

Policy Brief

Key messages

- Rapidly progressing nutrition transition is leading to negative health consequences and pressure on natural resources in China.
- Educational measures should address both micronutrient deficiencies and excessive intake of unhealthy foods.
- Regulatory approaches are necessary, but should be designed in a way that safeguard nutritional and economic welfare of lower income classes
- Innovations of the food system are necessary to achieve healthy diets at minimum environmental impact.

Nutritional Transition in China: Policy Approaches to Mitigate Health and Environmental Effects

By Lena Kuhn, Yanjun Ren, and Thomas Glauben

Introduction

While China's food system underwent remarkable progress along the food value chain, the experiences of countries further ahead on the pathway of nutrition transition raise concerns over negative consequences of changing diets. First, the prevalence of nutrition related health problems becomes a growing public health risk. Second, as the single largest driver of environmental degradation, food production — especially livestock production — puts great pressure on climate stability and ecosystem resilience. Thus, dietary changes necessitate new solutions to reduce health risks, environmental degradation, and public concern over food safety. This policy brief aims to review the linkage between nutritional transition, human health and environmental sustainability, as well as discussing potential policy approaches to mitigate epidemiological and environmental consequences.

Nutrition transition in China

In international comparison, Chinese diets are characterized by relatively high levels of intake of carbohydrates and vegetables, as well as legumes and vegetable oil. The intake of animal proteins like meat, animal fats and oils or dairy products was traditionally lower than in developed economies or other transition economies like Russia, which feature comparative advantages in animal production (Burggraf et al. 2015). In 2009, the daily per capita consumption of vegetables was still considerably above the consumption of milk, sugar-sweetened beverages; the intake of processed meats lay below the average consumption in Germany and USA (see figure 1).

With rapid urbanization, economic growth, technical progress and lifestyles, China's food system and nutritional patterns are however undergoing remarkable changes; consumption patterns continuously approach those of Western countries. Firstly, economic transformation is leading to decreased relative prices of agricultural products and changing price elasticities, increasing the consumption of animal proteins, in particular of dairy products and pork (Burggraf et al. 2015). Secondly, transforming food value chains and retailing sector increase the availability of highly processed, energy dense convenience food, which has a high content of salt, fat and sugar, but a low content of important nutrients and trace metals (YanJun Ren, Zhang, et al. 2018). Third, especially the urban population is consuming more meals away from home, also leading to an increased intake of processed foods, fat, oils and meat. Even when taking into account certain cultural differences, this suggests that Chinese demand for food products of animal origin will continuously increase along the path of nutritional transition.

