

Büro für  
Ernährung  
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*Revision of the Food-based  
Dietary Guidelines for  
Switzerland*

*Procedure Handbook*

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## *Abbreviations*

BFH	Bern University of Applied Sciences
BFH-HAFL	Bern University of Applied Sciences – School of Agricultural, Forest and Food Sciences
CHUV	Lausanne University Hospital
CVD	Cardiovascular disease
DHA	Docosahexaenic acid
EFSA	European Food Safety Authority
EPA	Eicosapentaenoic acid
FAO	Food and Agriculture Organization of the United Nations
FBDG	Food-based dietary guidelines
FCN	Federal Commission for Nutrition
FOAG	Federal Office for Agriculture
FOEN	Federal Office for the Environment
FOPH	Federal Office of Public Health
FSVO	Federal Food Safety and Veterinary Office
HEdS	Geneva School of Health Sciences
menuCH	Representative nutrition survey for Switzerland
NCD	Noncommunicable diseases
NRV	Nutrient reference values
LCA	Life cycle assessment
USI	Università della Svizzera italiana
UZH	University of Zurich
SSN	Swiss Society for Nutrition
SSNS	Swiss Sports Nutrition Society
SVDE	Swiss Association of Registered Dietitians
WFLDB	World Food Life Cycle Database
WHO	World Health Organization
ZHAW	Zurich University of Applied Sciences

# 1 Summary

The food-based dietary guidelines for Switzerland (FBDG for Switzerland) were revised between 2020–2024 under the lead of the Food Safety and Veterinary Office (FSVO). New scientific evidence on the relationship between diet, noncommunicable diseases (NCDs) and the environment has emerged since the last publication of the guidelines in 2011. With the first Swiss National Nutrition Survey menuCH, conducted between 2014–2015, food consumption data became available. In 2022, new dietary reference values for Switzerland were published.

Based on the “Scientific Opinion on establishing Food-Based Dietary Guidelines” by the European Food Safety Authority (EFSA 2010), a literature review was made on the link between food consumption and the risk of developing noncommunicable diseases (NCD), particularly type 2 diabetes, cardiovascular diseases, cancer, as well as obesity. Additionally, the environmental impact of foods frequently consumed in Switzerland was evaluated with life-cycle assessments. The results were published in a scientific background report (CHUV 2023).

Mathematical diet optimization was used as a new and scientifically based method to model diets. It allows the inclusion of various dimensions into dietary guidelines. The four dimensions “adequate nutrient intake”, “reduction of the risk to develop NCDs”, “reduction of the environmental impact” and “cultural habits” were included in the Swiss guidelines. Although the promotion of health and the adequate intake of nutrients remain the main purpose of dietary guidelines, Switzerland has aimed for the first time at a reduction of the environmental impact with its guidelines.

Before publication in September 2024, the FBDG for Switzerland were discussed in two focus groups and critically reviewed by scientists. A graphical re-design of the food pyramid was made. Scientists, stakeholders, federal offices, NGOs and other institutions contributed throughout the project with their expertise.

The new FBDG for Switzerland are still represented by a food pyramid, which gives an overview of the foods that should be eaten in higher amounts and those that should be eaten in smaller amounts to improve the health of the population and reduce the environmental impact. Two leaflets, a long and a short version, complete the graphical representation by explaining the guidelines and how to put them into practice.

This procedure handbook describes the methods used for the revision of the guidelines, the data generated for the optimization model and the procedure until the final food-based dietary guidelines were published. It also includes detailed information on the project organization, such as the roles and tasks of the involved institutions and stakeholders. The handbook may support the development of other dietary guidelines for specific population groups and facilitate future revisions of the FBDG for Switzerland.

## 2 Introduction

### 2.1 Context

What people eat impacts both the health of the population and the planet. NCDs such as diabetes, cardiovascular diseases and cancer are common in Switzerland; a quarter of the population is affected by a noncommunicable disease, and even more persons are overweight or obese. Besides personal distress, NCDs also generate high healthcare costs. Nutrition plays an important role in the development of NCDs, and a healthy lifestyle with a balanced diet helps to limit the burden of disease (FOPH 2022).

In Switzerland, production and consumption of food generates the largest environmental impact besides energy consumption and mobility. It should therefore be adapted to reduce its harmful effects (Jungbluth 2011). Climate change has negative consequences for the population's health and actions to reduce environmental damage, including changes in diet, can lead to benefits in public health (FOEN 2020, Milner 2023). The current diet of the population in Switzerland is neither balanced, nor sustainable. By eating a healthy diet, the environmental impact could be reduced compared to the current Swiss diet (Zimmermann 2017).

With the Swiss Nutrition Policy and Action Plan 2017–2024, the government addresses these challenges and promotes a varied and balanced diet for the population with various measures and action areas (FSVO 2023). The revision of the FBDG for Switzerland is one of the measures within this Action Plan. It is based on a recommendation by the Federal Commission for Nutrition, which expressed the need to update the Swiss food pyramid and its recommendations published in 2011 because of new scientific evidence, especially for fruit juice, legumes, nuts, and vegetable oils (FCN 2020).

## 2.2 Handbook objectives

The aim of this handbook is to describe the scientific procedure for the revision of the FBDG for Switzerland. It provides information about the methods, project organization, milestones, roles and tasks of involved institutions. It also describes the outcomes of project steps, if they have not been published in other documents. It further gives an overview of the relevant literature and documents published, such as scientific reports and communication tools. Chapters 5 to 9 of the handbook correspond to the individual project steps.

The handbook is aimed at all those interested in the development of the FBDG for Switzerland, including policymakers, nutrition and health professionals and scientists. The description of the procedure may support the development of other dietary guidelines for specific population groups and facilitate future revisions of the Swiss dietary guidelines.

The handbook does not include results or conclusions from the scientific background report, nor does it provide the arguments for or against specific recommendations or repeat the guidelines themselves. Such information can be found in the document "*Actualisation des recommandations nutritionnelles: argumentaire*" (FSVO 2025).

# 3 Background

## 3.1 Food-based dietary guidelines

Food-based dietary guidelines (FBDG) are recommendations to the population on the type and amount of food to eat for optimal health. They translate scientific evidence and nutrient information into practical dietary advice, often as food groups with similar nutritional properties and with visual representations such as pyramids or plates. The primary aim of FBDG is to improve the health of the population and to decrease diet-related diseases such as NCDs or micronutrient deficiencies.

