Corporate health management: evaluation of an educational and environmental intervention to promote a balanced, less salty diet

Part 1: nutrition education of employees

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Abstract

As part of the Swiss Nutrition and Salt Strategy, a 12-month combined educational and environmental intervention was carried out in 2015–2016 with the aim of promoting a balanced diet with adequate salt content in seven organizations with staff canteens. The programs were evaluated based on survey data with a view to determining their suitability for use in corporate health management. The nutrition education promoted health literacy and food literacy among the employees who participated and it was able to trigger a change in behavior. The coaching of catering teams encouraged the catering staff to reformulate the foods, but for the most part, this change could not be consolidated due to operational barriers. Combined, the two programs offer a solid foundation for longer-term interventions in workplace settings where there is a desire to understand and promote health literacy and hence food literacy as quality features in all areas of a workplace.

Keywords: Corporate health management, educational intervention, environmental intervention, nutrition education, food literacy, coaching of catering teams, communal catering, sodium, salt

Introduction

Nutrition-related chronic diseases impair the well-being of the many people affected by them and put a burden on the healthcare systems of many countries [1, 2]. In Switzerland, the direct health care costs of cardiovascular diseases alone amount to approximately CHF 10.3 billion per year. Added to this, there are indirect costs of CHF 4.9–6.4 billion per year due to reduced work productivity or early retirement [3, 4]. Hypertension is the most important physiological risk factor here, and a complex interplay of lifestyle and behavioral factors contribute to its development. These factors include smoking, physical inactivity, high stress levels, excessive alcohol consumption, and in particular an unbalanced diet with regular consumption of foods rich in salt and fat, but simultaneously low consumption of fruit and vegetables. Combined with other metabolic factors, such as being severely overweight, further health complications may occur [5]. Many Swiss consumers are aware that a high salt intake may be associated with health issues, especially high blood pressure [6, 7]. However, many people consider their salt intake to be uncritical and do not feel compelled to change their diet [8–11]. Furthermore, hypertension often remains undiagnosed and ischemia or stroke occur without warning [5].

There are various food policy instruments that can be used to influence consumer choices in terms of which foods they choose to consume [12].

The WHO [13] and the EU [14] recommend a three-pronged approach for the successful reduction of salt intake among the population

Citation
Beer-Borst S, Eisenblätter J, Jent S, Siegenthaler S, Hayoz S (2019) Corporate health management: evaluation of an educational and environmental intervention to promote a balanced, less salty diet. Part 1: nutrition education of employees. Ernahrungs Umschau 66(12): 242–249.e12–e13
This article is available online:
DOI: 10.4455/eu.2019.049

Peer-reviewed
Manuscript (original contribution) received: March 25, 2019
Revision accepted: July 04, 2019

to no more than 5 g/day on average [15]: This approach involves reformulating foods, increasing awareness and promoting the development of skills, and changing the environment. Therefore, the Swiss nutrition and salt strategy [16–18] has established educational and environmental measures to be taken, backed up by a broad understanding of nutrition education [19–22]. The fundamental principle is to encourage and spread a varied and balanced diet. It is intended that by strengthening the capacity and willingness of the population to act without making anything forbidden, the consumption of salty food will gradually reduce. The provision of alternative products with an optimized salt content should support consumers on their way to a consciously making healthier food choices. To this end, Swiss nutrition policy relies on the voluntary cooperation of stakeholders from the food industry and on a settings-based approach to health promotion.

Although there are already established, successful structural measures in place for the catering offered by cafeterias in the school setting combined with nutrition education, there is less evidence for the success of such measures in the workplace. However, what evidence there is tends to be positive [22]. Within the framework of corporate health management (CHM), nutrition interventions could reach women and men aged 15 years and over who are in employment on repeated occasions and thus enable and motivate them to change their behavior in a lasting way [23]. The health literacy and food literacy of the workforce are key to such a process of change, but these skills can only develop further in a workplace environment that promotes learning. A combined educational and environmental intervention implemented in the workplace setting could strengthen health awareness among employees and employers, as well as among those operating and working in staff canteens [24].

