

The development of public online services for assessing diet quality, having automated feedback, and getting support for dietary changes: the Finnish Nutrition Navigator and the Finnish Nutrition Path (Ravitsemusnavigaattori and Ravitsemuspolku)

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Abstract

Nutrition is one of the most important factors in the prevention of noncommunicable diseases. However, most Finns do not adhere to the nutrition recommendations. Furthermore, there are no commonly used digital dietary screener tools to measure and report diet quality. No such open tools or reliable consumer-oriented nutrition websites exist either for consumers interested in their quality of diet.

Two public online services were created including (1) a web app to measure diet quality with automated personalized feedback system based on the scientifically validated Healthy Diet Index (HDI) and nutrition recommendations, and (2) a website for a self-care path to support the individual in making dietary changes. We utilized service design, several user and expert interviews and feedback questionnaires in the development. The work is part of the National and North Savo regional FOODNUTRI projects funded by Research Council of Finland and North Savo Regional Council, co-funded by the European Union.

The Finnish Nutrition Navigator and the Finnish Nutrition Path were launched in November 2024 (in Finnish). The services are publicly available at no cost, targeted at adults aged 18–75 years. Services can be used independently or with a professional. The professional can guide the patient/citizen to fill in the dietary questionnaire in the Finnish Nutrition Navigator from which the user will get the automated feedback and a code. The user can give the code to the professional so that the information about the diet quality can be utilized and marked in a standard form. The Finnish Nutrition Path gives information and support for dietary changes.

The online services support (1) *consumers* seeking help with their diet, (2) *health care and wellbeing professionals* in dietary screening and nutrition counseling, (3) *researchers* to collect data on diet quality, and (4) *health promoting sector* to utilize data on population diet quality for reporting and planning and

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measuring effectiveness of health promotion actions. Using the services would standardize dietary assessment and documentation and provide evidence-based information of diet quality for consumers. The data collected can be used to study diet quality of the Finnish adults and the effectiveness and cost-effectiveness of nutrition and lifestyle counseling, allocate resources in health care, and support work to promote health and wellbeing.

Keywords: diet, dietary intake, dietary habits, diet surveys, food intake, health care

Introduction

Better diet quality is one of the key elements in the prevention and treatment of cardiometabolic diseases and ill health [1,2]. However, only a few Finns adhere to the nutrition recommendations [3]. For example, 14% of men and 22% of women consume the recommended ≥ 500 grams of vegetables, fruit, and berries per day.

Assessing dietary habits is a fundamental step in nutrition counseling [4]. For example, the American Heart Association has recommended incorporating rapid diet assessment screening tools into healthcare and into electronic health records (EHR) [4], highlighting the critical need for the development of such tools. Finnish Nutritional care guidelines [5] recommend using the Healthy Diet Index (HDI) [6], a short dietary screener, for assessing dietary habits in nutrition counseling. However, the HDI has not yet been widely implemented, and there are currently few evidence-based practical digital tools available for its use [7]. At present, Finland lacks a standardized tool for evaluating diet quality in general practice, and the HDI could provide a valuable solution [6]. Easily accessible and practical tools are essential to ensure dietary screening and counseling are consistent and based on the best scientific practices, regardless of the professional's level of nutrition expertise and available resources.

Globally, dietary screeners have been developed to align with various dietary guidelines, such as those

of the United States, Canada, and Norway [4,8,9]. At least three screeners follow Finnish nutrition recommendations [6,10,11]. These tools typically assess similar components of the diet, including the intake of vegetables, fruits, meat, fish, sugary foods and beverages, and fat sources. The differences between screeners reflect the specific dietary nutritional guidelines and dietary habits of the target populations.

In general, the associations between dietary screeners and metabolic factors have been relatively understudied [4]. The Mediterranean Diet Adherence Screener (MEDAS) [12] is one of the most extensively studied dietary screeners and has been linked to various health benefits. These include a 25% reduction in the combined risk of type 2 diabetes, heart disease, and mortality [13], as well as lower BMI, reduced waist circumference, improved lipid profiles, and a reduced 10-year coronary risk [12] while the MEDAS score increases.

Notably, also the Finnish HDI is associated with e.g., better lipid and glucose metabolism [6], better eating competence [14], and is shown to change in a lifestyle intervention [15]. These associations highlight its significance in both the prevention and management of chronic diseases, as well as its role in promoting beneficial eating behaviors.

Although several dietary screeners already exist [4, 8], they are not yet widely used, including in Finland. It is unclear if they are used online. Furthermore, it is important that the dietary screeners are

country-specific [8] in order to take into account the national food-based dietary guidelines and food culture. Traditional methods for assessing diet quality are time consuming, the results are not easy to interpret without education, and they do not provide uniform simple measures for EHRs. Thus, developing a short, user-friendly, accessible, and versatile dietary screener based on Finnish nutrition recommendations is needed.