The basis for establishing FBDG was set in 1992 during the International Conference on Nutrition which was convened by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization WHO (WHO 1998). By that time, the main method used for the development of FBDG were systematic literature reviews on the evidence between diet and health. In the past years, it has been recognized that guidelines on healthy eating should include other dimensions as well. They must be scientifically based and promote health, while being ecologically, socially, and economically sustainable as well as culturally appropriate and

practicable (FAO 2016). New methodologies such as diet optimization have been developed, which make it possible to integrate various dimensions into FBDG (Schäfer 2020).

### 3.2 Development of previous FBDG for Switzerland

FBDG for Switzerland have been represented as a food pyramid since 1998, when the first Swiss food pyramid was published by the former Swiss Association for Nutrition SVE (now Swiss Society for Nutrition SSN). The food pyramid of the United States Department of Agriculture of 1992 served as its basis (USDA 1992). The Swiss food pyramid and its guidelines for a balanced diet were adapted in 2005 and 2011 by SSN, with updated scientific background and graphical representations (SSN 2012). Besides literature reviews, an online survey with health professionals and a public consultation of the graphic and the key messages were conducted for the food pyramid of 2011. The method is described in the document “Schweizer Lebensmittelpyramide. Hintergrundinformationen” published by SSN in 2011. SSN and the Federal Office of Public Health (FOPH) were the publisher of the 2011 food pyramid. In 2014, the Federal Food Safety and Veterinary Office took over the responsibility for the Swiss food pyramid in collaboration with SSN. In 2014, additional information on the recommended quality and quantity of meat and fish consumption was available, while the existing graphic design was retained. A graphic of the Swiss food pyramid from 2011 can be found in the annex of the scientific background report (CHUV 2023).

## 4 Method and project organization

### 4.1 Project steps and milestones

The revision of the FBDG for Switzerland followed the stepwise approach proposed in the “Scientific Opinion on establishing Food-Based Dietary Guidelines” of the European Food Safety Authority (EFSA 2010). Table 1 lists the project milestones, while Table 2 describes the six steps of the project. For each step, individual methods were applied, depending on the objective.

Table 1: Project milestones for the revision of the FBDG for Switzerland.

<i>Date</i>	<i>Milestone</i>
07.2020	Project start
07.2023	Scientific report “ <i>Swiss dietary recommendations: scientific background</i> ” published
06.2023	Focus group discussions closed
02.2024	Mathematical diet optimization finalized
04.2024	Expert consultation closed
09.2024	Graphical representation finalized
09.2024	Guidelines published

Table 2: Description of the six project steps.

<i>Project step</i>	<i>Description</i>
1. Scientific report	Literature reviews on the link between the consumption of foods and the development of NCDs. Life cycle assessments on the environmental impact of foods consumed in Switzerland.

2. Diet optimization	Development of the mathematical diet optimization model <i>OptiSuisse</i> , which integrates various dimensions into the guidelines. Calculation of dietary scenarios and elaboration of draft guidelines.
3. Focus groups	German and French speaking focus group discussions of the draft guidelines with nutrition experts and stakeholders.
4. Expert consultation	Written reviews by experts from federal offices, NGOs and others.
5. Graphical representation	Re-design of the Swiss food pyramid.
6. Publication	Finalization and publication of the FBDG for Switzerland by FSVO and SSN. Publication of background documents and procedure handbook by FSVO. Additional scientific documents and communication material will be published.

## 4.2 Project organization

The nutrition sector of FSVO was the overall project leader. Experts from external institutions were mandated to work on specific tasks within the project, (figure 1 and table 3).

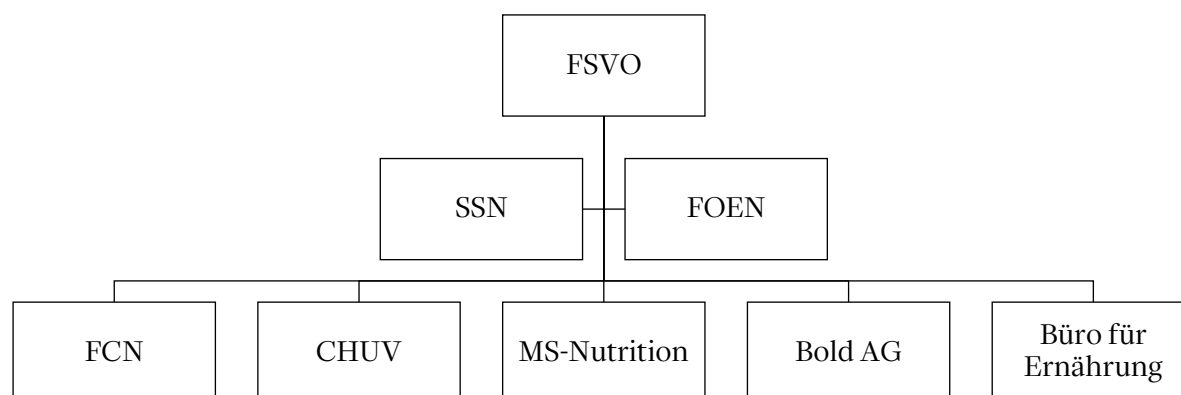


Figure 1: Organization chart for the revision of the FBDG for Switzerland.

Table 3: Roles and tasks of the main involved institutions.

<i>Institution</i>	<i>Roles and tasks</i>
FSVO	Overall responsibility. Project initiator and leader. Financing of external mandates. Review and approval of milestones. Development of dietary scenarios, writing of recommendations jointly with SSN. Publication and communication of the guidelines.
SSN	Support FSVO during the project. Review of scientific report. Writing of recommendations jointly with FSVO. Review of final guidelines. Moderation of focus groups.
FOEN	Responsible for financing and reviewing the chapter on environmental aspects in the scientific background report. Review of final guidelines.
FCN	Scientific advisor of FSVO. Review of scientific report and final guidelines.

CHUV	Mandate as leader, coordinator and main author of scientific background report.
MS-Nutrition	Mandate for the development of the optimization model. Support FSVO in implementation.
Bold AG	Mandated communication agency for the re-design of the graphical representation of the food pyramid.
Büro für Ernährung	Mandate to write the procedure handbook.

### 4.3 Procedure handbook

Büro für Ernährung *Christen* collected and structured the information on the project and wrote the present handbook on behalf of FSVO. The elaboration of the handbook started in September 2022 to ensure that all the relevant information would continuously be included. The visualization of the process to describe the development of the optimization model was made with the Open Source Camunda Modeler, Platform 8.1 from Camunda ([www.camunda.com](http://www.camunda.com)).

## 5 Scientific background report

### 5.1 Procedure and milestones

The basis of dietary guidelines is the scientific evidence between diet and health. Therefore, the main purpose of the scientific background report was to review and summarize the latest scientific evidence (years 2018–2021) on the link between the consumption of foods and the development of cardiovascular diseases, cancer, type 2 diabetes and obesity. Other objectives were to assess the environmental impact of foods regularly consumed in Switzerland, and to provide data for the mathematical optimization model. The report would be an update and extension of the report from the Federal Commission for Nutrition FCN (FCN 2020).

