



## Fostering healthy and sustainable eating

As part of the National Research Programme 69, researchers took a close look at the Swiss population's eating habits. A healthy and sustainable diet means eating more fruits and vegetables and less animal products such as red and processed meat. This section summarises the results of the NRP 69 projects on healthy and sustainable nutrition.

### Context

Comparisons between current Swiss diets and optimal diets show that many people in Switzerland still eat unhealthily and/or unsustainably, even though health literacy in Switzerland is on average high: most of the population can distinguish healthy from unhealthy and sustainable from unsustainable foods. Such discrepancies are often found in the environmental domain and in the public health sector: consumers do not necessarily act according to their knowledge. We therefore have to accept that knowledge has a limited impact on eating habits. To understand the discrepancy between knowledge and choice, we must consider the factors that influence consumers' eating habits.

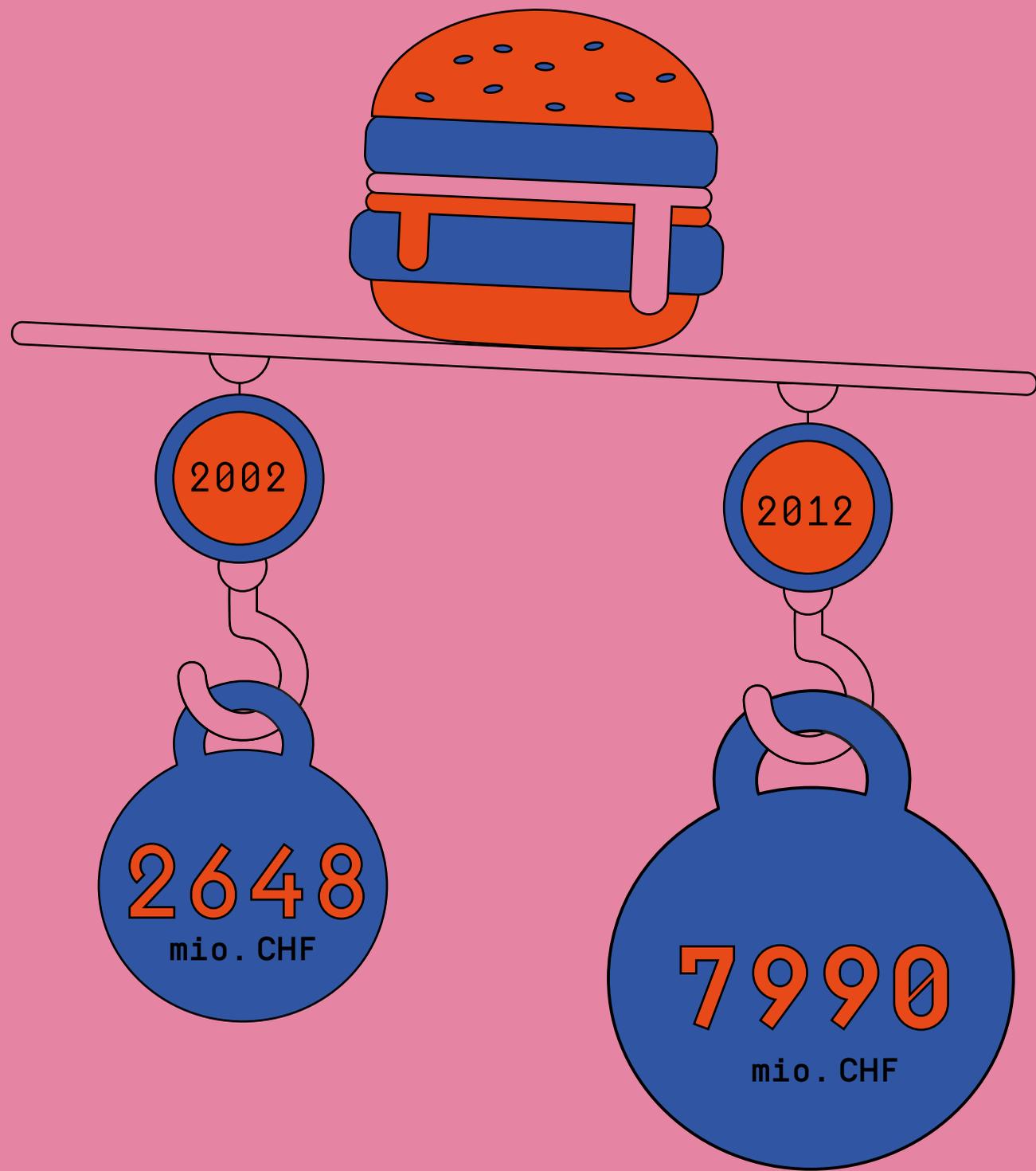
There are various reasons why individuals opt to eat unhealthily and/or unsustainably. Some don't have enough time to prepare proper meals, others buy the cheapest food they can find. Cravings, enjoyment and rewards also play an important role. People with an unhealthy diet are more likely to be overweight or to suffer from conditions such as diabetes, cardiovascular disease or cancer. The direct and indirect health costs of an unbalanced diet tripled in Switzerland between 2002 and 2012 to eight billion francs a year<sup>13</sup>.

