Exploring Health and Environmental Costs of Food

Leslie Pray, Laura Pillsbury, and Maria Oria

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Exploring Health and Environmental Costs of Food

Workshop Summary

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Rapporteurs

Food and Nutrition Board

Board on Agriculture and Natural Resources

INSTITUTE OF MEDICINE AND
NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES
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Willing is not enough; we must do.”
—Goethe
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1 Institute of Medicine planning committees are solely responsible for organizing the workshop, identifying topics, and choosing speakers. The responsibility for the published workshop summary rests with the workshop rapporteurs and the institution.
Reviewers

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council’s Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published workshop summary as sound as possible and to ensure that the workshop summary meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this workshop summary:

John Blanton, Agricultural Research Programs Manager, The Samuel Roberts Noble Foundation, Ardmore, OK
James K. Hammitt, Professor of Economics and Decision Sciences, Center for Risk Analysis, Harvard University, Boston, MA
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Although the reviewers listed above have provided many constructive comments and suggestions, they did not see the final draft of the workshop summary before its release. The review of this workshop summary was overseen by John W. Erdman, Jr., University of Illinois at Urbana–Champaign. Appointed by the Institute of Medicine, he was responsible for making certain that an independent examination of this workshop summary was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this workshop summary rests entirely with the authors and the institution.
# Contents

## 1 INTRODUCTION
- Organization of This Report 1-1
- References 1-3

## 2 THE ECONOMICS OF FOOD PRICES
- Determining the Market Price of Food 2-1
- The Concept of Externalities: Costs and Benefits Not Reflected in Market Prices 2-3
- Things to Keep in Mind About the External Costs of Food 2-3
- Questions 2-4
- References 2-5

## 3 UNDERSTANDING MEASURES AND STRATEGIES
- Life Cycle Assessment 3-2
- Health Impact Assessment 3-7
- Environmental Consequences 3-10
- Public Health Consequences 3-12
- References 3-16

## 4 EXAMINING SOCIAL AND ECOLOGICAL COSTS AND BENEFITS
- Agricultural Ecosystem Services and the Costs of Food Production 4-2
- Impact of the Food System on Health Inequalities 4-4
- Accessibility to Food 4-6
- Animal Welfare 4-8
- References 4-12

## 5 ATTACHING VALUE TO COSTS AND BENEFITS
- Lessons from the *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use* 5-1
- Valuing Agricultural Externalities and Public Health Impacts 5-9
- References 5-12

## 6 EXPLORING COSTS AND BENEFITS
- Effects of Food Production, Processing, and Consumption on GHG Emissions and Energy Use 6-2
- Soil, Water, and Other Environmental Consequences of Food Production, Processing, and Consumption 6-5
- Consequences of Antimicrobial Use in Agriculture 6-7
1
Introduction

The U.S. food system provides many benefits, not the least of which is a safe, nutritious, and consistent food supply. However, the same system also creates significant environmental, public health, and other costs that generally are not recognized and not accounted for in the retail price of food. These include greenhouse gas (GHG) emissions (Gonzalez et al., 2011); soil erosion, air pollution, and other environmental consequences (Heller and Keoleian, 2003; Wolf et al., 2011); the transfer of antibiotic resistance from food animals to humans (Hayes et al., 2011); and other human health outcomes, including foodborne illnesses and chronic disease (Heller and Keoleian, 2003). Some of these external costs (i.e., external to the food system), which are also known as externalities, are accounted for (“internalized”) in ways that do not involve increasing the price of food (see Box 1-1). But many are not. They are borne involuntarily by society at large (Tegtmeier and Duffy, 2004). A better understanding of external costs would help decision makers at all stages of the life cycle to expand the benefits of the U.S. food system even further. The Institute of Medicine (IOM) and National Research Council (NRC), with support from the U.S. Centers for Disease Control and Prevention (CDC), convened a public workshop on April 23-24, 2012, to explore the external costs of food, methodologies for quantifying those costs, and the limitations of the methodologies.

The workshop was intended to be an information-gathering activity only. Given the complexity of the issues and the broad areas of expertise involved, workshop presentations and discussions represent only a small portion of the current knowledge and are by no means comprehensive. The focus was on the environmental and health impacts of food, using externalities as a basis for discussion and animal products as a case study (i.e., specifically beef, poultry, pork, and dairy). The intention was not to quantify costs or benefits, rather lay the groundwork for doing so. A major goal of the workshop was to identify information sources and methodologies required to recognize and estimate the costs and benefits of environmental and public health consequences associated with the U.S. food system (see Box 1-2). It was anticipated that the workshop would provide the basis for a follow-up consensus study of the

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1 This workshop was organized by an independent planning committee whose role was limited to designing the workshop program and identifying goals, topics, and speakers. This workshop summary has been prepared by the rapporteurs as a factual summary of the presentations and discussions that took place at the workshop. Statements, recommendations, and opinions expressed are those of individual presenters and participants and are not necessarily endorsed or verified by the Institute of Medicine or the National Academies; they should not be construed as reflecting any group consensus.
subject and that a central task of the consensus study will be to develop a framework for a full-scale accounting of the environmental and public health effects for all food products of the U.S. food system.