FSVO published a tender on [simap.ch](http://simap.ch), the electronic platform of public procurement in 2020. Experts in the fields of nutrition and dietetics, and environmental scientists could submit an offer to write a scientific background report. The contract was awarded to the Lausanne University Hospital (CHUV) in 2021. The CHUV put together a consortium of nutrition researchers, health professionals and environmental scientists from Switzerland. Expert groups from all three language regions were formed to work on specific topics of the report.

The report “*Swiss dietary recommendations: scientific background*” was published in July 2023 on the FSVO website ([www.blv.admin.ch](http://www.blv.admin.ch)). See table 4 for the milestones.

Table 4: Milestones of the scientific background report.

<i>Date</i>	<i>Milestone</i>
07.2020	Publication of tender on <a href="http://simap.ch">simap.ch</a> .
07.2021	Contract between CHUV and FSVO signed.
02.2022	Presentation of draft report to FCN.
07.2022	External reviews completed (table 6).
04.2023	Submission of final report to FSVO after revision.
07.2023	Publication of the report “ <i>Swiss dietary recommendations: scientific background</i> ”.

## 5.2 Organization

CHUV was the project leader for the scientific background report, commissioned by FSVO. The project organization and roles and tasks of the involved institutions are shown in figure 2 and table 5.

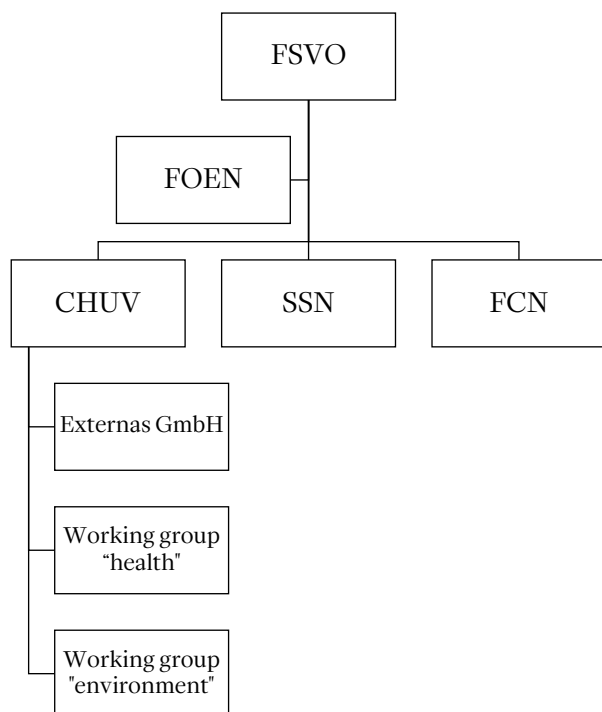


Figure 2: Organizational chart for the scientific background report.

Table 5: Roles and tasks for scientific background report.

<i>Institution</i>	<i>Roles and tasks</i>
FSVO	Commissioner and funder. Writing and publication of tender. Coordination with FCN, FOEN, SSN. Review and publication of report on FSVO website.
FOEN	Funder of chapter on environment. Support FSVO in writing tender, review of report.
CHUV	Project leader and author of the report. Presentation of draft report.
Externas GmbH	Coordinator and reviewer.
BFH, USI, UZH, Fourchette verte, ZHAW	Working group "health". Authors and reviewers of chapters on health.
Intep, BFH-HAFL, freistil	Working group "environment". Authors and reviewers of chapters on environmental aspects.
SSN	Support FSVO in writing tender. Participation in presentation of draft report. Review of report.
FCN	Participation in presentation of draft report. Review of report.

### 5.3 Online presentation and review of the draft report

A draft report was presented by the authors and discussed during an online presentation in February 2022. The presentation was primarily intended to the members of the FCN as the scientific advisor of FSVO. The FCN members included representatives from education and research in the field of nutritional sciences, food sciences, nutritional medicine, industry, and non-governmental organizations. Experts from FOEN and Agroscope also attended the presentation.

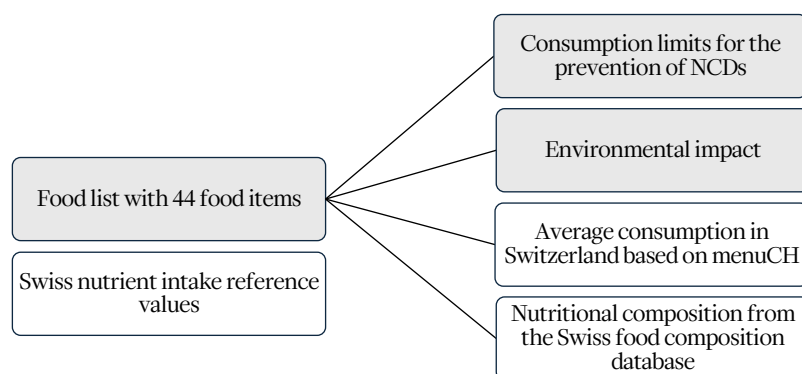
After the presentation, the participants were asked to submit a written review of the draft report. Around 80 comments were received from the reviewers, see table 6 for information on who submitted a review. Based on the reviews, FSVO and CHUV agreed that an annex with the detailed search strategy was necessary and that the scientific evidence from the FCN report should be integrated more clearly. Some comments could not be taken into account, for example if they concerned another target population, specific foods or longer time periods.

Table 6: Reviewers of the draft report.

<i>Review as</i>	<i>Institution</i>
Project leader	FSVO, FOEN (for the part on environmental aspects)
Members of FCN	FCN president, ETH Zurich, Consumer federation of French-speaking Switzerland (FRC), Ente Ospedaliero Cantonale, Swiss farmers' federation, Federation of the Swiss food industries, Children's hospital of Eastern Switzerland, BFH
Others	SSN, HEdS

### 5.4 Data for the optimization model

Modelling an optimal diet requires reliable data. For the present work, data was generated by the scientific background report on the one hand, and it was provided by FSVO on the other hand (figure 3). The following sections describe the data derived from the scientific report. The optimization model is explained in detail in chapter 6.



Grey: Data generated by the scientific report.  
 White: Data provided by FSVO.

Figure 3: Data for the optimization model *OptiSuisse*.

