

2013



THE STATE OF FOOD AND AGRICULTURE



FOOD SYSTEMS FOR BETTER NUTRITION



Photos on front cover and page 3: *FAO Mediabase.*



FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org.

2013

**THE STATE
OF FOOD
AND
AGRICULTURE**

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

ISBN 978-92-5-107671-2 (print)
E-ISBN 978-92-5-107672-9 (PDF)

© FAO 2013

FAO encourages the use, reproduction and dissemination of material in this information product. Except where otherwise indicated, material may be copied, downloaded and printed for private study, research and teaching purposes, or for use in non-commercial products or services, provided that appropriate acknowledgement of FAO as the source and copyright holder is given and that FAO's endorsement of users' views, products or services is not implied in any way.

All requests for translation and adaptation rights, and for resale and other commercial use rights should be made via www.fao.org/contact-us/licence-request or addressed to copyright@fao.org.

FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org.

Contents

Foreword	v
Acknowledgements	vi
Abbreviations and acronyms	viii
Executive summary	ix
Food systems for better nutrition	1
1. The role of food systems in nutrition	3
Why is nutrition important?	4
Why focus on food systems to address malnutrition?	6
Food systems and nutrition opportunities	7
Cross-cutting issues in nutrition-sensitive food systems	9
Knowledge and information gaps	11
Structure of the report	12
2. Malnutrition and changing food systems	13
Malnutrition concepts, trends and costs	13
Food system transformation and malnutrition	20
Conclusions and key messages	24
3. Agricultural production for better nutrition	26
Making food more available and accessible	26
Making food more diverse	30
Making food more nutritious	33
Conclusions and key messages	36
4. Food supply chains for better nutrition	37
Transformation of food supply chains	37
Enhancing nutrition through food supply chains	42
Conclusions and key messages	47
5. Helping consumers achieve better nutrition	49
Food assistance programmes for better nutrition	49
Nutrition-specific food price subsidies and taxes	52
Nutrition education	54
Conclusions and key messages	59
6. Institutional and policy environment for nutrition	61
Building a common vision	61
Better data for better policy-making	65
Effective coordination is essential	65
Key messages of the report	67
Statistical annex	69
Notes for the annex table	71
ANNEX TABLE	73
References	83
Special chapters of <i>The State of Food and Agriculture</i>	98

TABLES

1. Disability-adjusted life years in 1990 and 2010, by malnutrition-related risk factor, population group and region	18
2. Biofortified staple food crops implemented by the HarvestPlus programme and actual or expected release year	35

BOXES

1. Sustainable production and consumption	4
2. The importance of animal-source foods in diets	11
3. The urban–rural malnutrition divide	14
4. Limitations of using the body mass index in measuring excessive body fat	17
5. The first thousand days	29
6. Increasing dietary diversity through home gardens	31
7. Improving child nutrition in small-scale pastoral food systems	32
8. Improving livelihoods and nutrition throughout the bean value chain	43
9. Food processing, preservation and preparation in the home and micronutrient intakes	45
10. The Grameen Danone Partnership	46
11. Guiding principles for improving nutrition through agriculture	62
12. Nutrition governance at the international level	63

FIGURES

1. Food system interventions for better nutrition	8
2. Prevalence of stunting, anaemia and micronutrient deficiencies among children, by developing region	16
3. Prevalence of overweight and obesity among adults, by region	17
4. The multiple burdens of malnutrition	21
5. The food system transformation	22
6. Share of countries in each malnutrition category, by level of agricultural productivity	22
7. Share of countries in each malnutrition category, by degree of urbanization	23
8. Modern and traditional retail outlet shares of fresh fruit and vegetable market in selected countries	39
9. Retail sales of packaged food, by region	39
10. Modern and traditional retail outlet shares of fresh fruit and vegetable market and packaged food market in selected countries	40

Foreword

As the world debates the Post-2015 Development Agenda, we must strive for nothing less than the eradication of hunger, food insecurity and malnutrition. The social and economic costs of malnutrition are unconscionably high, amounting to perhaps \$US3.5 trillion per year or \$US500 per person globally. Maternal and child malnutrition still impose a larger burden than overweight and obesity, although the latter is increasing even in developing regions. The challenge for the global community, therefore, is to continue fighting hunger and undernutrition while preventing or reversing the emergence of obesity.