In light of this, the educational and environmental intervention *"Gesund & Gut: Na Klar!"* ("Healthful & Tasty: Sure!") was implemented and comprehensively evaluated as a way of promoting a balanced diet with adequate salt content in the workplace setting. This two-part article focuses on the suitability of the two simultaneously implemented intervention programs for CHM. An outcome evaluation should show to what extent (Part 1) the education program for employees that was implemented was able to increase the participants' health literacy and food literacy and thus initiate a change in behavior and (Part 2 Ernährungs Umschau 1/2020) to what extent the coaching of catering teams, oriented towards quality standards, led towards action and thus potentially provided supportive nutritional conditions in the staff canteens. The effect of the combined intervention on the salt intake of the workforce is the subject of a separate publication [25].

Methods

Intervention trial

The intervention trial *"Gesund & Gut: Na Klar!"* ("Healthful & Tasty: Sure!") was carried out in Switzerland from May 2015 to November 2016. The study investigated the effectiveness of a 12-month combined nutrition intervention in reducing the salt intake of participating employees in organizations with staff canteens. The study was approved by Swissethics (KEK BE 130/14, PB_2016_01156) and was registered on September 23, 2014 in the German Register of Clinical Trials (No. DRKS00006790) and on the Swiss National Clinical Trials Portal (No. SNCTP000001142). Central data collection and management was done using REDCap® (Research Electronic Data Capture), and was achieved in collaboration with the Clinical Trials Unit of the University of Bern [26].

Details about the study design and applied data collection methods can be found in the published study protocol [27]. The study was conceived as a cluster randomized controlled trial with the option to change the study design. The two-step recruitment process for recruiting organizations and employees aged 15–65 years started in November 2014. Managers responsible for CHM or catering at 389 organizations in eight German-speaking Swiss cantons received a personal letter explaining the study. The staff canteen had to sell at least 150 lunches per day. Due to the low level of willingness to participate in the study and the organizations' rejection of randomization, the study design was changed after six months in accordance with the previous power calculation and the study was implemented as a cluster non-randomized single-arm trial with calibration arm [27]. One out a total of eight organizations wanted to participate in the study as a control, so the information in this article is therefore limited to the seven organizations that took part in the intervention. These were two production/service businesses, two university/research institutions, two social service and welfare institutions and one federal administration facility. Five out of the seven staff canteens were run by outsourced catering companies. The participating organizations and the affected catering companies signed a gatekeeper agreement. The organization employees were informed about participation in the study by their managers and were invited to an information session provided by the research group regarding the content of the study and requirements for individual participation. The number of people employed at each organization (not including the canteen staff) who were eligible for participation in the intervention varied between 228 and 1,380. Participation was voluntary