### 5.4.1 Food list

A food list was generated based on the food groups of the former Swiss food pyramid and the FCN report. To reflect a broad range of foods, as well as all 31 basic food groups used in menuCH, 108 food items were defined. They were aggregated to food subcategories and food groups. For example, the food subcategory “fruits” consists of ten different fruits (food items) regularly consumed in Switzerland. Since dietary guidelines provide general recommendations on the consumption of fruits, and not individual foods such as apples, an aggregation was necessary. The final food list consists of eight food groups, 44 food subcategories and 108 food items and it can be found in the report in table 53, p. 193ff (CHUV 2023). An example is provided in table 7.

Some food groups were excluded from the list: alcoholic drinks, salty snacks, sugar, sweets, herbs, and spices. The latter are consumed in small amounts compared to other foods. Sweet and salty snacks are a very heterogenous group and their intake is limited by the WHO recommendations on salt and sugar intake (WHO 2012, 2015). The recommendations for the consumption of alcoholic beverages are made by FOPH (2018).

Table 7: Example of the food list for the food group “milk and dairy”.

<i>Food group</i>	<i>Food subcategory</i>	<i>Food item</i>	<i>Weighting (%)</i>
Milk and dairy	Milk for drinking	Semi-skimmed milk	50
		Whole milk	50
	Yogurt	Natural yogurt	33.4
		Yogurt with fruits	33.3
		Yogurt with chocolate <sup>1</sup>	33.3
	Fresh cheese	Cream cheese	50
		Mozzarella	50
	Soft cheese	Soft cheese	100
	Hard cheese	Hard and semi hard cheese	100

<sup>1</sup>Yogurt with chocolate: represents the flavored yogurt types.

### 5.4.2 Consumption limits for the prevention of NCDs

Where possible, the association between the consumption of foods and the risk of developing NCDs was quantified in the report. These amounts of foods may be minimal, maximal, or optimal amounts to be consumed daily. They are based on scientific evidence from the literature reviews. For example, the minimal daily consumption of vegetables for the prevention of CVD is estimated at 200 g, whereas the optimal amount is 400 g. Usually, such a quantitative relationship between the consumption of foods and NCDs is not known. Thus, for many food groups, it was not possible for the authors to define minimal, maximal, or optimal amounts in grams per day (see table 55 in the CHUV report, CHUV 2023). Depending on the available data for the food groups, the minimal, optimal and maximal amounts were used to set health targets. Additionally, the minimal and maximal amounts were used as constraints (see chapter 6.3.2).

### 5.4.3 Environmental impact of foods

For each of the 108 food items, the environmental impact was determined by means of life cycle assessments, where the stages “cradle to shop” were considered. Data from the World Food Life Cycle Database (WFLDB) and Agribalyse databases (if no data was available in WFLDB) was used for these assessments. The environmental impact was expressed as eco-points per 100 g edible food and per kilocalories. Eco-points are a measure of the environmental damage of a product and include emissions (such as greenhouse gas), resources and waste.

In a second step, the LCA data of the food items was aggregated to the 44 food subcategories. The contribution of the environmental impact of each food item to its food subcategory also had to be defined. It was generally assumed that each food item contributes equally to its subcategory (“equal weighting”). For example, the subcategory “dried fruits” consists of four food items: “raisins, dried”, “apricot, dried”, “apple, peeled, dried” and “fig, dried”. Each of these food items contributed 25% to the environmental impact of the subgroup “dried fruits”. See table 7, column four for an example of the weighting of the food group “milk and dairy”.

Where intake or environmental impact vary greatly between food items, consumption data was used for weighting instead of equal weighting. For example, in the food subcategory “red meat”, the consumption and environmental impact of beef is higher than that of other red meat. Equal weighting would have resulted in an underestimation of the environmental impact of the food subcategory “red meat”. For further information on the weighting, see the annex of the scientific background report (CHUV 2023).

## 6 Diet optimization

### 6.1 Procedure

Since FSVO did not have the expertise to develop and implement an optimization model, an external mandate was necessary. No offers were submitted to FSVO after a public invitation to tender, nor after direct invitations to several Swiss universities. Therefore, the mandate was given to the French university start-up company MS-Nutrition. MS-Nutrition had developed an optimization model for the German Society of Nutrition and therefore had the expertise needed for this task. The aim was to model diets that are nutritionally adequate, promote health, are culturally acceptable and have a low environmental impact.

The contract started in 2022, with the development of the optimization model. The tool *OptiSuisse* was implemented in 2023, and several dietary scenarios were modelled. Based on these scenarios, a draft dietary guideline was written in 2023 in preparation of the focus group discussions. The process to develop *OptiSuisse* required several iterations and included various tasks, which are depicted in the process visualization in figure 4.

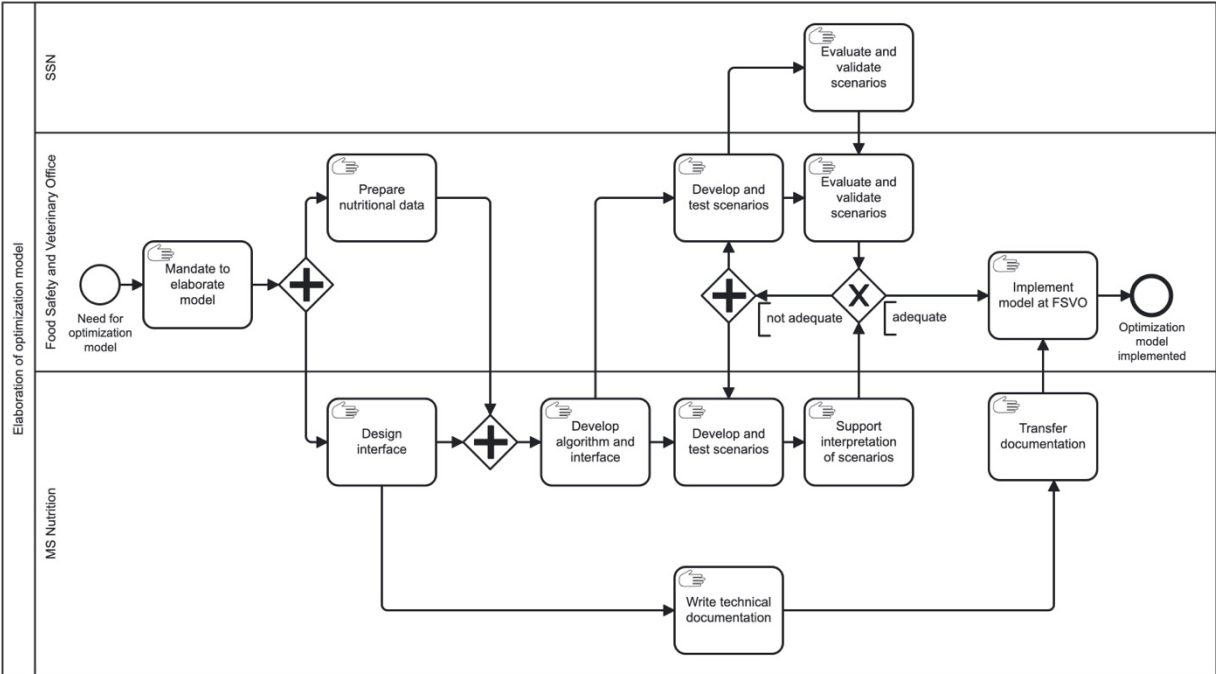


Figure 4: Process visualization of the elaboration and implementation of the optimization model.

