biodiversity and soil loss, water scarcity and greenhouse gas emissions. Finally, more than half of the people who live in extreme poverty work in agriculture.

The Food and Agriculture Organization of the United Nations (FAO) defines food systems as "all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes."

Piecemeal action by individual stakeholders isn't enough to improve food systems; a comprehensive system-wide approach involving all relevant stakeholders is required for change. Systemic analysis that includes system modelling, which can enable a better understanding of interactions in the system, is thus essential.

It's with this in mind that Food Reform for Sustainability and Health (FReSH) has commissioned food system modeling work, applying it first to the Mexican food system based on the most recent data available (2015 and 2016). This system approach has allowed us to better understand the role that business can play in the food system, and it has enabled the identification of hotspots where private sector interventions can make the most difference.

This summary provides a food system modeling approach that can be used by the private sector and wider stakeholders to promote the use of similar approaches for intervention planning towards better food production and consumption.

The assessment draws a simplified picture of the different food systems in Mexico. Where particularly relevant, we explicitly highlight differences between regions – which are notably linked to differences in climate, socio-cultural structures, etc. However, much of the data required for food system modeling is available only at the national scale.

2. The Model

The food system model consists of three steps:

1

Food system description

The first step describes the food system by means of a map with social, economic, and ecological variables. Arrows describe the interactions between the variables. For instance, an increase in food crop prices improves farmer profitability but reduces consumer demand.

2

### Identification of hotspots

The second step is the identification of hotspots. Several external databases contain food system performance indicators. These databases are used to better understand the functioning of a food system and allow for the identification of hotspots or failures in the food system. For instance, widespread obesity is a hotspot or failure in the Mexican food system.

3

Identification of relevant leverage points or interventions

In the third step, an interactive workshop brings together relevant stakeholders to analyze the hotspots, map the system and identify relevant leverage points or interventions that could enable the food system to move to a more desirable state.

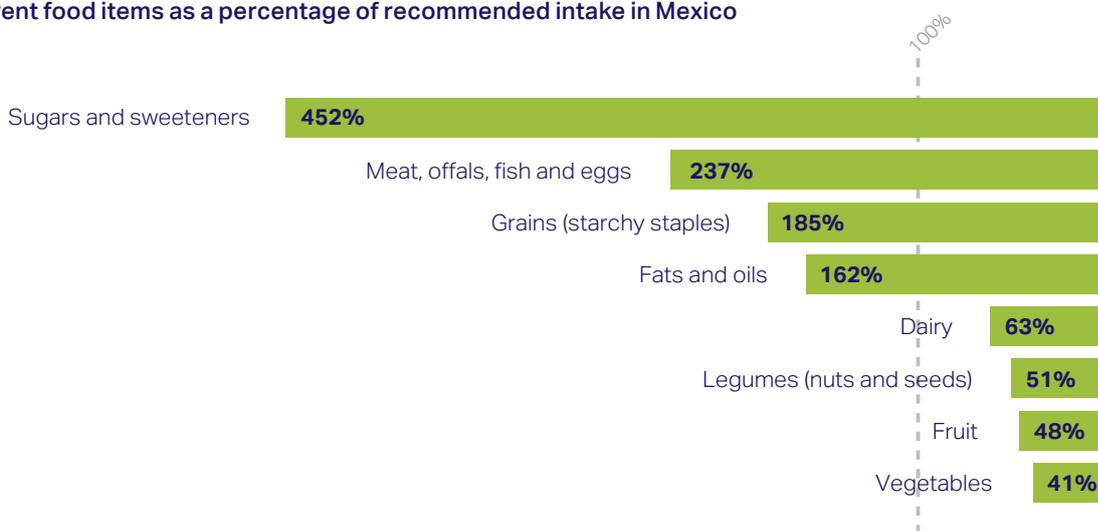**Figure 1:** Generic food system map
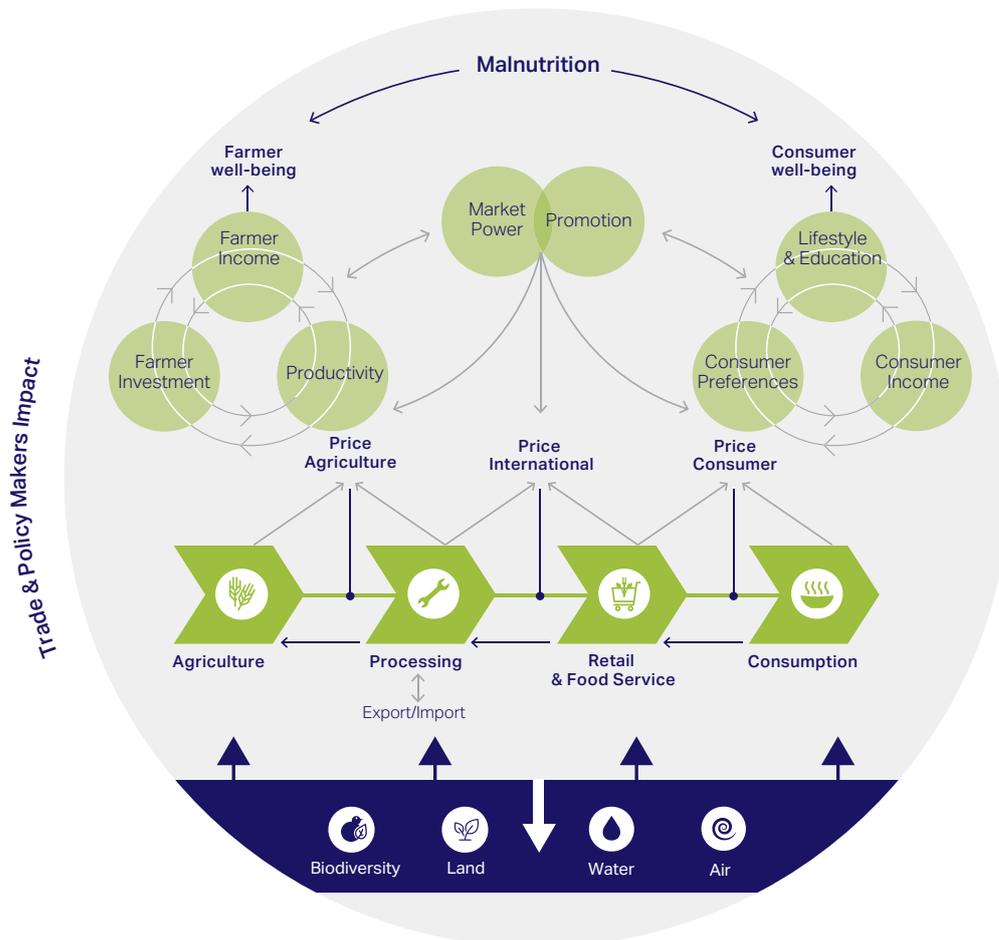
3. Results