This edition of *The State of Food and Agriculture: Food systems for better nutrition* makes the case that good nutrition begins with food and agriculture. Food systems around the world are diverse and changing rapidly. Food systems have become more industrial, commercial and global, unleashing processes of productivity growth, economic development and social transformation being felt around the world. These processes have profound implications for diets and nutritional outcomes.

Commercialization and specialization in agricultural production, processing and retailing have enhanced efficiency throughout the food system and increased the year-round availability and affordability of a diverse range of foods for most consumers in the world. At the same time, concerns are mounting about the

sustainability of current consumption and production patterns, and their implications for nutritional outcomes.

Food systems must ensure that all people have access to a diverse range of nutritious foods and to the knowledge and information they need to make healthy choices. The contributions of food and agriculture to nutritional outcomes through production, prices and incomes are fundamental and must not be neglected, but food systems as a whole can contribute much more. This report identifies a number of specific actions that can be taken to improve the contribution of food systems to better nutrition. At the same time, reductions in food and nutrient losses throughout the food system can enhance both environmental sustainability and nutrition.

Food system strategies for nutrition are often contrasted with those that rely on medically based interventions such as vitamin and mineral supplements. Although food supplements can address specific dietary deficiencies, a nutritious diet ensures that people get the whole complex of nutrients they need and thus is the only approach that addresses all forms of malnutrition. What is more, food system strategies further recognize the social, psychological and cultural benefits that come from enjoying a variety of foods. Malnutrition is a complex problem that requires integrated action across sectors, but good nutrition must begin with food and agriculture. This report helps point the way.



José Graziano da Silva
FAO DIRECTOR-GENERAL

Acknowledgements

The State of Food and Agriculture 2013 was prepared by members of the Agricultural Development Economics Division (ESA) of FAO under the overall leadership of Kostas Stamoulis, Director; Keith Wiebe, Principal Officer; and Terri Raney, Senior Economist and Chief Editor. Additional guidance was provided by Barbara Burlingame, Principal Officer; James Garrett, Special Advisor; and Brian Thompson, Senior Officer of the Nutrition Division (ESN); David Hallam, Trade and Markets Division (EST); Jomo Kwame Sundaram, Assistant Director-General, Economic and Social Development Department (ADG-ES) and Daniel Gustafson, Deputy Director-General (Operations).

The research and writing team was led by André Croppenstedt and included Brian Carisma, Sarah Lowder, Terri Raney and Ellen Wielezyski (ESA); and James Garrett, Janice Meerman and Brian Thompson (ESN). The statistical annex was prepared by Brian Carisma under the supervision of Sarah Lowder, ESA. Additional inputs were provided by Aparajita Bijapurkar and Andrea Woolverton (ESA); Robert van Otterdijk, Rural Infrastructure and Agro-Industries Division (AGS); and Alexandre Meybeck, Agriculture and Consumer Protection Department (AGD).

The report was prepared in close collaboration with Janice Albert, Leslie Amoroso, Juliet Aphane, Ruth Charrondiere, Charlotte Dufour, Florence Egal, Anna Herforth, Gina Kennedy, Warren Lee, Ellen Muehlhoff, Valeria Menza, Martina Park and Holly Sedutto, all from (ESN); and *The State of Food and Agriculture* Focal Points: Daniela Battaglia, Animal Production and Health Division (AGA); Alison Hodder and Remi Kahane, Plant Production and Protection Division (AGP); David Kahan, Office of Knowledge Exchange, Research and Extension (OEK); Florence Tartanac and Anthony Bennett (AGS); Julien Custot and Jonathan Reeves, Climate, Energy and Tenure Division (NRC); Karel Callens, South-South and Resource Mobilization Division (TCS); Neil Marsland and Angela

Hinrichs, Emergency and Rehabilitation Division (TCE); Maxim Lobovikov and Fred Kafeero, Forestry Economics, Policy and Products Division (FOE); Benoist Veillerette, Investment Centre Division (TCI); John Ryder, Fisheries and Aquaculture Policy and Economics Division (FIP); Eleonora Dupouy and David Sedik, Regional Office for Europe and Central Asia (REUT); Fatima Hachem, Regional Office for the Near East (FAORNE); David Dawe and Nomindelger Bayasgalanbat, Regional Office for Asia and the Pacific (FAORAP); Solomon Salcedo, Regional Office for Latin America and the Caribbean (FAORLC); and James Tefft, Regional Office for Africa (FAORAF). Additional inputs and reviews were provided by Jesús Barreiro-Hurlé, Juan Carlos García Cebolla, Maarten Immink, Joanna Jelensperger, Panagiotis Karfakis, Frank Mischler, Mark Smulders and Keith Wiebe (ESA); Terri Ballard, Ana Moltedo and Carlo Cafiero, Statistics Division (ESS); and Christina Rapone, Elisenda Estruch and Peter Wobst, Gender, Equity and Rural Employment Division (ESW).