## 6.2 Organization

The mandated company MS-Nutrition was responsible for the development of the optimization model. SSN was involved because it had elaborated the previous Swiss dietary guidelines in the form of the Swiss food pyramid and was therefore familiar with the development of dietary guidelines. The roles and tasks are shown in table 8.

Table 8: Roles and tasks for diet optimization.

<i>Institution</i>	<i>Roles and tasks</i>
FSVO	Project leader. Implementation of model, calculation of dietary scenarios. Writing of draft guidelines in cooperation with SSN.
SSN	Preparation of nutritional data for integration into the model. Writing of draft guidelines.
MS-Nutrition	Development of optimization model. User support.

## 6.3 Optimization model

### 6.3.1 Principle of diet optimization

Dietary guidelines provide information on the quantity of foods to be consumed. Until recently, these quantities were defined in an iterative process through testing and optimizing: recommended amounts of foods were modified by experts, using trial and error, until the nutrient and other requirements were fulfilled (Brink 2019). Mathematical optimization methods can automate this process and more importantly, make it possible to integrate various dimensions into FBDG (Schäfer 2020). This quantitative method is transparent, science-based and it can be adapted depending on the research question (Schäfer 2024).

In diet optimization, variables, constraints and objective functions are needed:

- Variables: these are the foods and any other information on these foods such as their nutritional composition or environmental impact.
- Constraints: these are the requirements that must be fulfilled, for example coverage of nutrient reference values.
- Objective functions: these are the questions that the model should answer, for example “What is the diet closest to the dietary habits of the population?”.

A diet optimization provides the best solution which minimizes or maximizes the objective function. The best solution consists of a value for each food or food group which, in combination, best comply with the constraints. If two or more constraints are incompatible, the optimization is not feasible, and no solution can be generated. Then it is either necessary to adapt the requirements (constraints) or the variables.

### 6.3.2 Optimization tool *OptiSuisse*

*OptiSuisse* is a computer application based on diet optimization and includes the four dimensions "nutrients", "consumer habits", "health", and "environmental impact" (table 10). *OptiSuisse* is intended for the exclusive use by FSVO. It was developed with the programming language R using linear programming.

The aim of *OptiSuisse* is to calculate a diet that is as close as possible to dietary habits in Switzerland, while providing adequate amounts of nutrients and reducing the environmental impact compared to the average Swiss diet (data from the National Nutrition Survey menuCH). The diet should provide all essential nutrients in adequate amounts, which is why the focus was set on the “nutrients” dimension.

## Variables

The variables of *OptiSuisse* were the 44 food subcategories defined in the scientific report, plus an additional three subcategories for wholegrain cereals (rice, crackers, pasta). Without these, an optimal diet would have been difficult to model, because wholegrain cereals contain relevant amounts of fibers and micronutrients. Intep, the company that had provided the LCA data for the scientific background report, delivered the missing LCA data for the three foods. The nutritional composition and the environmental impact of the 47 food subcategories were assigned (table 9).

Table 9: Variables in *OptiSuisse*.

<i>Variables</i>	<i>Additional information on variables</i>	<i>Source</i>
47 food subcategories	Definition of subcategories from 108 food items	Report “ <i>Swiss dietary recommendations: scientific background</i> ” (CHUV 2023), and Intep (unpublished).
	Nutritional composition (per 100 g or 100 ml food)	Swiss Food Composition Database (FSVO 2023 [4]), and Ciquel French food composition table (ANSES 2023)
	Environmental impact (eco-points per 100 g or 100 ml food)	Report “ <i>Swiss dietary recommendations: scientific background</i> ” (CHUV 2023)

## Constraints

*OptiSuisse* uses constraints that correspond to the four given dimensions (table 10). Details on the nutritional constraints, as well as the nutrients excluded from the model, can be found in the document “*Actualisation des recommandations nutritionnelles suisses 2024 : argumentation*” (FSVO 2025).

Table 10: Dimensions and constraints in *OptiSuisse*.

<i>Dimension</i>	<i>Constraint</i>	<i>Description</i>	<i>Source</i>
Nutrients	Nutrient reference value of 30 nutrients	The lower nutritional constraints are the minimal amounts of a nutrient needed, and the upper constraints are the tolerable upper intake levels (if available).	Nutritional Reference Values for Switzerland (FSVO 2023).
Environmental impact	Environmental impact reduction	The upper constraint is the environmental impact of the average Swiss diet. There is no lower constraint, as the environmental impact should be as low as possible.	Report “ <i>Swiss dietary recommendations: scientific background</i> ” (CHUV 2023)
Health	Risk of developing NCDs	The health constraints are the minimum or maximum amounts of foods to be consumed daily to reduce the risk of developing NCDs, see chapter 5.4.2.	Report “ <i>Swiss dietary recommendations: scientific background</i> ” (CHUV 2023)

Consumer habits	Consumer habits	The constraints are the minimum and maximum amounts of food items eaten in Switzerland (population usual consumption).	menuCH Konsummengen und Portionsgrößen (FSVO 2023)
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### Objective functions

Two objective functions were chosen for *OptiSuisse*: minimization of deviation from average consumption as well as health targets (table 11). A combination of more than one objective function is possible, where each function can be weighted individually by the user. For example, if consumer habits are considered most important, they can be weighted 70%, whereas the health objective function can be weighted 30%.

A percentage reduction of the environmental impact of the optimized diet compared to the average diet could be set (between 0% and 100% reduction) in addition to the objective functions.

Table 11: Objective functions in *OptiSuisse*.

Objective function	Description
Minimization of deviation from average consumption	Aims at improving cultural acceptability of the guidelines, since the optimized diet is as close as possible to the diet of the population.
Minimization of deviation from health targets	Aims at reducing the risk of developing NCDs. The health targets are the optimal amounts of foods to be consumed for the prevention of NCDs, see chapter 5.4.2.