Our goal was to make the HDI as a digital diet screener available for widespread use across Finland, so it could be utilized in various contexts, from self-care apps to healthcare integration. The project aimed to provide automated, general feedback on diet quality while offering practical tips to support a health-promoting and sustainable diet. Personalized feedback from a digital dietary screener motivates people to complete the questionnaire [9].

A web-based, open-access, standalone solution maximizes accessibility and adoption, ensuring a user-friendly and trustworthy system. The design process must consider data security, user management, branding, and usability. The development process also needs to incorporate service design principles and user testing, ensuring that the final product is both practical and aligned with user needs.

Thus, our aims for the development of the online services were to create public, easily accessible services that are flexible for independent users, including a possibility to revisit the results later and to share the results with professionals. Furthermore, we aimed to ensure services' acceptability and good user experience. The services were also developed to collect dietary intake data for research and health promotion.

This paper describes the rationale and development of the Finnish Nutrition Navigator and Finnish Nutrition Path.

Materials and methods

The foundation of the development was based on scientific evidence, national nutrition recommendations [16,17], and prior research on the development of HDI [6,18,19]. At the beginning of the development process of online services, literature searches were conducted regarding the useful and effective features of online services for lifestyle changes, which helped to define the desired features such as feedback, self-monitoring, and goal-setting [20,21]. Regarding nutrition content, national [16,17] and Nordic dietary recommendations [22] were at the core, but aspects of eating competence [14,23,24], such as focusing on meals, having a positive attitude towards food and eating, accepting various foods, and paying attention to internal cues of hunger and satiety, were also incorporated into the development.

Development of the Finnish Nutrition Navigator: a digital diet quality assessment and feedback tool

The Finnish Nutrition Navigator was developed to provide an independent, user-friendly tool for assessing diet quality and offering personalized feedback. The tool is based on the HDI [6], a scientifically validated measure of diet quality, initially developed as part of the Stop Diabetes study by several nutrition specialists [6,15] (Figure 1).

Updating and digitization of the D2D-FIQ Questionnaire and HDI

The HDI scoring system relies on the D2D-FIQ food intake questionnaire developed in the FIN-D2D as part of the National diabetes program DEHKO [25,26]. The D2D-FIQ with the updates in the HDI

creation [6] examines meal rhythm and key food groups consumed on a daily and weekly basis: meals and snacks; fast food; vegetable-, fish-, meat-, chicken- and sausage-based dishes; cooking fats; fat used on bread; salad dressing; fruits and vegetables; nuts and seeds; dairy products; grains; processed meats; sugar rich foods; sweets; drinks; and alcohol.

In 2022, minor updates were made to the questionnaire by its original developers. These updates included assessing the use of grain side dishes based on fiber content, as well as incorporating questions about potatoes, plant-based dairy and cheese alternatives, and non-alcoholic beverages to reflect changes in Finnish dietary habits and the food supply. Furthermore, we added questions about legume and egg consumption, aligning with new Nordic Nutrition Recommendations [22], to the Finnish Nutrition Navigator. However, these additions were not yet included in HDI scoring. Food examples were also updated to align with current product offerings.

The digitization of the dietary index commenced with the deconstruction of the updated D2D-FIQ into discrete components. The updated 18-item D2D-FIQ and our two additional questions comprised a total of 57 distinct questions (e.g., “How many times a week do you usually eat fish dishes as a main course?”) and HDI scoring system 32 scoring steps for the calculation of the HDI (e.g., ≥ 2 fish dishes per week = 2 points; < 2 fish dishes per week = 0 points). Unique identifiers and formal representations were developed for these questions and scoring processes to facilitate their implementation in an electronic format.

The transition of the originally paper-based D2D-FIQ survey to an electronic format required consideration of the specific characteristics of digital forms and usability factors [27]. The questionnaire

consisted solely of multiple-choice questions and numerical input questions. Many of the original questions and response options were quite lengthy, and an additional challenge was to define appropriate limits and increments for the numerical questions. For example, based on our previous experience, open-ended response fields in digital questionnaires frequently lead to errors. We compared different digital presentation formats for numerical questions like direct numeric input, sliders, and button-based implementations [28]. Based on user testing and ensuring functionality across various devices, the button-based implementation was selected. Some other design choices backed up by user testing included dividing questionnaire into multiple pages, rephrasing some questions for clarity and supplementing some questions with illustrative portion-size images to assist with portion estimation.

Feedback system

Automated feedback for the HDI was initially piloted in the Nutrition, Lifestyle Factors, Health and Genes (NLHG) recall study conducted by the University of Eastern Finland [19], and insights from this study informed the development. The feedback was created based on national and Nordic nutrition recommendations [16,17,22], designed to be clear, engaging, and actionable, considering also behavioral theories [29,30]. Both visual and textual elements were included to highlight the strengths of a user’s diet and identify areas for improvement.