Dietary patterns also directly influence the environment. According to research conducted under NRP 69, animal products are responsible for at least 40% of the environmental and climate impact of food consumption in Switzerland.<sup>a</sup>

a. Kopainsky et al., Environmental-economic models for evaluating the sustainability of the Swiss agri-food system. NRP 69

# The health costs of an unbalanced diet

The direct and indirect health costs of an unbalanced diet tripled in Switzerland between 2002 and 2012.



## More fruits and vegetables, less meat

b. Suren Erkman et al., Tipping points towards healthy and sustainable Swiss diets: Assessing prescriptions, practices and impacts. NRP 69

b. Ibid.

c. Pedro Marques-Vidal et al., Dietary intake in the Swiss French-speaking population: Socio-economic determinants of dietary intake in the Swiss French-speaking population. NRP 69

The project “Toward healthy and sustainable diets in Switzerland”<sup>b</sup> was undertaken as part of NRP 69. It took a close look at the Swiss population’s eating habits.

On average, men eat more meat than women do. Furthermore, people in French-speaking Switzerland and Ticino tend to eat less healthily than people in the German-speaking parts of the country<sup>b</sup>, although eating habits in French-speaking Switzerland improved slightly in overall terms between 1993 and 2014<sup>c</sup>.

One characteristic of the Swiss population is that there is a less significant divide between the dietary habits of people from different socio-economic groups than in other countries. In general, the inhabitants of Switzerland should eat more fruit, vegetables, wholegrain foods, nuts and pulses, while consuming less animal products such as red and processed meat.

The project “Social inequality”<sup>c</sup> investigated the eating habits of people living in Western Switzerland and identified reasons that deter people from eating healthily. Fewer than 40% of respondents in the Swiss Health Survey still view high food prices as an obstacle to a healthy diet.

c. Ibid.

## Making healthy food cheaper

Other reasons for not adopting a healthy dietary profile were frequently cited, including a fondness for indulgent food, time pressure, the constraints of daily life or a lack of willpower.

Because it is difficult to change the many personal reasons that motivate eating habits, the researchers of the “Social inequality” project<sup>c</sup> suggest selecting extensive measures that do not focus on specific population groups. They recommend reducing the price of healthy foodstuffs, particularly fruits and vegetables, for example by fostering domestic production.

c. Ibid.

## Encouraging healthy eating in the workplace

Of the Swiss working population, approximately one million eat in a staff restaurant or canteen during the week<sup>14</sup>. Organisations with catering facilities therefore have considerable influence on the health of a large portion of the country’s population.

Two NRP 69 projects have developed various ideas that companies could apply to encourage healthier food intake among their staff. Their results could help us move a step closer to the goal of ensuring that people eat healthy food at their workplaces, as envisioned in the action plan for the Swiss Nutrition Strategy.

d. Sigrid Beer-Borst et al., Environmental and educational intervention in communal catering to lower salt intake in the Swiss working population. NRP 69

The “Salt consumption” project<sup>d</sup> explored ways of encouraging the Swiss population to take up a balanced, less salty diet. Nowadays people’s salt intake largely exceeds the five grammes a day recommended by the World Health Organization.

The researchers studied seven different organisations with staff restaurants in German-speaking Switzerland using a two-sided approach. On the one hand, they sensitised employees of the organisations to the issue by educating them about nutrition, which they then followed up with quarterly health checks. On the other hand, they assisted catering teams in planning and implementing measures to reduce the salt content of the meals they usually provide.

Although the standard plated menus contained almost as much salt at the end of the one-year intervention as initially measured (median salt content 4.4 instead of 4.5 grammes per serving), average salt intake of intervention participants fell from 8.7 to 8.1 grammes a day. While women’s mean daily salt intake remained unchanged at 7 grammes – that is already below the intermediate Swiss salt intake target – men’s fell from 10.4 to 9.2 grammes a day. In general, salt reduction was stronger at higher initial values. In women, age and weight played a role in reducing the amount of salt. Both, women and men benefited from the educational programme, developing a stronger awareness of health and nutrition during the year.