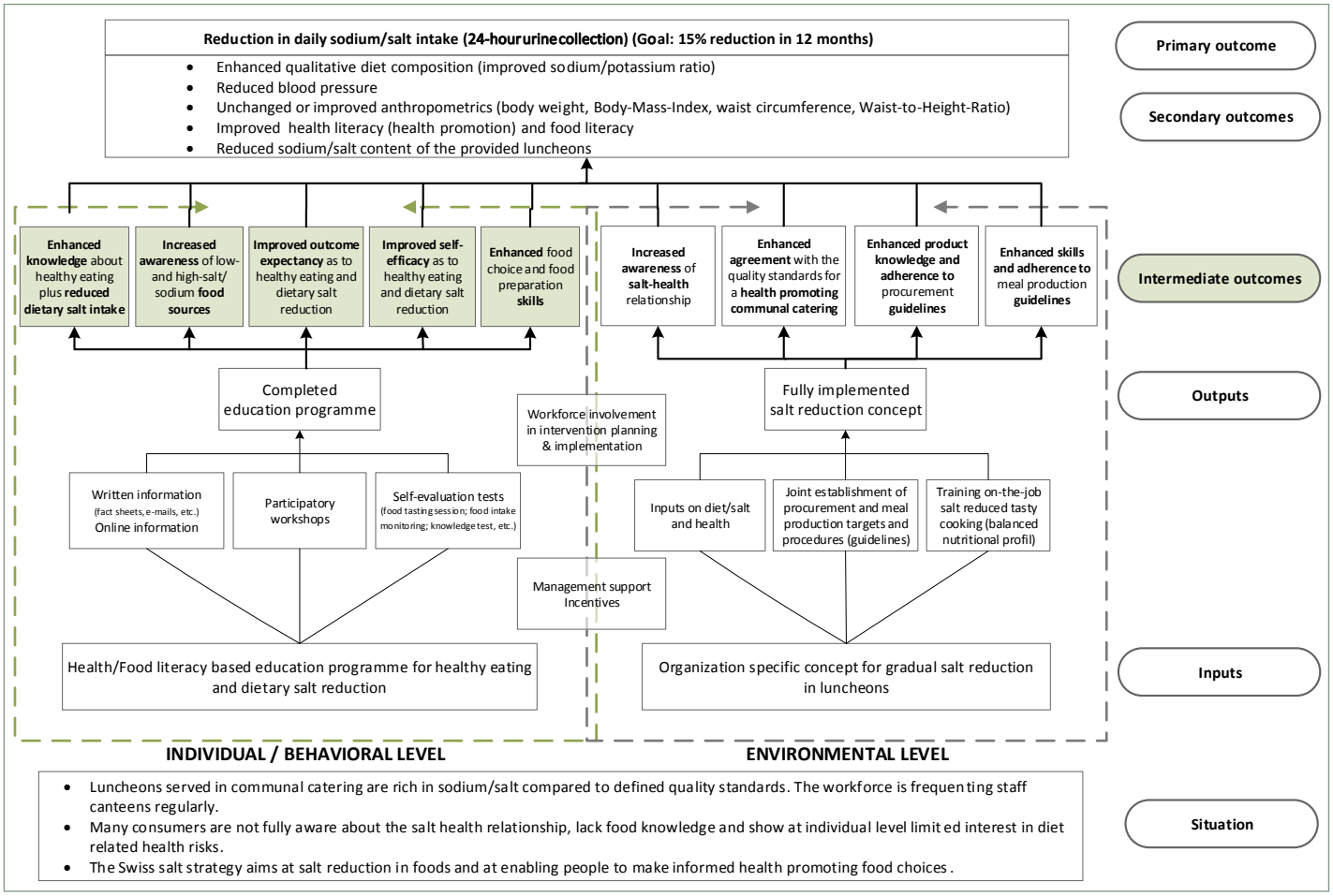

Fig. 1: **Logic model of the combined nutrition intervention *"Gesund & Gut: Na klar!"* ("Healthful & Tasty: Sure!")**
24-h urine = 24-hour urine collection

and participants could attend the hour-long nutrition education sessions during working hours. Across the seven organizations, 132 employees enrolled in the nutrition intervention and provided written consent.

Logic model

Based on a search of the literature and preliminary studies [7, 28–30], a study-specific logic model was developed (◆ Figure 1) in order to achieve the primary endpoint: a 15% reduction in the average daily salt intake of the participating employees, estimated based on sodium excretion in 24-hour urine. The model combined two intervention programs: at the behavioral level, an educational program for employees aimed at promoting a balanced diet with adequate salt content, and at the environmental level, organization-specific coaching for staff canteens aimed at gradually reducing the salt content of luncheons. This first part of the article focuses on the individual behavioral level indicated in ◆ Figure 1, with a focus on the intermediate outcomes.

Education program for employees

The conceptual framework of the education program was the Nutbeam health literacy model in a nutrition-specific context [31]. The three forms of health literacy (functional, interactive and critical) were the decisive factors in determining the objectives and content of the training program. These were translated into actionable tasks relevant to everyday life, aimed at the implementation and consolidation of a balanced diet with adequate salt content [32] (◆ Table 1).

◆ Figure 2 in the online supplement (→ www.ernaehrungs-umschau.de) shows how this content was communicated in five interactive workshops, which each built upon the last. In the first two workshops, the participants were taught the theoretical basics of a balanced diet with adequate salt content. After that, the participants were engaged with implementing what they had learned at home and outside the home. In the final workshop, the education program was evaluated and the participants reflected on how they could integrate what they had learned into their lives in the long term.