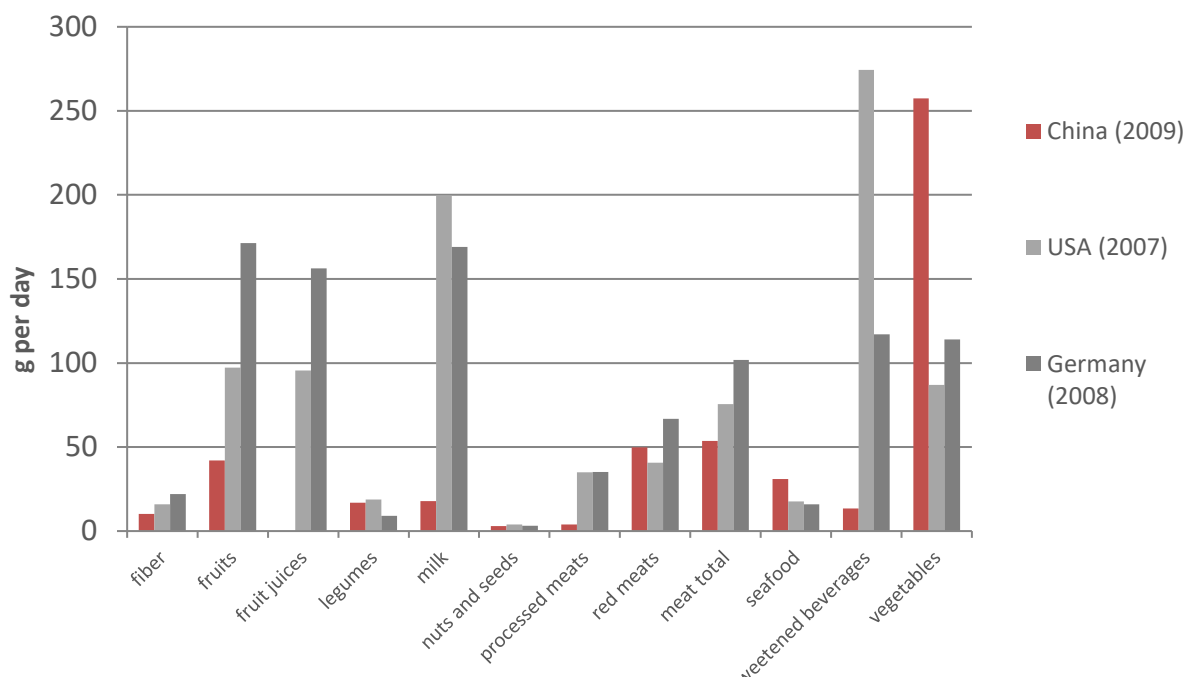


Figure 1: Per capita food consumption (in g/day)

Source: Own calculations. Data: USDA (2007), CHNS (2009), RMLSSE (2008)

Health Impacts

Changing nutrition patterns bring about both positive and negative health effects: On the one hand, nutrition transition means an improved supply with macro- and micronutrients for many rural Chinese. Increased intake of animal proteins is necessary to decrease the prevalence of iron deficiency among children and its related consequences like stunting and cognitive development deficiencies. The anemia rate was found to be as high as 25% among elementary school students in Western Chinese provinces (Luo et al. 2011).

On the other hand, the ample physical and financial availability of food can quickly turn into a burden. High intake of energy and fat combined with a decrease in physical activity and more sedentary work entails the emergence of a high prevalence of nutrition-related health diseases, the so-called epidemiological transition (see also Ren et al. 2019). Being overweight or obese may yield many health consequences like hypertension, type 2 diabetes, stroke, osteoarthritis, respiratory problems, as well as breast, colon, and prostate cancers. Approximately 46% of Chinese adults and 15% of Chinese children are estimated being obese or overweight (Wang et al. 2017). This value is like to further increase with economic development, especially for males and rural residents with limited resources (Ren et al. 2019). Projections show that the future health cost of the overweight epidemic will approach 9% of China's GDP by 2025 (Popkin et al. 2006). The simultaneous prevalence of micronutrient deficiencies and overweight or obesity in one society is not uncommon and described as 'double burden of malnutrition'.

Environmental Impacts

To satisfy new nutritional demands without making the country dependent on food imports, significant structural changes of the Chinese food sector were necessary, which inevitably put a strain on environmental resources.

While 19% of the world's population lives in China, the country is equipped with only 7% of the world's arable land, much of which is of poor soil quality and subject to continuous erosion due to poor soil and crop management practices. According to data by the Ministry of Water Resources, approximately 212.3 thousand hectares of land were lost between 2011 and 2018. Illegal forest clearings counteract efforts like the policy of returning farmland to forests, which has been active for ten years.

Second, dietary changes also affect China's scarce water resources since the water requirements per production of one calorie's worth of a certain food varies between crops, cultures and in particular between crop and livestock production. A further issue is nonpoint source pollution driven by the need to quickly increase productivity of the animal husbandry sector, mostly through excessive fertilizer and pesticide application or the leakage of pig waste into surface and groundwater. In the hog sector, especially mid-sized farms under transition were found to work under low environmental efficiency (Kuhn et al. 2018).

Third, any food production is associated with greenhouse gas or carbon emissions, which are particularly high for the production of animal proteins (see figure 2). Some technological and managerial options could reduce greenhouse emissions, such as enhancing carbon removals by restoring degraded lands or optimizing fertilizer use, however at the same time increasing production costs and thus consumer prices.

Fourth, food loss and waste aggravate concerns over food insecurity and are an inefficient use of scarce resources and embedded emissions (Koester et al. 2018). Although it was found that food waste in developing countries mainly occurs during the earlier stages of the food supply chain, a current report shows that over 200 billion yuan (US\$32 billion) worth of food is thrown away annually in China. Along with rising consumption driven by increasing household incomes and urbanization, food loss and waste might turn into major threats to the sustainable development of food systems in China and should be met with stronger awareness campaigns.

