

*This brief series was developed in preparation for the Foresight Breakout Session of the Global Conference on Agricultural Research for Development (GCARD 2012) and the Global Foresight Hub<sup>1</sup>. The briefs were written to communicate to a wider audience, such as policy makers, civil society organizations, researchers, and funders. The briefs were classified into three categories: Future Studies, Regional Update, and Visioning.*

## Does Less Meat for Some Mean Cheaper Food for Others?

Siwa Msangi and Mark Rosegrant

Based on: Msangi, S. and M.W. Rosegrant. 2012. "Feeding the Future's Changing Diets: Implications for Agricultural Markets, Nutrition and Policy." In *Reshaping Agriculture for Nutrition and Health* (S. Fan and R. Pandya-Lorch, eds) p. 65, International Food Policy Research Institute, Washington, DC.

In many regions of the world, diets change gradually as populations become more affluent and urbanized. Richer people tend to demand more energy-intensive foods, especially meat. While some advocate for 'greener diets' for animal welfare, environmental effects or human health reasons, few consider the effects of shifting diets on food prices.

The discussion over the implications of meat consumption has ranged from environmental concerns to the health implications of switching to more vegetable-oriented diets. This Brief on "Feeding the Future's Changing Diets" discusses the important link between consumption changes and future agricultural market dynamics and places the issue of meat consumption within the context of food prices. It moves the issue of meat consumption from being just about environmental sustainability towards the question of its impact on human well-being and the affordability of food in the future.

### Modeling diets

This work was conducted by an IFPRI (International Food Policy Research Institute) scientist, who coordinated the write-up and the quantitative application of the model. Funding came from one of the sponsors of the IFPRI 2011 conference (Pepsico), to which a more detailed follow-up report was submitted.

This work followed upon a collaborative study<sup>2</sup>, conducted with the Environmental Assessment Agency of the Netherlands (PBL) and the Agricultural Economics Institute of the Netherlands (LEI), which looked at the environmental impacts of protein consumption within the EU, and explored the implications of widespread adaptation of a 'healthy diet' regime, along the lines suggested by the WHO guidelines. Rather than including all components of this diet, we focused on meat consumption. The scope of the simulations was expanded to capture the influence of fast-growing countries like China which are also expected to increase their meat consumption.

The methodology used quantitative, model-based projections of supply, demand and trade over the medium to long term (20- to 30-year horizon), and incorporated the IFPRI global agricultural supply-demand model, IMPACT<sup>3</sup>. The figure below shows the baseline consumption trends for per capita meat consumption in various regions.

<sup>1</sup><http://www.egfar.org/our-work/shaping-future-together/global-foresight-hub>

<sup>2</sup>Westhoek, H. 2011. *The Protein Puzzle: The consumption and production of meat, dairy and fish in the European Union*. The Hague: Netherlands Environmental Assessment Agency (PBL)

<sup>3</sup>See Rosegrant, M.W., M. Paisner, S. Meijer and J. Witcover. 2001. "Global Food Projections to 2020: Emerging Trends and Alternative Futures." Washington, DC: International Food Policy Research Institute.