		Health literacy-related aims of education	Implementation examples
Forms of health literacy	functional	Ability to acquire information on food, food preparation and the effects of nutrition on health	Use of application-oriented informational materials on the portal of the Swiss Society for Nutrition *(Schweizerische Gesellschaft für Ernährung)*
		Ability to understand information about food (e.g. nutritional labeling, composition)	Practice reading and interpreting nutritional labeling and food composition using food packaging
		"Having knowledge" about: healthy nutrition, nutritional recommendations, food preparation, salt content	Inputs from professionals in workshops, e.g. regarding the food pyramid, salt in the diet, etc.
		Ability to prepare a balanced meal in accordance with available material and financial resources	Analyzing their own meals using photographs, discussing them, and suggesting improvements
		Ability to make a health-promoting choice	Searching for alternatives to high-salt foods in the supermarket using a "saltometer"
	interactive	Ability to talk to friends and family about nutrition	Discussing the topic of nutrition with colleagues at the workshop; addressing the topic of talking about nutrition with the personal surroundings and discussing the implementation in the workshop "implementation at home"
		Ability to apply information one has read about nutrition to one's own situation	Adjusting the salt content of their own recipes and establish concrete measures for implementation of the information imparted in the workshop
	critical	Ability to assess nutritional information from different sources	Use of various media and information sources and highlighting of these during and between the workshops (e-mails); for example information from professional associations and videos
		Ability to assess whether a food contributes to a healthy diet	Self-evaluation of sodium and potassium intake; analysis and optimization of own meals using a plate model
		Ability to differentiate between healthy and less healthy options	Assessment of the salt content of products using the packaging
		Ability to understand the association between nutrition and health	Inputs from professionals in workshops, e.g. regarding the long-term effects of high salt consumption
		Ability to advocate health-promoting conditions	Discussion of how to incorporate the content of the program within the organization, and implementation of the measures back at home

Tab. 1: **Health literacy-related aims and their implementation in the education program** [32, 33]

Support for the implementation of measures in everyday life took the form of working through an action plan and the provision of e-mails with topic-specific information or tasks between the workshops. All of the materials are available online as part of a manual [33].

Evaluation of the education program

The intermediate outcomes of the education program that were expected according to the logic model (◆ Figure 1) were operationalized as target measures for the outcome evaluation. They were recorded at the beginning and end of the intervention as part of a 68 item questionnaire, which is available online together with background information [34]. The questionnaire included questions about socio-economic status, health and lifestyle—including knowledge and behavior with regard to a balanced diet or a diet with adequate salt content–, self-efficacy, health literacy, and food literacy. Nine items (4-point Likert scale) were used to measure the perceived self-efficacy with regard to eating behavior according to Schwarzer and the mean Nutrition self-efficacy score was calculated [34, 35]. Health literacy was measured using the German version of the european Health Literacy (HL) Survey Questionnaire for the health promotion domain (HLS-EU-Q47) [36]. Based on the 16 items (4-point Likert scale), an HL index between 0 and 50 points was calculated in accordance with the recommendation of the HLS-EU consortium [27, 34]. One part of the 68-item questionnaire was also 16 questions on nutrition-specific health literacy, which the research group had developed, tested [32], and validated [27, 37]. Based on the validation, a 12-item Food Literacy (FL) questionnaire (4 or 5-point Likert scale) was compiled [37]; only one of the items

deals with salt. For these 12 items, an FL score from 7–52 points was calculated, with more points indicating better food literacy [32, 34, 37].

In addition, participation and feedback were documented for each workshop. A standardized, web-based questionnaire that the research team developed and checked for content validity was used for the evaluation of the first four of the five workshops [34]. This was used to evaluate the implementation of what was learned in everyday life as well as to evaluate the methodological elements of the training. In the fifth workshop, positive elements and potential for improvement of the four preceding educational sessions were qualitatively analyzed in addition.

Statistics (part 1)

The questionnaires used in the education program were checked for completeness and consistency before data input and data preparation. The statistical analyses at behavioral level are based on the following numbers of participants. A total of 128 participants providing valid 24-hour urine collection samples were characterized at the beginning of the study. The analyses for evaluation purposes only took account of the 125 people who remained at the end of the study [27]. In addition to descriptive analyses, Fisher's exact tests for categorical data and t-tests for continuous data were used to analyze the changes in the respective target variables in order to assess the intermediate outcomes of the education program. All statistical tests were performed two-sided at a significance level of 0.05. Due to the exploratory nature of these analyses, no corrections for multiple testing were applied. All analyses were carried out with the statistical software R 3.3.2 (www.r-project.org).

Results

Study participation

◆ Table 2 in the online supplement (→ www.ernaehrungs-umschau.de) shows the demographic and socio-economic characteristics of the training participants at the seven organizations [27]. The numbers of men and women who took part in the educational intervention were almost equal. They were well educated, 44 years old on average, and employed at 90% full-time equivalent on average.