From prototype to Finnish Nutrition Navigator

The development of Finnish Nutrition Navigator evolved from initial plans of creating separate consumer and professional services to create a unified solution inspired by another digital platform [31]. Thus, the focus shifted towards designing a versatile tool based on core principles like open and

anonymous access and enabling users to revisit and share feedback via a unique identifier, the “feedback code”.

Development of the Finnish Nutrition Path: enlargement of the feedback and getting support for dietary changes

Because it was not practical to include large amount of content directly in the feedback of the Finnish Nutrition Navigator, the Finnish Nutrition Path website was created to provide more information and broader support for dietary change.

“Nutrition Pathways” for different themes were created. This allows users to continue exploring topics of interest after completing the Finnish Nutrition Navigator. The Pathways also emphasize small actions that can be easily implemented in daily life and creating new permanent habits utilizing the BitHabit concept and library [32]. The “My Path” feature support users in exploring the Nutrition Pathways while also setting and tracking their own goals and concrete actions.

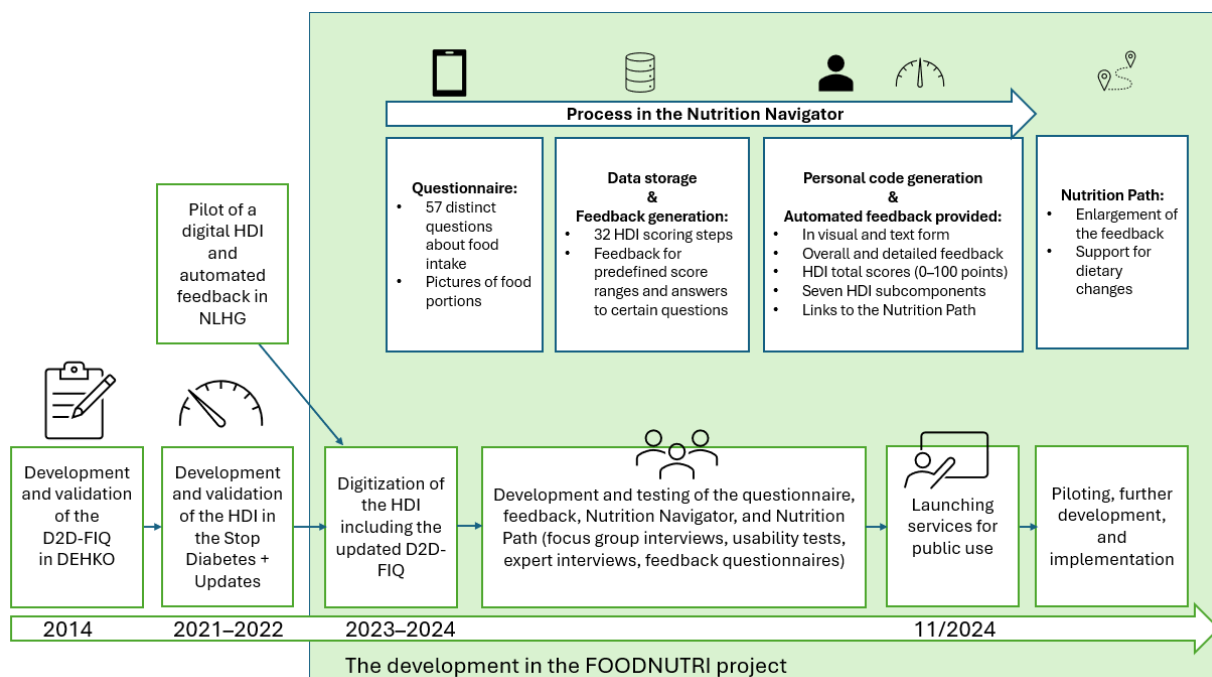


Figure 1. The background, service development and the process flow of the Finnish Nutrition Navigator and the Finnish Nutrition Path.

D2D-FIQ = the food intake questionnaire developed in the FIN-D2D as part of the National diabetes program DEHKO [25, 26]; HDI = the Healthy Diet Index (HDI) [6] developed in the Stop Diabetes study [15, 18] including the updated D2D-FIQ questionnaire and the HDI scoring system; NLHG = Nutrition, Lifestyle Factors, Health and Genes Study [19].

The development of Finnish Nutrition Path was guided by behavioral and cognitive theories, emphasizing sustainable habit formation and effective website. These theories are:

- Self-Determination Theory [29]: supporting intrinsic motivation and autonomy,
- Habit Formation Theory [33,34]: encouraging sustainable behavior through gradual, repetitive actions,
- Social Cognitive Theory [30]: emphasizing self-efficacy and observational learning as mechanisms for change,
- and deliberative processes with the Behavior Change Techniques [35] from the self-regulation theories [36], such as self-monitoring, goal setting, as well as action and coping planning.