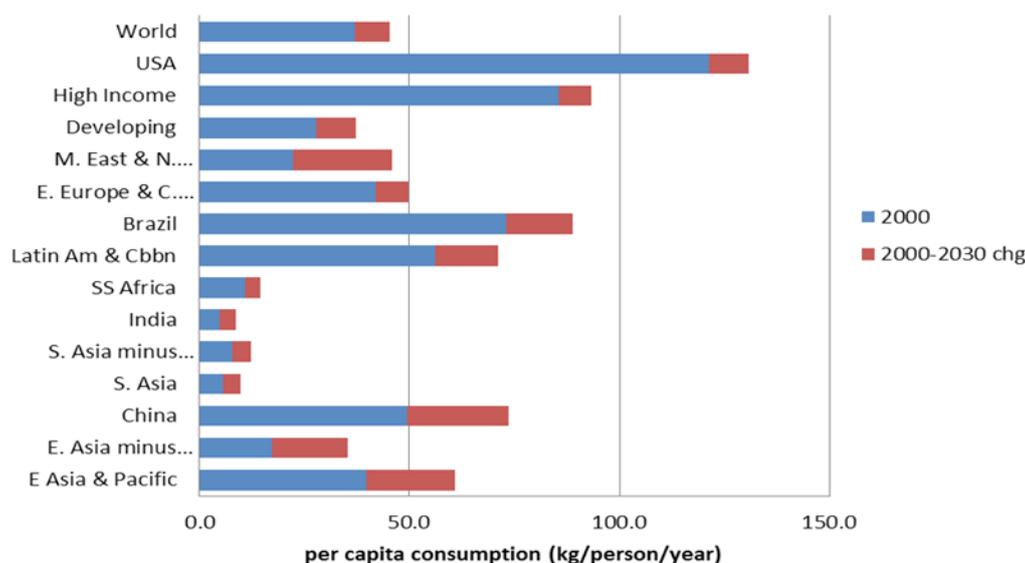


Figure 1: Growth in per capita meat consumption to 2030<sup>4</sup>

Aside from a baseline with continuing trends of meat, cereal and vegetable consumption, it considers two alternative simulations: (1) High-Income Countries (HICs) reduce their per capita meat consumption to 50 percent of the baseline levels in 2030; and (2) Brazil and China also reduce their meat consumption to 50 percent of their baseline levels, in line with the HICs. The figure below shows the baseline consumption trends for per capita meat consumption in various regions.

	2000	2030 baseline	2030 HIC Low-Meat	% chg from baseline	2030 HIC+BC Low-Meat	% chg from baseline
USA	121.3	130.1	64.7	-50.3%	64.7	-50.3%
China	49.4	73.1	83.1	13.6%	36.3	-50.4%
India	4.8	8.6	9.9	15.0%	12.8	48.5%
Brazil	73.0	88.3	102.6	16.2%	43.7	-50.5%
E. Europe & C. Asia	41.9	49.6	41.0	-17.4%	48.5	-2.2%
High Income countries	85.7	92.8	46.7	-49.7%	47.0	-49.4%
Sub-Saharan Africa	10.9	14.4	16.6	14.9%	21.1	46.4%
Rest of Developing*	18.2	25.2	27.1	7.4%	33.8	34.2%
World	37.1	44.9	41.9	-6.7%	36.4	-19.1%

\*Note: "Rest of Developing" excludes China and Brazil. Source: IMPACT model projections

**Table 1: per capita meat consumption under baseline and alternative scenarios for high-income (HIC) countries, Brazil and China (kg per capita per year)**

A number of key assumptions were made to run the model. Firstly, Productivity changes in crops and livestock remain constant at the baseline levels, and feeding efficiency gains within the livestock sector do not respond to the price signals in the market. Furthermore, the implications for grasslands and land use are not measured for extensive grazing systems, since they are not separated from more intensive livestock systems (in the version of the model that was used). On the human consumption side, diet changes are also imposed on the demand system of the model in a way that abstracts from 'health concerns' or other choice-based mechanisms that lead to changes in consumer preferences. Given the way in which commodity demand is modeled, factors that lead to consumption change, but are not price- or income-responsive, are not captured directly.

<sup>4</sup>Source: IMPACT model projections

## Food for thought

The results of the study revealed several trends. First, lower food prices will prevail if meat consumption is reduced in HICs and fast-emerging economies like Brazil and China. The reduction in consumption of livestock products – and the resulting decrease in livestock production – ‘releases’ grains and other feed products that would otherwise go towards feeding livestock, and results in lower demand for those cereal grains and lower cereal prices.

The second trend relates to lower levels of malnutrition resulting from reduced meat consumption in HICs and the emerging economies like China. The lowering of cereal prices allows for higher levels of cereal consumption for food, especially in developing regions where cereals like maize and sorghum are important staples. This causes an increase in overall calorie availability from food intake and has a positive effect on food security and nutrition in those countries.