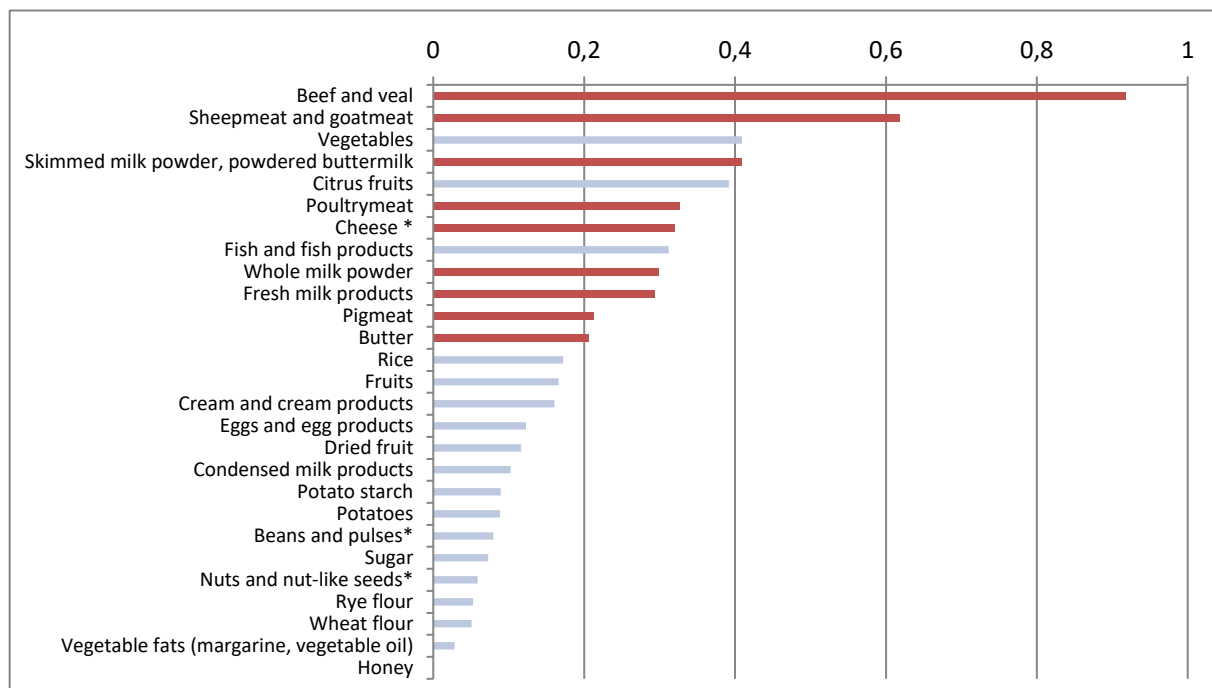


Figure 2: GHG emissions of different foods (in kg CO₂ equivalents per 100 calories)

Source: WWF 2012: *Climate change on your plate*

Production oriented policy

To tackle environmental externalities, the 2010 'Three Red Lines' policy promulgated targets for total water consumption, irrigation efficiency, and water quality. Water use rights transfers and water pricing policy reforms are intended to increase water use efficiency in production. Further, the Ministry of Agriculture has initiated two main projects of the National Soil Testing and Fertilizer Program, which supplies location-specific fertilizer formulations with appropriate guidance to farmers in order to improve fertilizer use. Since the mid-2000s, national standards regulate the physical infrastructure required in large-scale livestock operations and establish limits for waste emissions, especially after inclusion of livestock waste emissions in national targets for energy saving and emissions reductions. Geographical distance however makes it difficult and costly to monitor illegal discharge and excessive application of pig waste on crop land. Projects for rural biogas production could help to improve waste management, especially if support for the conversion of biogas into electricity and supply to the national power grid might give the necessary economic incentives to producers.

International comparison shows a mix of regulatory and incentive-based approaches. The European Union introduced a dense regulatory network concerning the application of fertilizer, pesticides and waste treatment. At the same time, economic incentives are used to increase the efficiency of inputs: For instance subsidies for fertilizer have been phased out long ago in the European Union; financial support is instead channeled towards environmentally friendly investments and organic production. In Germany, direct and indirect subsidies support the biogas sector by guaranteeing high prices for supplying energy from biogas production into the national power grid and providing financial support for installing biogas plants.

Consumption oriented policy

Much more debated, however, is the question in how far consumption can be guided towards more healthy and resource-saving nutrition patterns. In China, guidelines like the Dietary Guidelines for Chinese (DGC) and the Chinese Food Pagoda (CFP) provide recommendations for healthy food consumption (China Nutrition Society 2016). Since 2007, the Ministry of Health of the People's Republic of China has been promulgating the 'Regulation for Food Nutrition Labeling', which encourages food manufacturers to identify nutrition information panels, nutrition claims, and nutrient function claims on sale product labels. Since 2011, the program 'Compulsory Education for Rural School Children to Improve the Nutrition' supports a balanced nutrition among rural school children. For broad impact in fighting nutrition-related health issues, more policy efforts will be required though. Examples are integrating obesity prevention and control into government mandates, and reform health insurance policies to facilitate obesity prevention and treatment (Youfa Wang et al. 2019).