### 6.3.3 Dietary scenarios

*OptiSuisse* makes it possible for the user to modify parameters to calculate a variety of scenarios. For example, including or excluding some foods can result in specific dietary patterns, such as a pescetarian dietary pattern where the food subcategories “red meat”, “poultry” and “processed meats” are excluded. For the revision of the Swiss dietary guidelines, omnivorous, ovo-lacto vegetarian, pescetarian patterns, and dietary patterns with or without legumes were calculated.

Roughly 70 dietary scenarios were modeled, by adjusting the weighting of the objective functions and by modifying parameters. Since the constraints are quite restrictive, they set tight limits for the optimal solution. Therefore, the results did not vary widely with different weighting of the objective functions. Table 12 provides information on nutrients that are difficult to cover with the given constraints, even in an omnivorous diet. Generally, the aim of dietary guidelines is to provide all nutrients without supplementation. Further information on these nutrients, such as their bioavailability or food sources can be found in the document “*Actualisation des recommandations nutritionnelles suisses 2024: argumentation*” (FSVO 2025).

Table 12: Feasibility of *OptiSuisse* for selected nutrients.

Nutrient	Feasibility
EPA, DHA	NRV could only be covered by including fatty fish.
Vitamin B12	NRV could only be covered by including foods from animal origin.
Calcium	NRV could only be covered by including dairy.
Iodine	The NRV for iodine could not be covered with <i>OptiSuisse</i> because iodized salt was not included as a food.

### *6.3.4 Dietary scenario and draft guideline for focus group discussions*

After several discussions between FSVO, MS-Nutrition, HEdS, SSN, CHUV and Intep, a scenario was chosen for further development. It was the one with the best trade-off between health, consumer habits and environmental impact. This was achieved by weighting health 80%, consumer habits 20% and reducing the environmental impact by 20–25% (compared to the average diet from menuCH). A reduction of more than 25% was not possible with the given constraints.

Based on the chosen scenario, a draft guideline was developed by FSVO and SSN in preparation of the focus group discussions. It included a summary of the key findings from the scientific background report, the proposed amounts and portion sizes of foods and food groups, as well as the changes compared to the previous Swiss food pyramid from 2011. The document was reviewed by nutritional experts from HEdS.

It is important to note that the final guidelines do not exactly reflect the above-mentioned weightings and environmental impact reductions, because the later procedure with the focus groups and expert consultations led to adaptations of the chosen scenario.

## *7 Focus group discussions*

### *7.1 Procedure*

In addition to the scientific background report and the optimization model, focus group discussions with stakeholders were an important part during the revision of the guidelines. Focus groups are a form of group interview and a popular method for assessing health messages, as well as people's experiences and attitudes (Kitzinger 1995). The focus groups were useful for translating the scientific findings into practicable guidelines for the public.

SSN was mandated by FSVO to organize and moderate two focus group discussions with stakeholders from different sectors. The aim of the focus group meetings was to discuss practical issues such as the proposed assignment of foods to food groups and how to communicate the guidelines. Assessing the stakeholders' experiences and needs for the further procedure and discussing open questions were other objectives. It was not the purpose to find a consensus regarding the new guidelines. The focus group discussions took place in June 2023.

### *7.2 Organization and participants*

SSN was responsible for the organization, moderation, and documentation of the two focus group discussions. FSVO supported SSN with the organization, contacted the participants and attended the meetings without taking part in the discussions.

#### *Participants*

The participants were recruited by FSVO in collaboration with SSN and were contacted by email. Stakeholders from the German, French and Italian speaking parts of Switzerland were invited to participate in either the German or French speaking focus groups. The main inclusion criteria were that the participants should be using dietary guidelines in their practical work and have a good nutritional knowledge. The groups should consist of persons from different professional areas with focus on practical application and communication of the guidelines.

Eight persons participated in the German speaking and eleven in the French speaking focus group. The participants represented the following professional areas: Nutrition and dietetics, consumer protection, health promotion, food catering, education, environmental protection, communication and consumer behavior, sports nutrition.

People from the public did not participate in the discussions. They were represented by the stakeholders and by the recommendations of the citizen's assembly for nutrition politics in Switzerland ([www.buergerinnenrat.ch](http://www.buergerinnenrat.ch)). The participants received the draft guideline before the discussions.

Table 13: Participants of the focus group discussions.

<i>Group</i>	<i>Participant</i>
French speaking group	Canton Neuchâtel, Consumer federation of French-speaking Switzerland (FRC), School of Education Fribourg, HEdS, Lavaux hospital, HEG Arc Neuchâtel, registered independent dietitians, Health Promotion Switzerland, University of Lausanne and Unisanté.
German speaking group	BFH, Canton Lucern, FOEN, independent registered dietitian, consumer protection, SSNS, University of Bern and WWF Switzerland.

### 7.3 *Topics and suggested adaptations*

The main topics discussed were the communication and visual representation of protein-rich foods such as animal products and plant-based protein sources. These foods have raised much attention from science and the public in the past years because of health and environmental reasons. It was not possible to consider all the comments from the discussions in the further project steps, but the focus groups provided valuable information for the revision of the dietary guidelines. This sub-chapter gives an overview of the topics discussed and the suggested adaptations.

*Dairy products: Same food group as other protein-rich foods or a separate group?*

In the 2011 food pyramid, dairy products were visually represented in the same group as other protein-rich foods such as fish, eggs, meat and tofu. Generally, the participants agreed that the communication of the nutritional properties of dairy products would be easier if they were a separate group. However, it was mentioned in the German speaking group that the recommendation of consuming a variety of protein-rich foods would be better understood if there was only one food group.

*Legumes: Same food group as starchy foods or protein-rich foods, or both groups?*

In the 2011 food pyramid, legumes were part of the group of starchy foods such as cereals and potatoes. Since legumes are a good source of proteins and should replace meat more often for health and environmental reasons, most participants favored their allocation to the protein-rich food group. Some participants proposed that they should belong to both food groups, but it was agreed that it might be too complicated, and it is not in line with the other foods which all belong to one group. Since the protein quality of legumes is not comparable to the protein quality of animal-based foods, some argued that they should belong to the starchy food group.

*Plant-based protein sources: Visual representation*

In the 2011 food pyramid, plant-based protein sources such as soy-based products and legumes are not emphasized visually, nor are they highlighted in the text. All participants agreed that they should be better represented visually and textually to encourage their consumption over too many animal products, especially meat.

*Plant-based protein sources: Minimally and highly processed foods*

Plant-based protein foods have become increasingly popular, but their nutritional properties and level of processing vary between products. Since the scientific basis is insufficient to recommend these products generally, the German speaking group agreed that minimally processed foods should be preferred. This topic could not be discussed in the French speaking group.

### *Protein-rich foods: Name of this food group*

It was discussed whether this food group should be named after the main nutritional property of its foods (proteins) or if the foods themselves should be mentioned because it might be easier to understand for the consumer. No agreement was found but a food-based approach was favored, especially in the German speaking group.