**The analysis for Mexico identified eight hotspots.
These can be classified into three broad categories:**

A workshop organized in Mexico City enabled the stakeholders to identify the most meaningful interventions to address the hotspots.

Land use

In the land use category, participants highlighted the importance of policy frameworks. The prices that farmers can obtain for their products are very low due to the trade agreements that Mexico has with other countries. A possible intervention would be to reduce the agricultural policy support that is provided on a hectare basis and replace it with more targeted support for smallholder farmers. Furthermore, smallholder farmers would also greatly benefit from improved access to credit. Multinational companies could play a role in making this happen.

Consumer diets and habits

In the consumer diets and habits category, participants identified sugar intake as a threat to the Mexican food system (and, by extension, to the healthcare system and society as a whole). Sugar-sweetened beverages contribute to almost 70% of sugar intake in the population, leading to widespread weight problems and obesity. Product reformulation (sugar reductions) could play a major role, while education could help change consumer behavior. Furthermore, participants identified street vendors as important actors in the food system because people are increasingly eating out of home. Training courses in healthy food preparation for street vendors could help change people's preferences in the longer term.

Costs of a healthy diet

Finally, in the costs of a healthy diet category, participants discussed the difficulty that the poor populations in Mexico have in affording high-quality food and nutrition. The group identified supply chain costs as important drivers of food prices, in particular for perishable fruit and vegetables that are an important part of healthy diets. They identified the shortening of supply chains (consuming local products) for perishable ingredients as a promising intervention to make healthy diets more affordable. Furthermore, food companies should specifically aim to deliver affordable healthy food products to poor consumers in Mexico. This could include specific healthy products in small portion sizes.

Figure 2: Intake of different food items as a percentage of recommended intake in Mexico

| Food item	Percentage
Sugars and sweeteners	452%
Meat, offals, fish and eggs	237%
Grains (starchy staples)	185%
Fats and oils	162%
Dairy	63%
Legumes (nuts and seeds)	51%
Fruit	48%
Vegetables	41%

4. Outlook

The food system modeling approach has enabled us to better understand the functioning of the Mexican food system and has highlighted the importance of using a multistakeholder approach to improve it. We identified several interventions where the private sector or civil society can lead; other interventions require policy change.

The approach tested in Mexico paves the way for various stakeholder groups in the country to develop prioritized and focused interventions in order to make food system reform a reality.

Similar food system modeling may be replicated in other countries before the development of any intervention to ensure maximum impact and minimum trade-offs.