The median level of participation (n = 125, excluding drop-outs) was four workshops, with 19 persons (15.2%) participating in a maximum of one workshop and 29 persons (23.4%) participating in five workshops.

Outcomes of the education program

◆ Table 3 shows the intermediate outcomes of the educational intervention in accordance with the logic model (◆ Figure 1).

With a few exceptions, the target variables in the areas of knowledge, awareness, outcome expectancy, self-efficacy and abilities and skills that were affected by the education program changed positively between study start (t0) and end (t12). The HL index and FL score increased significantly, but the Nutrition self-efficacy score showed no major change. In addition, after one year, fewer people identified the correct representation of a balanced plate. Furthermore, more people reported difficulty composing a balanced meal away from home. At the beginning of the study, a quarter of the participants reported that they found it either quite difficult or very difficult to do this when being at home (26%) or away from home (22%). ◆ Figure 3 shows that this was mainly attributed to a lack of time and influences in the personal surroundings. A personal lack of knowledge was only mentioned as a difficulty with regard to composing meals at home. In the course of the study, external obstacles such as price and food selection became more important when eating away from home, whereas the wishes of the family became more important in terms of meals at home.

Discussion

This evaluation of the project *"Gesund & Gut: Na Klar!"* ("Healthful & Tasty: Sure!"), which was aimed at promoting a balanced diet with adequate salt content in the workplace setting [27] showed that nutrition education significantly improved the health literacy and food literacy of the participating employees from seven organizations (◆ Table 3). We understand health literacy and food literacy to be both prerequisite and result, since they are key to every phase in the process of a change in behavior. We expected that through the promotion of the three forms of food literacy (functional, interactive and critical), participants would be empowered and motivated to change their eating habits to be more health-promoting, that they would pay special attention to salt consumption, and that at the same time, they would also actively involve their immediate environment and their personal surroundings in the process [27]. Although there were improvements over the course of a year, the average HL index and FL score of the well-educated participants who could also have been particularly interested in nutrition remained in the mediocre range, indicating a need for longer-term support. In the same population, Luta et al. [38] investigated the relationship between health/food literacy and salt awareness

Intermediary target variables	N		Start (t0)	End (t12)	p-values
Expanded knowledge regarding healthy eating and reduced salt intake					
Knowledge of the Swiss recommendation for salt intake (completely agree and mostly agree)	121	n (%)	46 (38.0%)	106 (87.6%)	0.009
Knowledge of where to find information (completely agree and mostly agree)	122	n (%)	106 (86.9%)	114 (93.4%)	0.07
Knowledge of the fruits and vegetable recommendation (completely agree and mostly agree)	122	n (%)	81 (66.4%)	100 (82.0%)	< 0.0001
Familiarity with the Swiss food pyramid (very familiar and familiar)	121	n (%)	72 (59.5%)	98 (81.0%)	< 0.0001
Knowledge of what a balanced plate looks like (plate model, correctly identified)	120	n (%)	65 (54.2%)	55 (45.8%)	0.03
Increased awareness about foods with low and high salt content					
Adding salt at the table at home (never)	122	n (%)	67 (54.9%)	81 (66.4%)	< 0.0001
Adding salt at the table away from home (never)	122	n (%)	76 (63.9%)	91 (76.5%)	< 0.0001
Salt content influences buying choices when shopping (always, mostly and sometimes)	122	n (%)	39 (32.0%)	84 (68.9%)	< 0.0001
Salt content influences food choices in restaurants (always, mostly and sometimes)	122	n (%)	43 (35.2%)	64 (52.5%)	0.0001
Knowledge of the recommended maximum daily salt intake (correctly identified)	122	n (%)	64 (52.5%)	89 (73.0%)	0.01
Improved outcome expectancy with regard to healthy eating and reduction of salt intake					
Assessment of the effects of eating behavior on health (very easy and quite easy)	122	n (%)	96 (78.7%)	102 (83.6%)	0.0003
Assessment of the significance of a food in terms of health (very easy and quite easy)	121	n (%)	110 (90.9%)	116 (95.9%)	0.06
Evaluation of associations between foods and health in advertising (very easy and quite easy)	122	n (%)	84 (68.9%)	98 (80.3%)	0.0004
Improved self-efficacy with regard to healthy eating and reduction of salt intake					
Health literacy (health promotion domain), HL index[a]	121	MW (95 %-CI)[d]	28.7 (27.7; 29.8)	30.1 (29.0; 31.2)	0.003
Food literacy, FL score[b]	121	MW (95 %-CI)	35.9 (34.8; 37.0)	39 (38.0; 39.9)	< 0.0001
Nutrition self-efficacy score[c]	121	MW (95 %-CI)	2.6 (2.5; 2.7)	2.5 (2.4; 2.6)	0.13
Improved abilities and skills in food choice and preparation					
Use of nutritional information in purchasing decisions (always, often and sometimes)	122	n (%)	60 (49.2%)	75 (61.5%)	< 0.0001
Understanding of information on food packaging (very good and good)	121	n (%)	58 (47.9%)	69 (57.0%)	< 0.0001
Success in selecting relevant information on the topic of nutrition (very good and good)	122	n (%)	73 (59.8%)	89 (73.0%)	0.007
Ability to compose a balanced meal at home (very easy and quite easy)	122	n (%)	90 (73.8%)	101 (82.8%)	< 0.0001
Ability to compose a balanced meal away from home (e.g. in the staff canteen) (very easy and quite easy)	121	n (%)	94 (77.7%)	87 (71.9%)	0.0006