Based on the theories, the user can self-decide what to do, the content supports self-efficacy and delivers a feeling of being respected. To create new diet-related lifestyle habits, the website offers small actions to test in everyday life and to notice the rewarding feeling of finding a new suitable habit.

Ensuring the usability of the services

Service design workshops

The aim of three workshops among the developer team was to consider the views of all parties affected by the services, to see the service chain as a whole for the customers and service provider, and to create solutions through co-creation. Furthermore, service blueprints were generated to describe detailed service model, the connections between the parts of the services, and the processes for the service provider and the customer.

In addition, experts were utilized for visual content and brand design for the services.

Focus group interviews, usability tests, expert interviews, and feedback questionnaires

Altogether 11 focus group interviews, 17 individual usability tests, and 4 individual expert interviews were conducted between November 2023 and December 2024 (Table 1). The aim was to gather feedback on the content, usability, and structure of both online services.

We arranged usability testing also within the *Comprehensive study of Biochemical Response to Alternative protein sources in different food matrices* (COBRA Study, ClinicalTrials.gov identifier NCT06253728). Participants were volunteers (30–65 years) having overweight and high waist circumference but no chronic illnesses or conditions.

Table 1. Number and description of the participants giving feedback during the development process of the online services.

	Total number of participants	Participants
Focus group interviews (11 sessions)	59	hospitality management and nutrition students, university and university of applied sciences personnel, sports coordinators of a municipality, peer tutors for digital support for the elderly, experts from patient NGOs and national expert and research institute
Individual usability tests	17	university of applied sciences personnel, participants in the COBRA study
Expert interviews	4	nutrition experts from municipal health promotion and education/academy/clinical work, expert from patient NGO
Feedback questionnaire	85	e.g., participants in the COBRA study, university and university of applied sciences personnel and students, members of the project's steering group

NGO = nongovernmental organization; COBRA = Comprehensive study of Biochemical Response to Alternative protein sources in different food matrices, ClinicalTrials.gov ID NCT06253728.

The focus groups and individual interviews provided valuable feedback to support the development process. Related to the Finnish Nutrition Navigator, participants primarily offered feedback on enhancing the clarity of questions and the development of response options. Feedback on the Finnish Nutrition Path focused mainly on the amount of provided information, the website's visual design and the solutions implemented on the site. Part of the results are already published in the Bachelor thesis [37]. We also tested two demo versions of Finnish Nutrition Navigator questionnaire. Version 1 was visually similar to the paper-format of the D2D-FIQ. Version 2 with predefined response options and portion size pictures was found to be superior in usability and user experience.

Participants of the COBRA study filled in the demo versions, one version on one and another version on another study visit. Thus, the results were individually comparable. Two versions of presenting alcohol questions were tested. The original four-question format [6] yielded most often higher and thus possibly more accurate reports compared to a

single aggregated question. The original format was retained for precision. In the COBRA study, some participants filled in the questionnaire in less than 10 minutes. The average time was 14 minutes 34 seconds (marked outliers and participants of the individual usability tests excluded).

Results

The online services Finnish Nutrition Navigator and Finnish Nutrition Path were launched in Finnish language on November 11th, 2024. The services are publicly available for everyone at no cost to support health-promoting and sustainable diets with evidence-based automated feedback. The services can be used independently or with a professional.

The Finnish Nutrition Navigator (Ravitsemusnavigaattori)

For the user, the Finnish Nutrition Navigator (Ravitsemusnavigaattori) (<https://ravitsemusnavigaattori.fi/>) includes the updated, validated food intake questionnaire, feedback based on the HDI scoring

[6] and nutrition recommendations [16,17,22], optional personal background questions, and instructions for using the service.

The food intake questionnaire and feedback

Finnish Nutrition Navigator includes 48 questions (57 distinct entries) about meal rhythm and food intake. To help the user to estimate the amounts of foods consumed, pictures of food portions are presented (Figure 2 A). The user gets immediately a personal code (Figure 2 B) and automated feedback of the diet based on the HDI scoring [6] and additionally, in some cases, answers to certain questions. HDI evaluates overall adherence to Finnish

nutrition recommendations [16] on a scale from 0 to 100, with higher scores indicating better diet quality and assesses seven key subcomponents of diet using weighted scoring, reflecting their relative importance: meal pattern; grains; fruits and vegetables; fats; fish and meat; dairy; and snacks and treats including beverages [6]. The feedback includes an overview of the diet quality graded as excellent/good/moderate/still to be improved (Figure 2 C) and details based on the HDI subcomponents graded as excellent/good/still to be improved (Figure 2 D). The grading of the HDI scores is based on previous research data from the StopDia and NLHG studies [15,19].