FReSH is currently exploring collaborations with other organizations that could help enable future food system modeling workshops.

Figure 3: Workshop outcomes on levers for health and sustainability
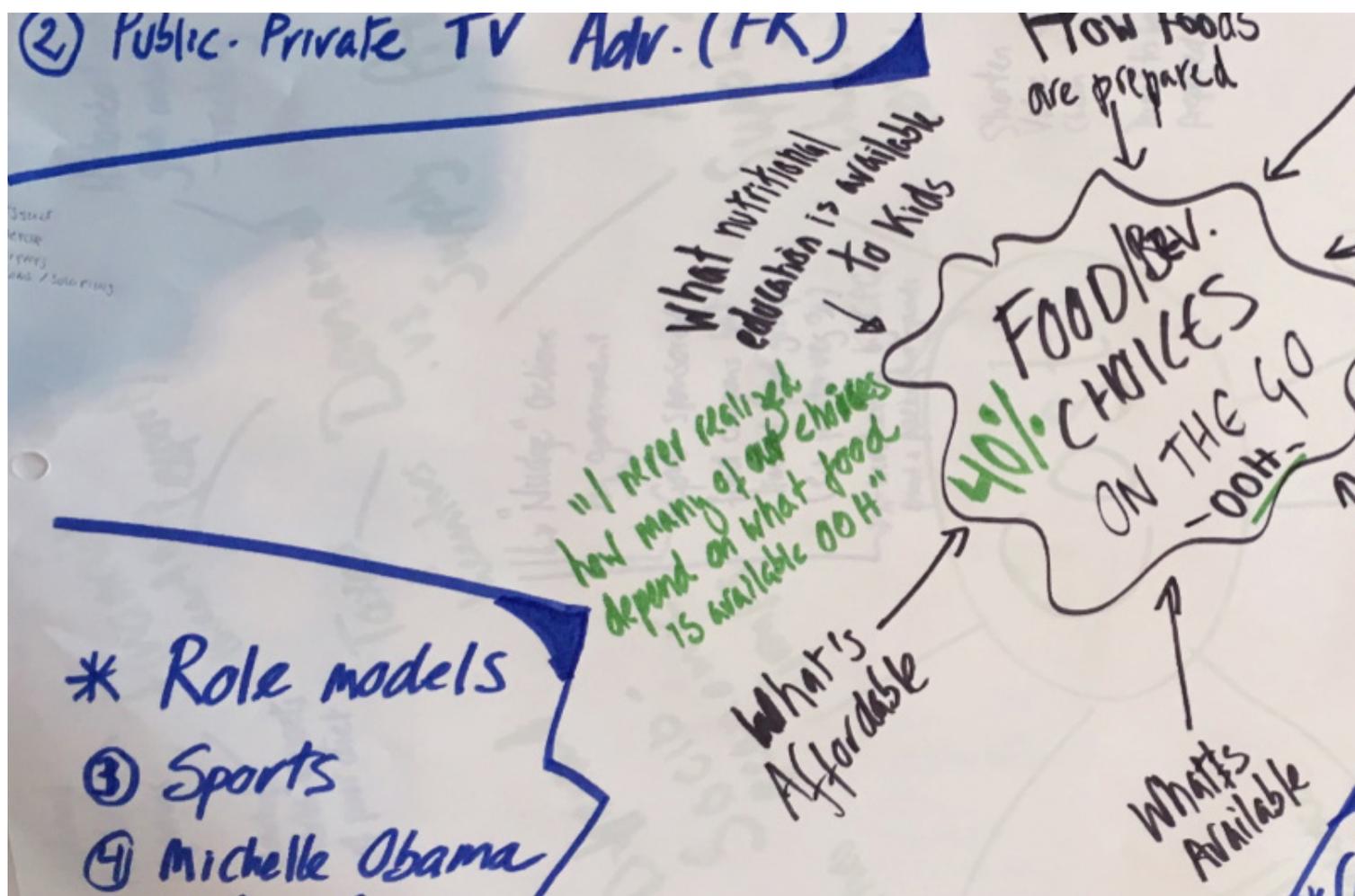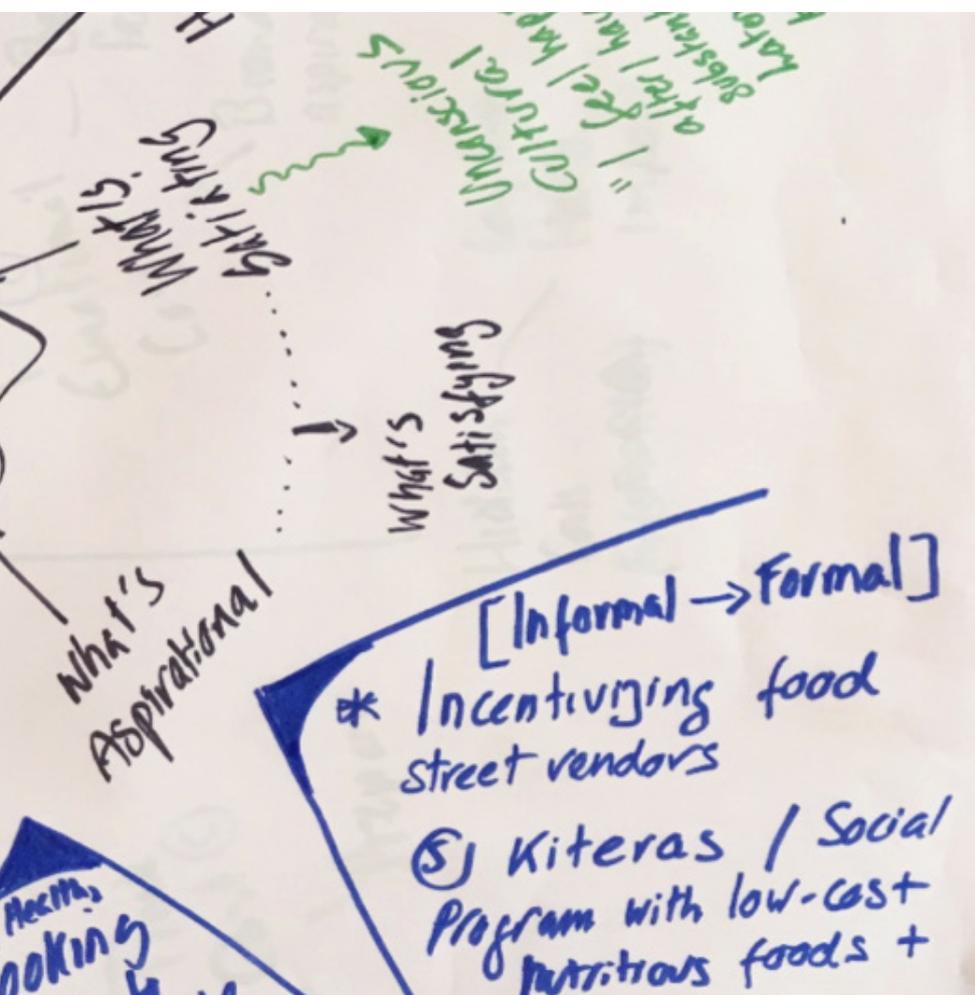
5. Food System Modeling Toolkit