Tab. 3: **Intermediate outcomes of the 12-month education program according to the logic model**

[a] Health Literacy index 0–50, [b] Food Literacy score 7–52, [a, b] more points = higher competence [27, 34]

[c] Self-perceived ability to overcome barriers or challenges and manage to stick to healthy eating [34, 35]

[d] Mean (95% confidence interval [CI])

[e] Fisher's exact test for categorical data and t-test for continuous data

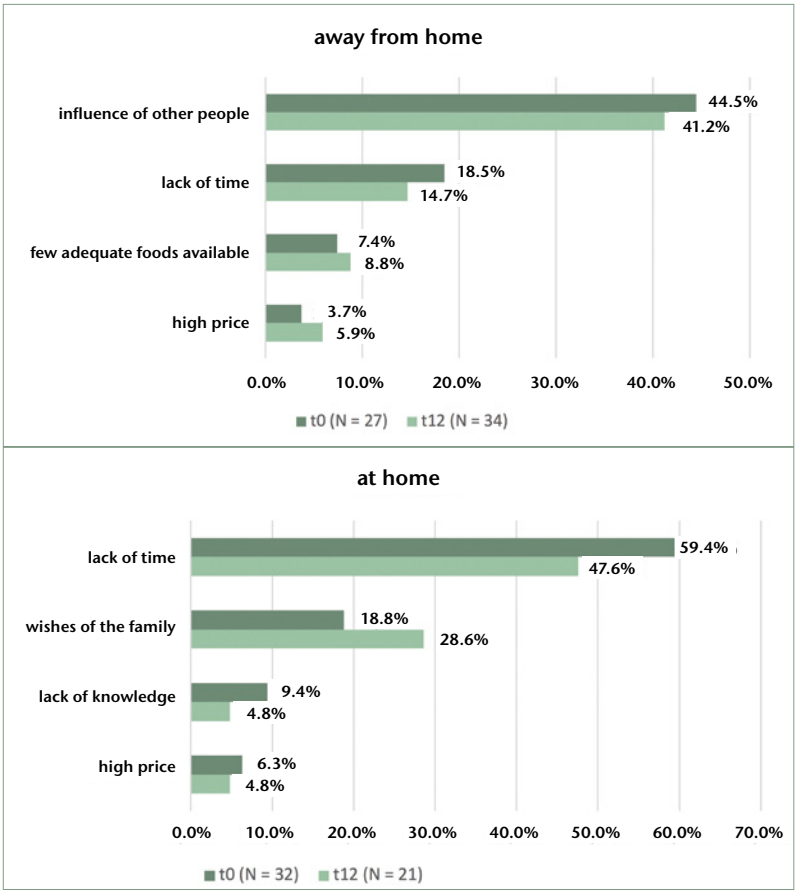

Fig. 3: **Most common factors that impeded composing a balanced meal at study start (t0) and study end (t12)**
(according to place of consumption [multiple answers possible])