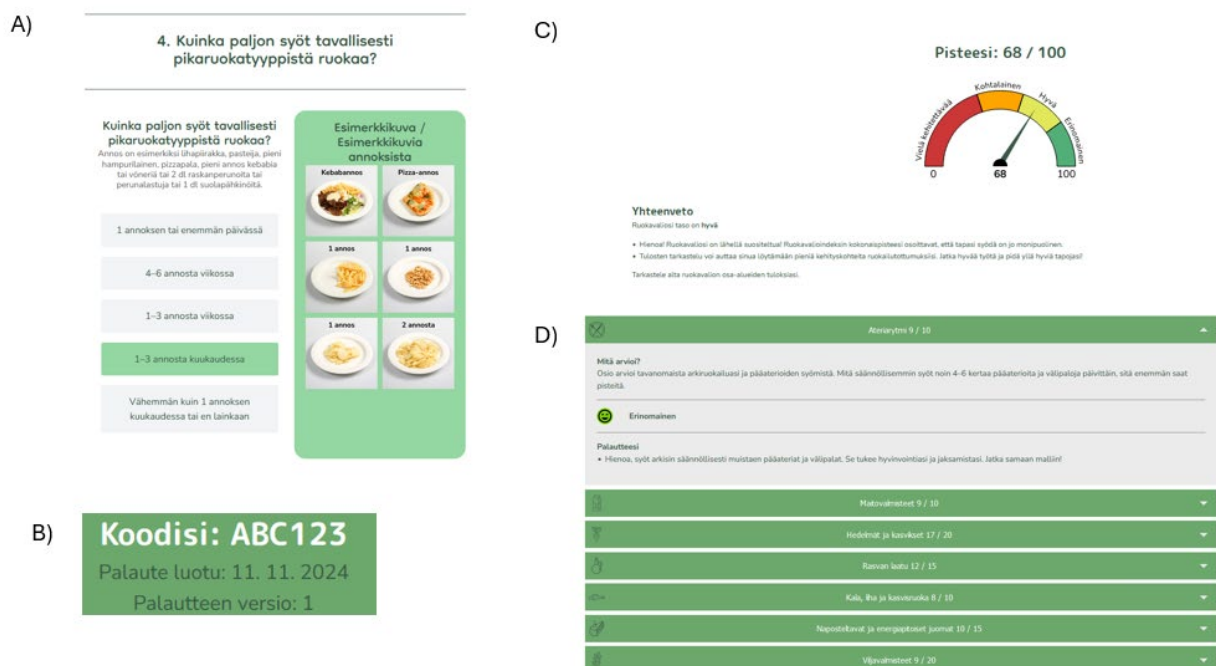


Figure 2. Screenshots of the Finnish Nutrition Navigator: A) questionnaire, B) the code, C) overall feedback, D) more detailed feedback.

The feedback is designed to provide general insights into an individual's diet compared to nutritional recommendations. To receive more specific information and tips for a health-promoting diet, the user is directed to the Finnish Nutrition Path. Each theme in the feedback (e.g., "Fruit and vegetables") includes a link to the particular theme in the Finnish Nutrition Path (e.g., the pathway "Vegetables, berries and fruits") for further reading. It is important to note that the services do not provide personalized nutrition counseling and do not consider user's medical condition or special requirements for the diet. For individual dietary guidance and nutrition therapy, the person must contact their healthcare provider.

Data for research and health promoting purposes

The Finnish Nutrition Navigator includes also five optional questions about the user: whether living in Finland, home municipality in Finland, age group, gender, and satisfaction to life on a scale of 0–10.

Technical solution

The Finnish Nutrition Navigator is implemented as a web app using widely adopted development frameworks and tools. The app utilizes the MERN tech stack, consisting of MongoDB, Express.js, React.js, and Node.js [38]. The core design principle was to keep the system simple for both administrators and end users.

When the user submits the completed food intake survey, the system verifies the received data, performs the scoring calculations, generates feedback based on the scores and individual responses, creates a unique code, stores the responses and feedback in the database, and directs the user to the feedback page (Figure 1).

To ensure user anonymity, the platform is designed to be open without need for registration and identification. Thus, the dietary feedback is equipped with a unique "feedback code" (Figure 2 B), allowing users to save or share results with professionals or for research purposes while staying anonymous from the system's perspective. The code is active for two years. This implementation method also enables data transfer between systems, facilitating system integrations using e.g., application programming interfaces (APIs). The information collected in the system alone is not sufficient to identify an individual; however, for precautionary reasons, the data is treated as if it were confidential personal information and system is implemented following General Data Protection Regulation (GDPR) guidelines.

The Finnish Nutrition Path (Ravitsemuspolku)

The Finnish Nutrition Path (Ravitsemuspolku) website (<https://ravitsempolku.fi/>) includes nine Nutrition Pathways, My Path, and a site for the project's news. The website is an enlargement for the feedback from the Finnish Nutrition Navigator but can be also viewed independently.