External background papers and inputs were prepared by Christopher Barrett, Miguel Gómez, Erin Lentz, Dennis Miller, Per Pinstrup-Andersen, Katie Ricketts and Ross Welch (Cornell University); Bruce Traill (Reading University); Mario Mazzocchi (University of Bologna); Robert Mazur (Iowa State University); Action Contre la Faim/ACF-International; Save the Children (UK); Manan Chawla (Euromonitor); and Stephen Lim, Michael MacIntyre, Brittany Wurtz, Emily Carnahan and Greg Freedman (University of Washington).

The report benefited from external reviews and advice from many international experts: Francesco Branca, Mercedes de Onis, Marcella Wüstefeld and Gretchen Stevens, World Health Organization (WHO); Corinna Hawkes (World Cancer Research Fund International); Howarth Bouis and Yassir Islam (HarvestPlus); John McDermott, Agnes Quisumbing and Laurian Unnevehr, International Food Policy Research Institute

(IFPRI); Lynn Brown and Saskia de Pee, World Food Programme (WFP); Jennie Dey de Pryck, Mark Holderness and Harry Palmier, Global Forum on Agricultural Research (GFAR); Delia Grace, International Livestock Research Institute (ILRI); and Marie Arimond (University of California at Davis).

Michelle Kendrick, Economic and Social Development Department (ES), was responsible for publishing and project management. Paola Di Santo and Liliana

Maldonado provided administrative support and Marco Mariani provided IT support throughout the process. We also gratefully acknowledge the support in organizing the technical workshop offered by David Hallam and organized by Jill Buscemi-Hicks, EST. Translations and printing services were provided by the FAO Meeting Programming and Documentation Service (CPAM). Graphic design and layout services were provided by Omar Bolbol and Flora Dicarolo.

Abbreviations and acronyms

BMI	body mass index
CONSEA	National Council for Food Security (Conselho Nacional de Segurança Alimentar e Nutricional)
DALY	disability-adjusted life year
EU	European Union
GDP	gross domestic product
HFP	Homestead Food Production (project)
IFPRI	International Food Policy Research Institute
MCLCP	Roundtable for Poverty Reduction (Mesa de Concertación para la Lucha Contra la Pobreza)
MDG	Millennium Development Goal
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OFSP	orange-fleshed sweet potato
R&D	research and development
REACH	Renewed Efforts Against Child Hunger and undernutrition
SUN	Scaling Up Nutrition
UN	United Nations
UNICEF	United Nations Children's Fund
UNSCN	United Nations Standing Committee on Nutrition
VAC	Vuon, Ao, Chuong (Crop farming, Aquaculture, Animal husbandry)
WFP	World Food Programme
WHO	World Health Organization
WIC	Supplemental Nutrition Program for Women, Infants, and Children (United States of America)

Executive summary

Malnutrition in all its forms – undernutrition, micronutrient deficiencies, and overweight and obesity – imposes unacceptably high economic and social costs on countries at all income levels. *The State of Food and Agriculture 2013: Food systems for better nutrition* argues that improving nutrition and reducing these costs must begin with food and agriculture. The traditional role of agriculture in producing food and generating income is fundamental, but agriculture and the entire food system – from inputs and production, through processing, storage, transport and retailing, to consumption – can contribute much more to the eradication of malnutrition.

Malnutrition imposes high costs on society

FAO's most recent estimates indicate that 12.5 percent of the world's population (868 million people) are undernourished in terms of energy intake, yet these figures represent only a fraction of the global burden of malnutrition. An estimated 26 percent of the world's children are stunted, 2 billion people suffer from one or more micronutrient deficiencies and 1.4 billion people are overweight, of whom 500 million are obese. Most countries are burdened by multiple types of malnutrition, which may coexist within the same country, household or individual.