The research results show that – given a supportive food environment – regular practice-oriented educational workshops can initiate health relevant changes of dietary habits. Therefore, the researchers recommend systematically extending workplace health promotion to include nutrition. They suggest that guideline values for salt content should be included in existing staff restaurants’ health label criteria.

### Activating health motivators with environmental incentives

e. Claude Messner et al., Environmental cues and their effect on sustainable food intake. NRP 69

Another project that addressed the issue of nutrition in the workplace was “Health motivators”<sup>e</sup>. Researchers working on the project investigated how environmental stimuli affect our eating habits. They positioned posters showing different subjects – for example, photos of sculptures by Alberto Giacometti or pleasure-evoking pictures of a funfair – next to vending machines, then evaluated the posters’ effect on consumers’ choices. While pictures of landscapes or activities did not affect the quantity of food purchased, they increased the likelihood of consumers choosing a healthy option.

However, a poster of a skinny Giacometti sculpture next to a vending machine had the effect of reigning in people’s appetite. They ate less than if they had used a machine with no poster or a machine with funfair images. This led the researchers to conclude that environmental stimuli can activate health motivators. The researchers believe that the use of nutrition-related stimuli does not have to be restricted to canteens and staff restaurants.

### Helping with weight loss

f. Lukas Emmenegger et al., Laser spectroscopic breath analysis for the prevention of obesity through individual energy balance monitoring. NRP 69

Two further projects from NRP 69 produced results that could help people lose weight.

Researchers working on the “Preventing obesity”<sup>f</sup> project developed an instrument that uses a breath sample to determine whether the body is metabolising fat at the moment the measurement is taken. The device uses laser spectrometry to measure the concentration of acetone molecules in breath. The human body produces this volatile organic compound when it is using more energy than it is absorbing.

The tests indicate that acetone content in breath is a promising biomarker for measuring the energy balance in the human body: the higher the content, the greater the energy deficit.

Such measuring instruments could therefore help obese patients to monitor their efforts to lose weight and motivate them to continue. This is in line with the current perspective in preventive medicine, providing individual markers for the quantitative follow-up of exposure or of the disease.

Further development is necessary to reduce the instrument’s size and to enable simple practical application.

In the second project – “Functional food”<sup>g</sup> – scientists bound fat droplets into emulsions that release triglycerides only in the duodenum and investigated whether the resulting functional emulsions are capable of prolonging satiation after eating. Their investigations revealed that the emulsions do trigger the satiation stimulus in both animals and humans. This indicates that the special emulsions are suitable for controlling overweight people’s energy intake more effectively. However, the researchers point out that widespread use (in salad dressings, for example) will not be possible without improvement of the sensory characteristics of the emulsions.

g. Peter Fischer et al., In Vivo Validation of Functional Food Emulsion Systems. NRP 69

### New approaches to combat deficiency-related diseases

But NRP 69 did not only address nutritional excesses and how to avoid them. It also looked at the opposite end of the spectrum and ways of avoiding shortfalls in vitamin and mineral intake.

More than two billion people worldwide – primarily women and children – suffer from iron deficiency<sup>15 1</sup>. The condition causes various problems, including reduced performance, anaemia and a greater susceptibility to diseases. Food supplements currently on the market do not resolve the problem because iron compounds are either hard to digest or have a detrimental impact on the flavour, odour or colour of food.

h. Raffaele Mezzenga et al., Nanostructured minerals for food and nutrition applications: Enhancing aqueous dispersibility, sensory stability and bioavailability of Fe/Zn nanostructures using biomineralization on proteins. NRP 69

A research group working on NRP 69 developed a new, nanotechnology-based approach to adding the trace element iron to food<sup>h</sup>. Although iron nanoparticles have a good bioavailability and do not affect taste, they do frequently oxidise and form aggregates, so that the body can no longer utilise them.

The researchers have developed a hybrid material that stabilises the iron nanoparticles. The nanoparticles adhere to what are known as amyloid fibres. These consist of the edible milk protein beta lactoglobulin, a by-product of cheese production. In tests on rats, the researchers established that the iron nanoparticles do not re-dissolve until they enter the acidic environment of the stomach, after which they are rapidly absorbed by the body.

Because the new hybrid material is not only taste-neutral but has a long shelf life and is cheap to produce, the researchers feel that their invention has significant potential as a way of combating iron deficiency – especially in lesser developed countries, where the condition is particularly widespread.

### Understanding beneficial effects of beta-glucan

i. Laura Nyström et al., Beta-glucan processing for improved molecular interactions. NRP 69

The research group conducting the “Dietary fibre”<sup>i</sup> project analysed the chemical properties of beta-glucan in cereals. This dietary fibre helps to reduce the blood cholesterol level and to control blood sugar. The researchers analysed the effects of food processing on beta-glucan as well as on several specific molecular interactions involving beta-glucan.