The Nutrition Pathways are websites offering knowledge, self-reflective exercises, and practical tips for health promoting and environmentally sustainable food choices based on the nutrition recommendations [17,22]. The topics of the Nutrition Pathways mainly follow the themes of the Finnish Nutrition Navigator's feedback: meal pattern; vegetables, berries and fruits; grains and potato; quality of fat; vegetable, fish and meat dishes; dairy products and plant-based alternatives; beverages; snacks and mindful choices; and salt (Figure 3).

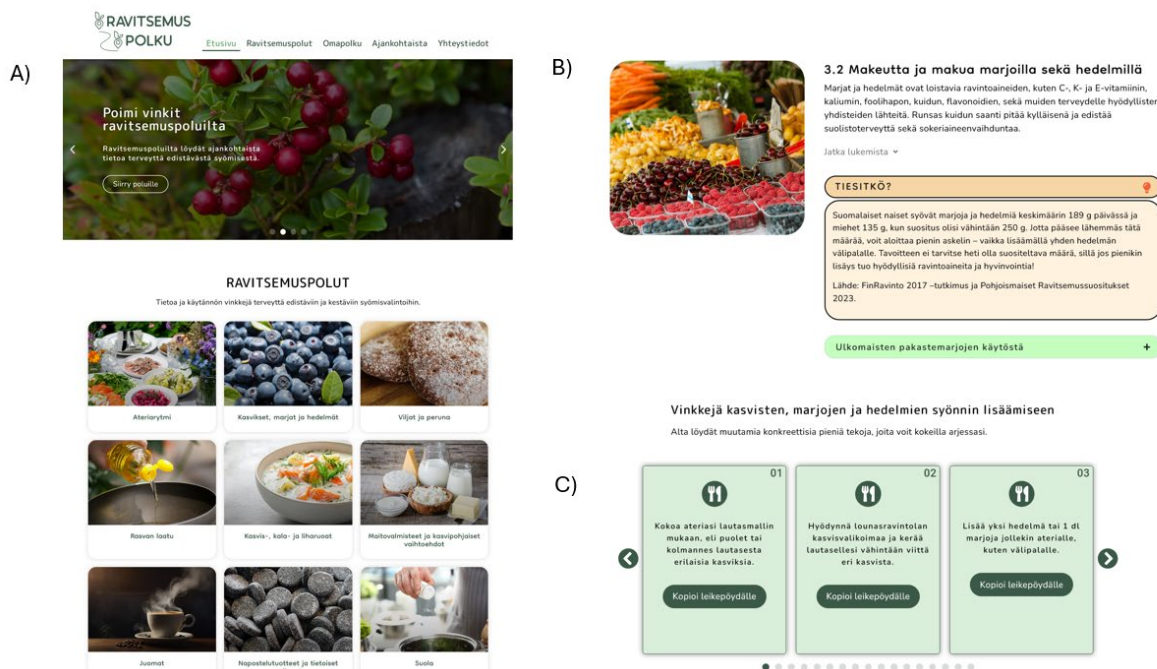


Figure 3. Screenshots of the Finnish Nutrition Path: A) an overview of the front page, B) an example of the content on one of the paths, C) an example of the tips for tiny habits.

The My Path supports identifying and setting suitable goal(s) of dietary change and defining concrete actions to achieve that goal. It is an interactive "self-change journey" based on behavioral and cognitive theories [29,30,33–36]. This journey incorporates: (a) *Self-assessment*: Using the Finnish Nutrition Navigator to evaluate current dietary habits; (b) *Result interpretation and goal setting*: Reviewing feedback, reflecting on dietary strengths and weaknesses, and defining clear, manageable dietary goals; (c) *Practicing small habits*: Identifying simple, daily actions to support goal achievement, followed by practicing and monitoring these actions; (d) *Incremental habit formation*: Gradual development of sustainable, healthier eating habits.

Technical solution

The WordPress CMS platform is used for the implementation of the Finnish Nutrition Path as CMS allows for fast experimentation of various ideas even though using CMS is not ultimately as flexible

solution as creating a custom web app from scratch. CMS with plugins offers enough options for mainly informational website needs. Especially on My Path, technical solutions are created to assist users. For example, self-filled PDF forms and interactive website forms to assist with setting goals and actions.

The customer journey

The intended full customer path is presented in Figure 4 although the user can freely utilize the services in any order or pick only a part of the whole path. The user is intended to begin with filling in the food intake questionnaire and receiving immediate automated feedback in the Finnish Nutrition Navigator. The feedback includes links to the Nutrition Pathways in the Finnish Nutrition Path. Thus, the user can smoothly continue to the process of dietary changes in the Finnish Nutrition Path, if needed.