### *Protein-rich foods: Amounts to consume*

The amounts of protein-rich foods proposed in the draft guidelines seemed quite high to the participants, since they were roughly the same as in the 2011 pyramid (or higher as in case of fish). It was agreed that the amounts should be scientifically justified if they were to remain as indicated in the draft. This topic could not be discussed in the French speaking group due to time constraints.

### *Sweets and salty snacks: Name of this food group*

A lot of different foods are part of this food group and there was a discussion on how to name and visualize this heterogenous group. Several names were proposed such as “Sweets, sweetened beverages or savory snacks”, “Fatty, sweet, savory or/and ultra-processed foods”, “Not indispensable”. However, no consensus was found. This topic could not be discussed in the German speaking group.

### *Graphical representation*

Although this topic was not discussed in detail, the participants expressed some concerns regarding the graphical representation. It was proposed to show minimally processed foods and no cans. Tofu and legumes could be more visible. Poultry could represent meat instead of beef or pork because of health and environmental reasons. In addition, the possibility of showing the top level of the pyramid separately, like in the Belgian food pyramid, was mentioned.

### *Communication*

Participants agreed that easily understandable messages were needed in addition to the recommended amounts and portions. Especially the main message of the pyramid, i. e. to consume some foods in higher quantities and others in smaller quantities, was apparently not easily understandable. Instead, consumers tend to categorize foods as “healthy or unhealthy” or “good or bad”.

## *8 Expert consultation*

### *8.1 Procedure and milestones*

Following the focus group discussions, FSVO adapted and finalized the guidelines and wrote an extensive document with background information on the revision of the guidelines. The document included the arguments for the recommended amounts, portion sizes and food groups. The expert consultation of the document started in March 2024 and the reviews were received by FSVO in April 2024.

### *8.2 Participants*

26 experts from federal offices and other organizations were asked to make a review (table 14). The experts had to answer questions on the scientific and practical aspects of the new guidelines, in particular concerning the food groups (classification, names, new food groups, main messages), the environmental aspects, physical activity and the visual representation. All in all, over 200 comments were received. The reviews themselves, as well as information on how they were

included in the final guidelines are published in the document “*Compte rendu de la consultation des offices fédéraux et experts sur la mise à jour des recommandations nutritionnelles suisses*” (FSVO 2025).

Table 14 : Affiliations of the reviewers.

<i>Type of institution</i>	<i>Expert's institutional affiliation</i>
Federal offices and federal institutions	FOAG, FOEN, FOPH, Agroscope, FCN.
Other institutions	Health promotion Switzerland, HEdS, SSN, SSNS, SVDE, SVDE specialist group vegetarian diets, Swiss association of mineral sources and soft drink producers (SMS).

## 9 Graphical representation and communication

### 9.1 Procedure and organization

Although dietary guidelines can be communicated by several graphical representations, food pyramids are often used (FAO 2016). The research institute gfs-zürich was mandated by FSVO in 2016 to evaluate the Swiss food pyramid. It was shown that the pyramid is well-known within the population and professionals in Switzerland (gfs-zürich 2016). Therefore, FSVO decided that the new guidelines would still be represented by a food pyramid.

In February 2024, FSVO invited several graphic designers to submit an offer to re-design the Swiss food pyramid. The contract was awarded to the communication agency Bold AG in March and the publication of the pyramid followed in September 2024.

The media and communication division of FSVO was the project leader, in close collaboration with the nutritional experts from FSVO and SSN. Bold AG was responsible for the graphic design.

### 9.2 The new Swiss food pyramid

The graphical representation was made with three-dimensional, computer-generated food items (figure 6). Foods from the lower levels of the pyramid such as water, vegetables, and fruits, seem to be closer to the viewer, whereas foods recommended to be consumed in smaller quantities appear to be further away. Generally, the viewer first looks at the foods that seem closer, which are the foods that should be eaten in higher quantities. Since they look like “real” foods, the consumer might be motivated to buy those foods. It was the aim to show unprocessed or minimally processed foods as far as possible, except for the top level which includes highly processed foods, and which is called “optional” because these foods are not necessary for an adequate nutrient intake.

#### *Food groups*

It was important to show fruits and legumes that are grown in Switzerland and that are in season for several months, if possible. Wholegrain cereals are shown more prominently than in the previous pyramid. The consumption of legumes as part of a healthy, sustainable diet is promoted in the graphic, whereas meat is less prominent. Milk and milk products are a separate group from the other protein-rich foods. The group of fats and oils has also been divided into two groups, one for nuts and seeds, one for vegetable oils and fats.

### *Environmental impact*

Besides highlighting plant-based protein sources such as legumes and tofu in the graphic, environmental aspects are mainly addressed in the written recommendations. For each food group, the reader finds tips on healthy and sustainable eating, for example to reduce food waste and prefer seasonal, local produce.



Figure 6: The new Swiss food pyramid.

## *9.3 Communication*

Several measures were taken in September 2024 to communicate the guidelines to the public and professionals: A press release by FSVO and SSN, posts on social media, information on the website of FSVO and SSN as well as a newsletter.

A second communication phase started in October 2024 and will continue until 2025 with monthly web and social media releases and newsletters. Further publications are planned, for example more detailed information on the individual food groups of the pyramid and translation of the guidelines into additional languages. A graphical representation of the guidelines as a food plate is planned for 2025.

## *10 Overview of published documents*

Several documents and materials have been published by FSVO or by mandate. Table 15 provides an overview of the published documents. They can be found on the FSVO website ([www.blv.admin.ch](http://www.blv.admin.ch)) or on [www.aramis.admin.ch](http://www.aramis.admin.ch). Additional material will be published on the SSN website ([www.sge-ssn.ch](http://www.sge-ssn.ch)) in 2025, and the leaflets will be translated into several other languages.

Table 15: Documents related to the revision of the guidelines (January 2025).