The social cost of malnutrition, measured by the "disability-adjusted life years" lost to child and maternal malnutrition and to overweight and obesity, are very high. Beyond the social cost, the cost to the global economy caused by malnutrition, as a result of lost productivity and direct health care costs, could account for as much as 5 percent of global gross domestic product (GDP), equivalent to US\$3.5 trillion per year or US\$500 per person. The costs of undernutrition and micronutrient deficiencies are estimated at 2–3 percent of global GDP, equivalent to US\$1.4–2.1 trillion per year. Although no global estimates of the economic costs of overweight and

obesity exist, the cumulative cost of all non-communicable diseases, for which overweight and obesity are leading risk factors, were estimated to be about US\$1.4 trillion in 2010.

Child and maternal malnutrition – in particular child underweight, child micronutrient deficiencies and poor breastfeeding practices – impose by far the largest nutrition-related health burden at the global level, responsible for almost twice the social costs of adult overweight and obesity. The social burden due to child and maternal malnutrition has declined almost by half during the last two decades, while that due to overweight and obesity has almost doubled, yet the former remains by far the greater problem, especially in low-income countries. Undernutrition and micronutrient deficiencies must therefore continue to be the highest nutrition priority for the global community in the immediate future. The challenge for policy-makers is how to address these problems while at the same time avoiding or reversing the emergence of overweight and obesity. This challenge is significant, but the returns are high: investing in the reduction of micronutrient deficiencies, for example, would result in better health, fewer child deaths and increased future earnings, with a benefit-to-cost ratio of almost 13 to 1.

Addressing malnutrition requires integrated action across sectors

The immediate causes of malnutrition are complex and multidimensional. They include inadequate availability of and access to safe, diverse, nutritious food; lack of access to clean water, sanitation and health care; and inappropriate child feeding and adult dietary choices. The root causes of malnutrition are even more complex and encompass the broader economic, social, political, cultural and physical environment. Addressing malnutrition, therefore, requires integrated action and complementary interventions in agriculture and the food system in general, in public health and education, as well as in

broader policy domains. Because the necessary interventions cut across the portfolios of several government institutions, high-level political support is required to motivate the necessary coordination across sectors.

Better nutrition depends on every aspect of the food system

Food systems encompass all the people, institutions and processes by which agricultural products are produced, processed and brought to consumers. They also include the public officials, civil society organizations, researchers and development practitioners who design the policies, regulations, programmes and projects that shape food and agriculture.

Every aspect of the food system influences the availability and accessibility of diverse, nutritious foods and thus the ability of consumers to choose healthy diets. But the linkages from the food system to nutritional outcomes are often indirect – mediated through incomes, prices, knowledge and other factors. What is more, food system policies and interventions are rarely designed with nutrition as their primary objective, so impacts can be difficult to trace and researchers sometimes conclude that food system interventions are ineffective in reducing malnutrition. In contrast, medical interventions such as vitamin supplements can address specific nutrient deficiencies and their impacts are more easily observed, but they cannot fully substitute for the broader nutritional benefits offered by a well-functioning food system. Every aspect of the food system must align to support good nutrition; any single intervention in isolation is therefore unlikely to have a significant impact within such a complex system. Interventions that consider food systems as a whole are more likely to achieve positive nutritional outcomes.

Nutrition transition is driven by food system transformation

Economic and social development lead to the gradual transformation of agriculture, characterized by rising labour productivity, declining shares of population working in agriculture and rising urbanization.

New modes of transportation, leisure, employment and work within the home cause people to lead more sedentary lifestyles and to demand more convenient foods. These changes in activity and dietary patterns are part of a “nutrition transition” in which households and countries may simultaneously face the emerging challenge of overweight, obesity and related non-communicable diseases while continuing to deal with undernutrition and micronutrient deficiencies. The complexity and rapidly changing nature of both the malnutrition situation and food systems in individual countries mean that policies and interventions need to be context-specific.

Agricultural productivity growth contributes to nutrition but must do more

Agricultural productivity growth contributes to better nutrition through raising incomes, especially in countries where the sector accounts for a large share of the economy and employment, and by reducing the cost of food for all consumers. It is, however, important to realize that the impact of agricultural productivity growth is slow and may not be sufficient to cause a rapid reduction in malnutrition.

Maintaining the momentum of growth in agricultural productivity will remain crucial in the coming decades as production of basic staple foods needs to increase by 60 percent if it is to meet expected demand growth. Beyond staple foods, healthy diets are diverse, containing a balanced and adequate combination of energy, fat and protein, as well as micronutrients. Agricultural research and development priorities must be made more nutrition-sensitive, with a stronger focus on nutrient-dense foods such as fruits, vegetables, legumes and animal-source foods. Greater efforts must be directed towards interventions that diversify smallholder production, such as integrated farming systems. Efforts to raise the micronutrient content of staples directly through biofortification are particularly promising. Agricultural interventions are generally more effective when combined with nutrition education and implemented with sensitivity to gender roles.