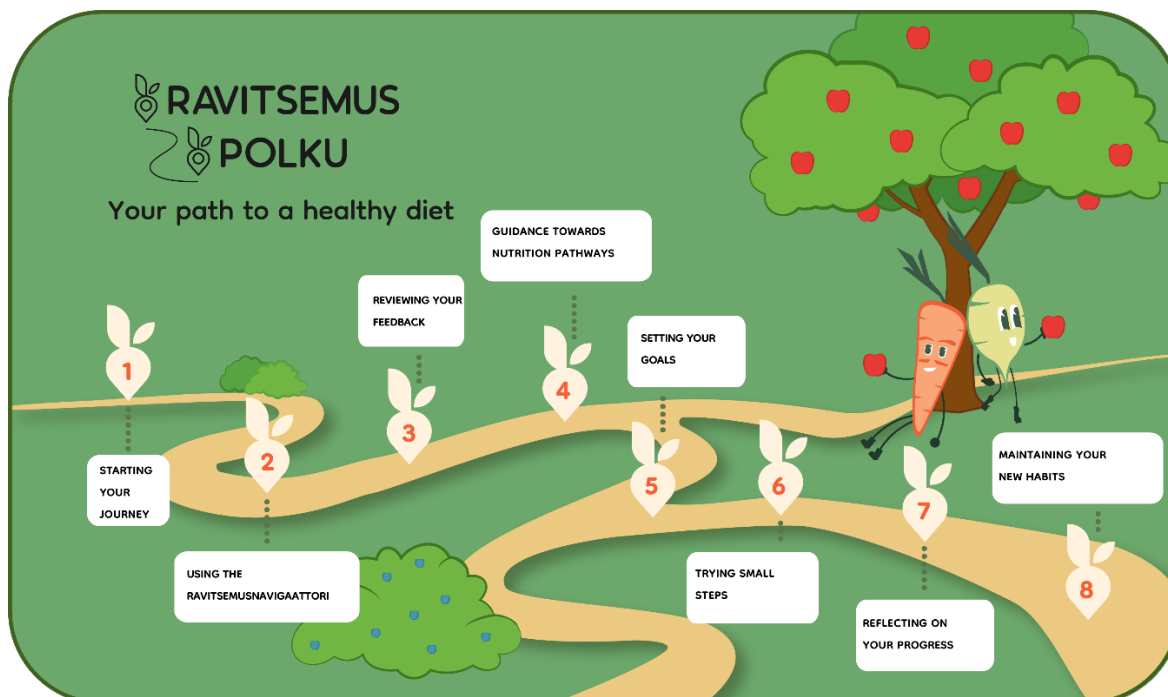


Figure 4. The eight steps of the customer’s path.

Discussion

The online services Finnish Nutrition Navigator and Finnish Nutrition Path include dietary screener, automated feedback, updated nutrition information, and self-care path for dietary changes. The services can be used independently or as a part of nutrition and lifestyle counseling in e.g., health care and municipal settings.

Finnish Nutrition Navigator is the most sophisticated web app in Finland to implement the HDI [6] as a short digital dietary screener as recommended nationally [5]. The chosen implementation for Finnish Nutrition Navigator allows for the widespread use of the HDI across Finland. As it is important that the dietary screener is country-specific [8], HDI was selected as it is developed by several nutritionists in large Finnish diabetes prevention programs [6,18,25,26]. It is also more updated, validated in wider population, more sensitive to show changes, and measures diet quality more broadly than

another Finnish short diet quality survey, Index of Diet Quality (IDQ) [11].

Finnish Nutrition Navigator meets several theoretical and practice-based criteria for a rapid diet screener tool [4]: it evaluates total diet quality, is assessed against food records and health biomarkers, provides immediate guidance on healthy dietary changes, is sensitive to changes, easy to learn and use, provides automatic scoring, and is useful for chronic disease management. However, some criteria are not yet met: test-retest reliability is not assessed, it could be validated in more diverse populations, and completion time is over 10 min, approximately 10–20 min. Validating the whole Finnish Nutrition Navigator, including the automated feedback, is also important.

The most similar online service including food intake questionnaire with automated feedback is the DIGIKOST-FFQ created in Norway [9,39,40]. Compared to the Finnish Nutrition Navigator, the

DIGIKOST-FFQ includes more questions about food items (n=78) and also questions about other lifestyle factors. In terms of diet, the DIGIKOST-FFQ is shown to be a valid measure [39].

The self-care path Finnish Nutrition Path aims to empower users to take proactive, theoretically justified [29, 30, 33–36], steps toward healthier eating habits while providing a scalable resource for population-level dietary interventions. Currently, there are no other consumer-oriented websites focusing solely on general health promoting diet.