Another important trend is that, even though there are improvements to nutrition from lower meat consumption – these are relatively small compared to the gains that can be made from more direct interventions in food-insecure regions. Of the ‘four pillars’ for food security that are cited by FAO – availability, access, utilization and stability – the food price effects of meat consumption only addresses the access (i.e. affordability) pillar. Eating less meat won’t address all four pillars by itself.

In terms of the insight and information that this case brings to the major themes of the GFAR-GCARD Foresight process, the most significant is the link between production and consumption. Since this is a supply-and-demand model for global agriculture, the consumption changes for different foods is given explicitly in terms of per capita levels of food intake, calorie availability and resulting malnutrition levels. As the diet-driven consumption levels of certain commodities increase, the price changes cause consumers to adjust consumption on the demand side, and crop producers to respond to price signals by expanding area and increasing yield.

## Expanding the dialogue on diets, health and agriculture

This work was commissioned as a paper meant to feed into the IFPRI-hosted “Vision 2020 Conference on Agriculture, Nutrition and Health” that was held in New Delhi in February 2011<sup>5</sup>. It was among other commissioned research papers intended to provide a basis for reflection and discussion on the linkages between agriculture, nutrition and health issues during the conference.

The results of this work have been presented at other workshops and discussion events, and have generated follow-up discussion and studies such as: (1) a conference on agribusiness management held at the University of Guelph in February 2012, sponsored by the Agricultural Management Institute of Canada<sup>6</sup>; and (2) commentary on the implications of diet change and meat demand that IFPRI staff have provided to the media .

The greatest value of this study has been to highlight the importance of changes in food consumption patterns on prices, which in turn influences the patterns of future agricultural trade and production.

If the study had been conducted with the participation of outside stakeholders – such as nutrition and health experts or actors in the food value chain (such as meat packing) – the scope of work might have included more qualitative elements that go beyond the quantitative indicators of the IMPACT model. Certain health-related indicators such as the prevalence of obesity, high-blood pressure or other non-communicable, lifestyle-related diseases might have emerged as important indicators of outcomes to consider. If epidemiological models aren’t able to capture those indicators quantitatively, then perhaps they would need to be addressed more qualitatively.

## Lessons learned

A number of valuable lessons – regarding the price implications of meat consumption and the implications for calorie intake and malnutrition – were learned from carrying out this study, and provide a good starting point for future work on this topic.

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<sup>5</sup>See: <http://www.ifpri.org/2020-agriculture-nutrition-health>

<sup>6</sup>See: <http://www.takeanewapproach.ca/events/details.aspx?id=ef6459f1-9704-4400-acac-97a417f6074c>

<sup>7</sup>See: <http://www.wbur.org/npr/155720538/the-making-of-meat-eating-america>

Looking at macronutrients (e.g. protein, fat, carbohydrates, fiber) is quite different from looking at micronutrients (e.g. vitamins, minerals), and the relative abundance of these nutrients in the diets has different implications for health. It is more difficult to measure micronutrient intake because so much depends on 'bioavailability' (i.e. what actually gets absorbed by the human body) and not just what the raw content is in food.

Often the cooking method and combination of foods consumed can change the bioavailability of micronutrients like iron, which makes it difficult to handle the effects of micronutrient deficiencies quantitatively – in terms of what they imply for prevalence of iron- or zinc-deficiency in women and children (who tend to be vulnerable to shortfalls in these micronutrients). To date, there is almost no quantitative modeling of human health effects from micronutrient deficiency that can be used on a global scale like the IFPRI study.

Notwithstanding these challenges, the issue of diet change will continue to occupy a prominent place in the debate over sustainable consumption patterns, and represents a pertinent topic for the CGIAR (and the wider research community) to engage in. Among the important 'drivers' of change in food systems is that of consumption growth and diversification, which provide opportunities for the producers of these products. However, they also imply ongoing challenges for the ecosystems that have to accommodate future changes in agricultural supply.

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