Meanwhile, many countries worldwide have made the experience that nutrition recommendations and education treatments are not sustainably reaching all population groups. On the other hand, too deep interventions into the decision-making processes are hardly effective either, most prominently illustrated by the notoriously failed alcohol ban in the US during the 1920s, the so-called prohibition. Consequently, international policies feature degrees of invasiveness ranging somewhere between food pyramids and food bans. A low-invasive approach is the introduction of nutrition guidelines or reference systems directly on food products. The effectiveness of such approaches however strongly depends on the information provided. For example Emrich et al. (2017) suggested that the British traffic light labelling does not adequately represent the complex nutritional quality of food products. It was criticized that it only aimed at reducing the intake of components considered risky, while the adequate supply of nutrients considered positive was disregarded. Burggraf et al. (2015) proposed a modified traffic light labelling taking account of both. A similar label, the 'Nutri-Score', was introduced in autumn 2019 in Germany; evaluations are still underway. In general, international experience indicates a positive effect of nutrition labels on consumption patterns (e.g. Ni Mhurchu et al. 2018).

A rather fast effect on consumption patterns is observed for so-called sin taxes on products considered unambiguously harmful. For instance the consumption of alcohol drinks targeting young consumers ('alcopops') in Germany, or soft drinks with high sugar content in Mexico or the UK, was considerably reduced by high taxation. Similarly, German policy makers are currently discussing a tax on pork, which is rather cheap and heavily consumed in Germany. Critics meanwhile argue that these taxes not only infringe freedom of choice but also disproportionately affect lower income strata: Households with higher income have low price elasticity and will hardly respond with considerable consumption reticence. Lower income groups, on the other hand, would have to further cut their already low meat consumption. Burggraf and Glauben (2016) further argue that sin taxes are likely to reduce consumption only for limited time, particularly in emerging economies like China with quickly increasing purchasing power. Another tool, bans on advertisement, so far only concern alcohol and cigarettes. Various studies found a direct connection between perception of advertisement and consumption intensity for cigarettes (Cheng et al. 2018). The suggestion of a binding vegetarian day at public cafeterias in Germany meanwhile met strong public opposition and was quickly dropped.

Recommendations

As presented in the above discussion, efficient policy has to tackle both consumption and production side, taking into account preferences, decision-making processes and economic incentives. Yet, it has to be highlighted that currently no country has been successful in developing a gold standard solution. After reviewing existing policies and regulations inside and outside China, we reach following recommendations:

First, despite developmental achievements, nutritional programs targeted at poorer population strata, whose vitamin and mineral intake is often too low due to low purchasing power and low nutritional know-how, should not be phased out. In rural areas, communal nutrition programs and the well-targeted dissemination of nutritional knowledge should not only tackle micronutrient deficiencies but also promote the moderation in terms of consumption of fats, sugar and salt, as the transition from quantitative and qualitative malnutrition to obesity and overweight is swift.

Second, caution should be exerted when studying existing international policies. Approaches limiting the marketing or increasing taxation of unambiguously unhealthy products are found to achieve fast results. However, the taxation for meat is certainly not an option for China's situation, since there is still a considerable share of population with too low protein intake, whose nutrition quality would be seriously harmed by increasing meat prices. In contrast, a well-formulated "traffic-light" label might help to inform consumers about nutrition quality by considering not only risky food ingredients but also aspects of an adequate intake of vitamins and minerals. Chinese initiatives should be compared with the experiences of international approaches.

Overall, more research is required to quantify the impact of nutrition transition on health and environment and understand its pathways. The mechanism underlying the effect of nutrition transition could be studied from a behavioral economics perspective and with means of experimental economics. More attention should be paid to the interlinkages between health effect and environmental effect of nutrition transition, and the opportunities of digitalization and informatization in the process of nutrition transition. To resolve the conflicts between increasing demand for animal foods and negative environmental effect caused by their production, improving technology and market efficiency remain a primary option.

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About the project:

The Sino-German Agricultural Centre is a joint initiative of the German Federal Ministry of Food and Agriculture (BMEL) and the Ministry of Agriculture and Rural Affairs of the People's Republic of China (MARA). It was established in March 2015 as a central contact and information point and for coordinating bilateral cooperation between Germany and China in the agricultural and food sector. The DCZ brings together stakeholders from the public and private sector and the scientific community. It creates forums in which agricultural issues of common interest are addressed. The spectrum of Sino-German cooperation in the agricultural sector is reflected in the three components of the DCZ: Agricultural Policy Dialogue, Agri-Food Business Dialogue and Scientific Dialogue. Further information can be found on the project website.

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