Nor was the intention to make any recommendations or suggest policies. Rather, again, it was to lay the groundwork for future efforts. According to Anne Haddix, senior policy advisor at CDC’s National Center for Disease Prevention and Health Promotion, the hope is that a framework can be built that will help to identify novel strategies for dealing with food system-related public health problems, such as obesity, in ways that are not only healthful, but also environmentally sound and economically productive. Currently, no framework is available for analyzing in a comprehensive and systematic way how the food system impacts public health. Although the CDC’s initial intention was to focus on public health, Haddix described the food system as being so complex and interactive that it is impossible to separate the health consequences of the food system from environmental, economic, social justice, and other consequences. Thus, the workshop planning committee invited a diverse group of experts and stakeholders to participate in the discussion, including economists, farmers, environmental and agricultural scientists, and public health experts. Their expertise spanned the entire course of the food life cycle.

Given the diversity of perspectives, numerous challenges and complexities regarding the types of information sources and methodologies available to measure the health and environmental costs and benefits associated with the U.S. food system were identified over the course of the workshop. Some participants questioned the rationale for conducting a full-scale accounting of the costs of food and whether another approach might be more feasible. They also stressed that all costs are relative because all food and agricultural systems are dependent on the natural environment; therefore, such an exercise would need to undertake comparisons of alternative food system activities or practices. The heterogeneity of landscapes and management practices among sites only complicates this endeavor, as emphasized by many workshop participants. Participants also expressed varying opinions about the limitations of framing the analysis in terms of externalities. Several other issues were noted, including the broad range of external costs and benefits that were not included in the focus of the workshop; the lack of sufficient data; the importance of considering all stages of the food life cycle; the risks associated

**BOX 1-1**

**Externality as Defined by Individual Speakers**

Katherine Smith defined externality as

>a cost or benefit not transmitted through prices that is incurred by a party who did not agree to the action causing the cost or benefit.


>**An externality, which can be positive or negative, is an activity of one agent (for example, an individual or an organization, such as a company) that affects the well-being of another agent and occurs outside the market mechanism.**
with simplifying assumptions about the effects and the inability of models to capture the heterogeneity among how food is produced; the variability in the degree of certainty around the magnitude of some effects; and the numerous unanswered questions about the methodologies discussed for quantifying health, environmental, and other effects. Many of these overarching issues are discussed in greater detail in Chapter 7.

By bringing together a wide range of experts, however, the workshop was able to forge connections across subjects that typically are discussed as though they are distinct from one another. The diversity of perspectives and experiences represented among the participants allowed for this workshop to become an important first step in illuminating the range of expertise, methodologies, and information sources that would need to be included in future explorations of the topic.

ORGANIZATION OF THIS REPORT

The organization of this report roughly parallels the organization of the workshop itself (see the agenda in Appendix A). Chapter 2 addresses the economics of food prices and considerations for valuing food. Chapter 3 summarizes the Session 1 presentations on measures and strategies for estimating the external environmental and health impacts of food. Speakers

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considered the opportunities and limitations of several methodologies: life cycle analysis (LCA), health impact assessment, cost-benefit analysis, multidimensional impact assessment and modeling, and risk assessment. Although the focus of the workshop was on environmental and health costs, a panel session on the social and ecological dimensions of the food supply was held to explore some of the broader impacts. Speakers discussed ecosystem services and disservices, health inequalities, accessibility to food, and animal welfare. Chapter 4 summarizes that panel session. Chapter 5 summarizes the two presentations that focused on methodologies and limitations of attaching monetary value to costs and benefits.

Chapters 6 and 7 summarize group discussion that occurred throughout the course of the workshop, including discussion that occurred during the small working group portion of the workshop. About one-third of the workshop time was spent in small working groups. There were four working groups: energy usage and GHG emissions; soil, water, and other environmental consequences; consequences of antimicrobial use in agriculture; and other public health consequences. The groups were asked to identify effects, methodologies for measuring those effects, and limitations of the methodologies. Chapter 6 includes a summary of these working group discussions. Chapter 7 provides an overview of the major overarching themes from all the open discussions that occurred throughout the workshop, including participants’ reflections on key considerations for moving forward with future work in this area.

This workshop summary was prepared by the rapporteurs as a factual summary of the presentations and discussions that took place during the workshop. Neither the workshop nor this summary were intended to be exhaustive explorations of the subject. None of the material summarized here should be construed as reflecting group consensus. For an explanation of key terms used throughout this workshop summary, please refer to Box 1-3.
**INTRODUCTION**

**BOX 1-3**

*Key Terms Used in This Report*

**End-of-life:** In the context of LCA, end-of-life refers to the stage of the product after preparation and consumption by the consumer. At this stage, the food product is disposed of in some manner (e.g., recycled or placed in a landfill).

**Health impact assessment (HIA):** HIA is not a single method, but rather a systematic process that uses a wide array of data sources, analytical methods, and stakeholder input to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population.

**Life cycle assessment (LCA):** In the context of the food system, LCA is a tool for examining the environmental impact of a product that covers the impacts of manufacturing, of the upstream production chain (e.g., material extraction, fuels, transportation, etc.) and downstream disposal (e.g., recycling, landfilling, etc.). According to Heller and Keolian (2003), “a product life cycle approach provides a useful framework for studying the links between societal needs, the natural and economic processes involved in meeting these needs, and the associated environmental consequences.”

**Life cycle stages:** For a food product, the following life cycle stages are considered in the context of economic, social, and environmental sustainability indicators: the origin of the product; agricultural and production conditions; processing, packaging, and distribution of the product; preparation and consumption by the consumer; and the end-of-life of the product (Heller and Keolian, 2003).

**REFERENCES**