<i>Title</i>	<i>Author</i>	<i>Target audience</i>	<i>Publication</i>	<i>Languages</i>
Evaluation der Schweizer Lebensmittelpyramide und des Informationsdienstes nutrinfo®	gfs-zürich	FSVO, SSN	2016	German
Reappraisal of the scientific evidence linking consumption of foods from specific food groups to non-communicable diseases	FCN	Academic community, policy makers, educators.	2020	English

Swiss dietary recommendations: scientific background	CHUV	Academic community, policy makers, educators.	2023	English
Statement of conflict of interest	CHUV	Academic community.	2023	English
Leaflet “Neue Schweizer Ernährungsempfehlungen”	FVSO and SSN	Public	2024	German
FAQ new dietary recommendations for Switzerland	FSVO	Public	2024	German, French
Actualisation des recommandations nutritionnelles suisses 2024: argumentation	FSVO	Academic community, public.	2025	French
Compte rendu de la consultation des offices fédéraux et experts sur la mise à jour des recommandations nutritionnelles suisses	FSVO	Academic community, public.	2025	French
Revision of the food-based dietary guidelines for Switzerland, procedure handbook	Büro für Ernährung <i>Christen</i>	Academic community, public.	2025	English

## 11 Discussion

### 11.1 Discussion of the method to adapt the FBDG for Switzerland

Several approaches for the establishment or revision of food-based dietary guidelines exist, depending on the objective and country-specific diet problems. Switzerland has chosen and adapted the approach of EFSA as it is a European organization (EFSA 2010). It is widely recognized that besides the nutritional content of a diet, sustainability, dietary habits, socioeconomic and other aspects should be more emphasized (EFSA 2010, FAO 2016). Therefore, FSVO extended EFSA’s approach to include the method of mathematical optimization to model diets that integrate various dimensions. Although Swiss dietary guidelines have been published since 1998, scientific findings on the environmental impact of foods consumed in Switzerland had not been included previously. However, the comparison revealed that the former recommendations were already quite sustainable. The method to adapt the Swiss guidelines has several strengths, but also some limitations, which are discussed below.

#### 1.1.1 Strengths and limitations

##### *Strengths*

With the scientific background report, several country-specific aspects could be addressed. Foods commonly consumed in Switzerland were identified, their influence on the most common diet-related health problems in the country were reviewed and the environmental impact of Swiss foods could be assessed.

The new Swiss dietary guidelines make it possible to fulfil more than just the criteria of being nutritionally adequate. *OptiSuisse* enables the integration of the environmental dimension and the risk of NCDs, while being as close to the dietary habits as possible. The tool can be used and adapted to model diets for other target groups.

The inclusion of various stakeholders throughout the project was necessary to enable knowledge transfer, transparency and broad acceptance of the guidelines. Especially the close collaboration between federal offices, nutrition experts and environmental scientists was important.

Finally, the new guidelines are a good opportunity to communicate the importance of a healthy and environmentally sustainable diet. The wide media coverage and discussions on social media have contributed to this public perception. Several background documents and scientific reports are available to the public and professionals interested in further information on how the new guidelines were established.

### *Limitations*

The target group of the FBDG is limited to healthy adults aged 18–65 years. A large part of the population belongs to other groups with specific needs (e.g. children, elderly, pregnant and lactating women, vegetarians/vegans, persons with chronic health conditions). However, by adapting the optimization model, it will be possible to address the needs of other population groups in the future.

EFSA recommends identifying food consumption patterns when establishing FBDG, because the health benefits of diets such as the Mediterranean diet cannot be attributed to the nutrient content alone (EFSA 2010). In the new guidelines, Switzerland has not addressed dietary patterns of its population specifically but has included dietary habits within the optimization model.

LCA data has several limitations, which are described in the scientific report. For this project, conventional agricultural production was set as the standard, but organic production can influence the results. Further, the environmental impact of foods varies depending on the chosen reference unit. For this project, 100 g and 1 kcal were chosen, whereas the protein content can also be a relevant reference unit. However, animal-based products, especially meat, still have a high impact, even with protein as a reference unit (Fernandez-Rios 2024).

Mathematical diet optimization depends largely on data quality as well as the hypothesis and the chosen parameters. Constraints must be chosen carefully. There is usually a range of possible solutions, and the expertise of a nutrition scientist or dietitian is crucial to further analyze and implement the results. *OptiSuisse* does not reflect the huge variety of foods available, because it only includes 108 food items. Further, *OptiSuisse* does not include undesirable substances such as contaminants or pesticides, which might be used as constraints to increase food safety in an updated version of *OptiSuisse*.

### *1.1.2 Comparison with methods of other countries*

It is not within the scope of this handbook to make an extensive comparison with methods of other countries, but some interesting similarities and differences are discussed here.

Other European countries such as Germany, the Netherlands, Austria, and France have also used computational diet optimization for the revision of their guidelines (Brink 2019, AGES 2024, ANSES 2016). They have appreciated it as an objective and transparent method (DGE 2024).

The Nordic Co-Operation, which published the New Nordic Nutrition Recommendations 2023, mainly relied on literature reviews of scientific evidence and consultation of several hundred researchers and experts as a method. Although they considered optimization models to integrate environmental aspects, they decided not to use it. Contrary to Germany, they considered that it was not a transparent method. They published considerable background material and made it possible for the public to comment on the scientific background and the guidelines before publication (Nordic Co-Operation 2024). In Germany, the public was also invited to comment on the guidelines before publication (DGE 2024).

The communication material of other countries varies. Many have published pyramids or plates, but also a circle (Germany) or the use of key messages (the Nordic Nutrition Recommendations)

instead of a graphic is possible. More information on the graphical representations and key messages of other countries can be found in the scientific background report (CHUV 2023).

### *1.1.3 Recommendations for future revisions of FBDG for Switzerland*

Although it was not the aim of this handbook to evaluate the project, some recommendations can be made for future revisions of the FBDG for Switzerland.

- Besides the inclusion of a wide range of scientists and stakeholders, the public and other interested parties could also be directly involved in the project, e.g. through a public consultation on the scientific publications and/or the guidelines including the graphical representation.
- Although the focus groups were a valuable method to assess the participants attitudes, the outcomes depend on the invited experts and cannot be generalized. The inclusion of professionals without a nutritional background and representatives of the public might have generated more information. Thus, it is recommended to include participants with a broader range of backgrounds for future revisions of guidelines.
- The scientific background could be extended to include data on dietary patterns.
- Recommendations for other target groups such as children and adolescents should be published for Switzerland and could use the same approach.
- It is advisable to update the next guidelines for Switzerland within a shorter time interval than in the last period (13 years). The evidence on the relationship between diet and health is regularly reviewed by scientists and it is therefore necessary to update and revise dietary recommendations, although no indication exists on the interval.

## *12 Conclusions*

What we eat has a big impact on our health and the health of the planet. The new FBDG for Switzerland integrate health and sustainability aspects into practicable recommendations for the first time. If the population were able to adhere to the new guidelines, this would reduce both the burden of NCDs in Switzerland and the environmental impact, while maintaining an adequate nutrient intake. However, dietary habits and food choices are very complex, and many factors play a role whether individuals can change their diets or not. The publication of the new FBDG for Switzerland is a first step and a good opportunity to communicate this very important topic. Hopefully, it will motivate the population to reflect on their dietary habits and enjoy the advantages of a healthy and sustainable diet.

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