Supply chains offer risks and opportunities for better nutrition

Traditional and modern food systems coexist and evolve as economies grow and urbanization increases. Modern supply chains entail vertical integration of storage, distribution and retailing and offer efficiency gains that can yield lower prices for consumers and higher incomes for farmers. They typically carry a wide variety of nutritious foods year-round, but also sell more highly processed packaged foods, which can contribute to overweight and obesity when consumed in excess. Modern food processing and distribution also offer new opportunities for the use of fortified foods, which can make important contributions to nutrition.

Although supermarkets are spreading rapidly in low-income countries, most poor consumers in rural and urban areas still purchase most of their food through traditional food distribution networks. These traditional outlets are the primary channel for nutrient-rich foods such as fruits, vegetables and livestock products, although they increasingly carry processed and packaged foods. The use of traditional retail outlets for distributing fortified foods such as iodized salt is another proven strategy for improving nutritional outcomes.

Improved sanitation, food handling, and storage technologies in traditional food systems could boost efficiency and improve the safety and nutritional quality of foods. Reducing food and nutrient losses and waste throughout food systems could make important contributions to better nutrition and relieve pressure on productive resources.

Consumer choices determine nutritional outcomes and sustainability

Making systems more nutrition-enhancing so that food is available, accessible, diverse and nutritious is key, but so is the need to help consumers make healthy dietary choices. Promoting behaviour change through nutrition education and information campaigns within a supportive environment that also addresses household sanitation and appropriate complementary foods

has proved effective. Even in locations where undernutrition and micronutrient deficiencies persist as the primary problems, a forward-looking approach that can prevent a rise in overweight and obesity is necessary, especially in the long run. Behaviour change can also reduce food waste and contribute to the sustainable use of resources.

Institutional and policy environment for nutrition

Progress has been made: in some countries malnutrition has been significantly reduced over recent decades. But progress has been uneven and there is a pressing need to make better use of the food system for better nutrition. The complexity of malnutrition and its underlying causes means that a multistakeholder and multisectoral approach will be most effective.

Such an approach requires better governance, based on sound data, a common vision and political leadership to be able to plan, coordinate and foster the necessary collaboration across and within sectors.

Key messages of the report

- **Malnutrition in all its forms imposes unacceptably high costs on society in human and economic terms.** The costs associated with undernutrition and micronutrient deficiencies are higher than those associated with overweight and obesity, although the latter are rising rapidly even in low- and middle-income countries.
- **Addressing malnutrition requires a multisectoral approach that includes complementary interventions in food systems, public health and education.** This approach also facilitates the pursuit of multiple objectives, including better nutrition, gender equality and environmental sustainability.
- **Within a multisectoral approach, food systems offer many opportunities for interventions leading to improved diets and better nutrition.** Some of these interventions have the primary purpose of enhancing nutrition. Other

interventions in food systems, and in the general economic, social or political environment, may affect nutrition even though this is not their primary objective.

- **Agricultural production and productivity growth remain essential for better nutrition, but more can be done.**

Agricultural research must continue to enhance productivity, while paying greater attention to nutrient-dense foods such as fruits, vegetables, legumes and animal products and to more sustainable production systems. Production interventions are more effective when they are sensitive to gender roles and combined with nutrition education.

- **Both traditional and modern supply chains offer risks and opportunities for achieving better nutrition and more sustainable food systems.** Improvements in traditional supply chains can help reduce losses, lower prices and increase diversity of choice for lower-income

households. The growth of modern retailing and food processing can facilitate the use of fortification to combat malnutrition, but the increased availability of highly processed, packaged goods may contribute to overweight and obesity.

- **Consumers ultimately determine what they eat and therefore what the food system produces.** But governments, international organizations, the private sector and civil society can all help consumers make healthier decisions, reduce waste and contribute to the sustainable use of resources, by providing clear, accurate information and ensuring access to diverse and nutritious foods.
- **Better governance of food systems at all levels, facilitated by high-level political support, is needed to build a common vision, to support evidence-based policies, and to promote effective coordination and collaboration through integrated, multisectoral action.**