Both services are planned to support health promoting and environmentally sustainable food choices based on the nutrition recommendations. Thus, the services suit well to disseminate the newly published Finnish national nutrition recommendations [17], which mention Finnish Nutrition Navigator as an example of a dietary screening tool. However, as the HDI assess dietary habits in relation to the recommendations, updating the scoring of the Finnish Nutrition Navigator will require updating first the HDI in its responsible expert group.

Four main user groups or use cases can be identified for the services: (1) *Adults* interested in testing the quality of diet, and/or seeking information on nutrition or help for dietary changes. (2) *Health care and wellbeing professionals* utilizing the services in dietary screening or nutrition counseling. Easily accessible and practical tools are essential to ensure dietary screening and counseling are more consistent and grounded in the best scientific practices, regardless of the professional's level of nutrition expertise and resources. Currently we do not have any simple structured way to document patient's diet quality to the EHR in Finland. Utilizing HDI, the information about the diet quality can be marked to the EHR in a standard form. (3) Finnish Nutrition Navigator can be used in *research* as a tool to collect data on diet quality. (4) *Health*

promoting sector (municipalities, wellbeing services counties, associations etc.) can utilize the anonymous data collected via Finnish Nutrition Navigator while collecting data on population diet quality and food consumption in terms of health promotion. In addition to diet quality, the data includes information on the individual's home municipality, age group, gender, and satisfaction to life as a simple Patient-Reported Outcome Measure (PROM). These data can e.g., support work with counties' wellbeing accounts and plans to promote population level health and wellbeing.

Strengths and limitations

The services possess several strengths. The contents are created by nutrition experts and scientists. The services are made user-friendly by utilizing the user experiences of both professionals and consumers. They can be used independently or with professionals with diverse nutrition education. All software packages used are well-known and widely adopted, minimizing technical issues. The dietary questionnaire is rather short and easy to use. Rather short filling time demonstrates feasibility of the digital format. The current implementation is well-suited for broad adoption, and data gathered can be used for research and health promotion. By using the unique "feedback code", there is no need for registration and identification, the data stays anonymous, the code allows users to save or share results with professionals or for research purposes while staying anonymous from the system's perspective, and data transfer between systems is enabled, facilitating system integrations using e.g., APIs.

However, there are limitations: (1) Because the services are not regulated medical devices, the EU Medical Devices Regulation sets some limitations to the development work. The services provide an overall feedback on the diet but cannot consider

the user's individual health situation and needs. The services do not guide or make decisions for professionals. Thus, professionals still need to provide personalized counseling. While using the services independently, the user must contact healthcare provider for individual dietary guidance and nutrition therapy. One possible direction in future development could be utilizing artificial intelligence (AI) in e.g., prioritization in showing the results/feedback, persuasion for dietary changes, and analysis of risks for chronic diseases. However, this would require collecting more personal information and considering the regulation of medical devices. (2) A significant factor that has guided and limited the design of the self-care service is the decision not to develop user management as part of the Finnish Nutrition Path. Instead, the service has been kept open, secure, and easily maintainable. This solution partly stems from the limitations of the CMS platform's user management and considerations related to data security. As a result of this choice, it has not been possible to establish a seamless continuation from assessing the current diet quality to goal setting and tracking. Furthermore, a mobile app would be better platform to support dietary changes. (3) The services are currently only in Finnish, with plans for other language versions. (4) The services focus solely on nutrition, although other lifestyle factors are important for wellbeing. However, we wanted to focus only on nutrition because there are no other public services for health promoting diet.

Studying the effectiveness of new services is important for implementation. Pilot testing with municipal sports coordinators and occupational healthcare professionals is ongoing. Furthermore, the Finnish Nutrition Navigator will be implemented in healthcare and municipal settings during the EU-funded JACARDI project from 2023 to 2027 (<https://jacardi.eu/>). Additionally, an open-access

course on the use of the HDI, including the Finnish Nutrition Navigator, is planned to support professionals.

Having a widely used, scientifically validated, digital dietary screener tool to measure diet quality in health care, health promotion and research would unify the measures and make easier to compare diet quality. While the HDI is used in healthcare, nutrition-related information will be collected to the EHR and data lakes in a standardized manner, aiding decision-making, studying the effectiveness and cost-effectiveness of nutrition counseling, allocating healthcare resources, and supporting work with the counties' wellbeing accounts and plans to promote health and wellbeing.

Conclusion

The Finnish Nutrition Navigator and Finnish Nutrition Path are public online services for general adult population for assessing diet quality, having automated feedback, and getting support for dietary changes based on scientific evidence and nutrition recommendations. Ongoing pilot and usability testing continue to guide refinements, ensuring the websites remain practical, up-to-date, precise, and user-friendly. The services can be used individually or with wellbeing/health care professionals providing also a tool for data collection for researchers and organizations working in health promotion. Studies on feasibility and effectiveness will be conducted to support the implementation of the services to wider use.

Conflict of interest

The authors declare that they have no conflict of interest.

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