Describe the Food System	Identify Hotspots	Discuss Leverage Points & Interventions
FAO Food Balance Sheets (FBS)	Food Sustainability Index (by EIU)	Organized in local multi-stakeholder roundtables on site
	Global Food Security Index (by EIU)	

The Food System Modeling approach can be applied to other food systems beyond Mexico.

The exact procedure is described in the technical report, the below toolkit links to the most important data sources.

The Food System Modeling approach proceeds in three steps. The first and second step can be done by a single organization or researcher, the third step requires roundtables together with multiple stakeholders and is not covered in the toolkit – further details can be found in the technical report.

6. About FReSH

FReSH (Food Reform for Sustainability and Health) is one of the key initiatives of the WBCSD's effort to drive the transformation of the food system and to create a set of business solutions for industry change.

We take a 'fork to farm' approach, starting with what people consume and focusing on the dietary and production shifts that are required, to develop, implement and scale transformative business solutions that are aligned with science-based targets. FReSH emerged from the World Business Council for Sustainable Development (WBCSD) and EAT Partnership.

WBCSD is a global, CEO-led organization of over 200 leading businesses and partners working together to accelerate the transition to a sustainable world. WBCSD helps make its member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

This report is released in the name of WBCSD. Like other WBCSD publications, it is the result of a collaborative effort by WBCSD staff, experts, and executives from member companies. A wide range of members reviewed drafts, thereby ensuring that the document broadly represents the perspective of the WBCSD membership. It does not mean, however, that every member company agrees with every word.

EAT is a non-partisan, non-profit organization devoted to fixing the global food system. The challenges we face are complex and intimately intertwined. Thus, our actions must be integrated across sectors, disciplines and countries. Inviting different perspectives to be part of the conversation is necessary to develop holistic solutions.

The views and opinions expressed by our programs, partners and our event participants are their own and do not necessarily represent those of EAT, nor do they represent an endorsement by EAT of any company, service or product.

We conducted this food system modelling work in collaboration with

KU LEUVEN