The project increased our understanding about the beneficial effects of beta-glucan on health, owing to its interactions with iron and mucin, for example. The researchers call on decision-makers and practitioners to invest more effort in encouraging consumers to gain a better understanding of the components of food. They also invite industry to apply the knowledge gained from the work on this dietary fibre to produce tailor-made foods for individuals suffering from cardiovascular disease, diabetes and obesity.

### Improving vitamin D intake during pregnancy

j. Sabine Rohrmann et al., Evaluation of Vitamin D Status and Its Determinants in Switzerland. NRP 69

The “Vitamin D”<sup>j</sup> project investigated the vitamin D status of expectant mothers in Switzerland and found that more than half of the pregnant women had too little vitamin D in their blood. The lack of vitamin D during pregnancy is the most important determinant factor for infantile rickets and may also result in poor foetal and neonatal growth<sup>16</sup>.

The median level of vitamin D in the blood was higher in summer than in winter. Women from Ticino – the sunniest part of the country – had a lower risk of developing vitamin D deficiency than women from Zurich. Women with dark skin types were particularly prone to low vitamin D levels.

### Groundwork for a healthy and sustainable diet

k. Matthias Stolze et al., Sustainable and healthy diets: Trade-offs and synergies. NRP 69

The researchers conclude that Swiss guidelines on vitamin supplementation as they currently stand do not adequately protect pregnant women against vitamin D deficiency, either because the recommended doses are too low or, more likely, women do not take their supplements regularly. Medical practitioners need to pay greater attention to vitamin D supplementation during pregnancy.

The Swiss population’s eating habits have far-reaching consequences. The way that food is produced, processed and consumed not only influences human health, it also has repercussions for the environment, the economy and society as a whole<sup>17</sup>. Researchers working on the “Recommendations for sustainable and healthy diets” project<sup>k</sup> modelled various future scenarios in a bid to assess these impacts with greater accuracy. The models show that reducing meat consumption would lead to people following a healthier diet and a food production system that is environmentally and socially more sustainable.

The first scenario assumes that in 2050 the Swiss population will be following the recommendations of the Swiss food pyramid. By contrast, the second scenario, “FeedNoFood”, envisages eating habits that are primarily driven by environmental awareness. This scenario assumes that in 2050 livestock in Switzerland will have a diet consisting entirely of grass and food processing by-products. The current situation, in which the production of animal feed and of human food are in competition, will have ceased to exist. Both, the pyramid and the “FeedNoFood” scenarios, are based on the assumption that the Swiss population will be eating less meat and more pulses by 2050. The third scenario envisages no change in the country’s eating habits.

The analysis showed that the two alternative future scenarios basically imply similar adjustments in eating habits. In both cases, meat consumption is significantly reduced and compensated with pulses. This change generates positive synergies between sustainability and public health: a diet with less meat is healthier and at the same time improves the ecological and social sustainability of food production.

In addition, the analysis suggested that the net self-sufficiency of the Swiss food sector is likely to increase as a result of falling imports of fodder for meat production, and consumers’ food expenditure will decrease as their expenditure on expensive animal products decreases. At the macroeconomic level, however, such a change would result in lower added value for the Swiss food sector.

However, the analysis of the scenarios also showed that a change in eating habits leads to many contradictions. There are substantial contradictions in current dietary recommendations with respect to health and health impact models. For example, meat should be eaten as a source of minerals, protein and vitamins, but epidemiological studies suggest that small increases in the risk of several cancers may be associated with high consumption of red meat or processed meat. Another contradiction concerns the foods replacing meat: if plant-based products such as pulses need to be imported, we have to consider the social impacts in exporting countries. These need to be resolved in order to reduce confusion among consumers.

Another conflict identified in the study lies in the expansion of organic production. A higher share of organically produced food could reduce the environmental impacts in Switzerland but would – without changes in diets – lead to higher import levels and might increase environmental pressure abroad due to lower yields.

While fruits and vegetables are considered as healthy, they are quickly perishable and thus contribute to higher amounts of food waste at all supply chain levels. More efficient logistics and a better shelf life of foodstuffs could alleviate this negative impact on the environment in the future.

These examples show how the models substantially contribute to understanding the discrepancies between a strictly agricultural production view and a comprehensive food system view.

The project also showed that a healthy diet and sustainable food production cannot be achieved through unilateral action within the food system. According to the researchers, health, food and agricultural policies – three areas that are currently independent of each other – need to be coordinated into a systemic and shared framework for a future Swiss food system that provides a healthy and sustainable diet for as large a share of the population as possible.

# The Swiss food pyramid