to daily salt intake using the baseline data collected before the start of the education program. The participants with higher health/food literacy did indeed tend to consume less salt, but the authors could not find any significant association between health/food literacy and salt intake. This illustrated that the gap between knowledge and actual everyday salt intake must be bridged interacting with the nutrition environment [38]. Nevertheless, the results presented here show that nutrition education could provide an important stimulus for behavioral change. For most of the behavioral parameters that were measured, there was a clear improvement (◆ Table 3), which was also the case for other behavioral and educational interventions aimed at changing salt consumption [39]. Moreover, in the final workshop, many participants reported that during the education sessions, they became aware that they had already been doing many things right in terms of a healthy diet even before the training, but they now would eat in an even more balanced way. In addition, some individuals evaluated the changes they had specifically planned themselves as successfully implemented, even though the written evaluation showed that the participants had to overcome various barriers to this in everyday life. The fact that the Nutrition self-efficacy score as a measure of nutrition-related self-efficacy remained unchanged despite this could be explained by the "response shift bias". This bias is based on the assumption that treatment or education changes the understanding and evaluation of self-assessed parameters. Participants would therefore have assessed their ability to overcome obstacles or challenges when attempting to change their dietary behavior before the start of the intervention better than they did in retrospect after experiencing the intervention [40, 41]. This could also explain why after the education, fewer people estimated their knowledge of the plate model and their ability to compose a balanced meal away from home positively than they did before the training. However, it is also possible that at the beginning of the study, some participants marked the correct representation of a balanced plated menu purely by chance even though they did not know the correct response. A personal lack of knowledge about the composition of a balanced meal was described as a problem by some people in the at home context, but it was never mentioned as an issue for meals away from home (◆ Figure 3). This location-based difference indicates that participants delegate responsibility for providing a balanced selection of food with adequate salt content away from home to those providing it. However, as their knowledge increased, they were increasingly able to recognize barriers to a balanced diet and, in particular, barriers to a reduction in salt intake in their daily eating routine. Thus, at the end of the study, food provided away from home – which includes staff canteens – was rated as less suitable more frequently (◆ Figure 3), which again highlights the importance of a combined intervention.

Strengths and limitations

The educational intervention, which was carried out in the workplace setting, reached the same number of men as women and thus reached more men than is usual for nutritional interventions [42]. The training participants were very well educated compared to the general adult Swiss population [43], but the proportion of people with a problematic level of health literacy was at a comparable level [38]. Population groups with a lower level of educational attainment are also difficult to reach in a workplace setting [44].
The research group could specifically place

nutrition-specific health literacy at the center of the educational intervention and was able to measure it using a validated instrument for the first time in a Swiss population group [32, 37]. Attempting to change dietary behavior with a focus on salt, which is not only a key factor in nutrition and a risk factor, but is also key to the sensory perception of food, increased the complexity of the education program and demanded a great deal of motivation and commitment from the intervention participants, not least due to the need for repeated measurements (24-hour urine collection, etc.) for research purposes. The education program had an open design so that it would be adapted to the surroundings and the needs of the seven employee groups in the different organizations and would comply with the specifications of the research. For application in the CHM, it is therefore possible to adapt the content of the program to the needs of subgroups of the workforce to bring about a workplace-specific change in behavior and to offer interventions of varying intensity [45, 46].

The intervention study was limited to the German-speaking part of Switzerland and the validity of all study results is therefore limited to this language region. Long-term success after completion of the study is uncertain. Due to time constraints and the financial restrictions of the research program, the intervention phase lasted one year, but in any case, this was longer than in comparably intensive interventions [39]. Because the willingness of organizations and/or their staff canteens to participate in the study was limited, the study was ultimately conducted as a non-randomized trial without a real control group. With this study design, positive changes in the behavioral parameters were observed in the majority of cases after the intervention, but whether or not a causal relationship exists cannot be established with certainty. These general limitations also apply to the environmental intervention. The coaching of the catering teams and the overarching conclusion for the article will form the content of part 2 of this article in Ernährungs Umschau 1/2020.

You can find the continuation of this article and the literature for part 1 and part 2 in the next issue of Ernährungs Umschau (1/2020).

Funding
The intervention study was financed by the Swiss National Science Foundation (SNSF) as part of the National Research Program NRP69 Healthy Nutrition and Sustainable Food Production (Project No. 145149) and by the Swiss Heart Foundation. The project group received the Health Literacy Award – *Preis der Allianz Gesundheitskompetenz* 2016 for its health/nutrition literacy-based intervention program in the workplace setting.

Conflict of Interest
The authors declare no conflict of interest.

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DOI: 10.4455/eu.2019.049