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Development of a Healthy Eating and Lifestyle Program (HELP) Online Website for Filipinos: A Case Report

Background and Purpose: Non-communicable diseases (NCDs) are a major public health problem in the Philippines and around the world. Preventive measures to reduce its continuous rise require improvement in the health system. Utilization of information and communication technology-(ICT)-based tools will allow dissemination of evidenced-based information in the population. This case report contains the description of the development process of a Web-based nutrition Website.

Case Description: ICT-based tools were explored as means of communicating nutrition information to the public because of the increasing access and usage of the Internet among Filipinos. An iterative process with five major phases were followed in the development.

Outcome: The Website HELP Online can be accessed through (<http://i.fnri.dost.gov.ph/helponline>). There is integration of two modules: one for the general public and the other for registered nutritionist dietitians (RND) of the Food and Nutrition Research Institute (FNRI). The first module contained the nutrition counseling platform that connects and records all interactions of online and walk-in clients with their RNDs. The second module contained nutrition calculators, a health tracker, and nutrition education materials.

Discussion: The developed HELP Online Website was used for online users to easily access nutrition information and services offered by Department of Science and Technology (DOST)-FNRI. The user-centered design focus in combination with a responsive Web platform resulted in improved user satisfaction. In terms of content, use of the current and accepted scientific information translated to simpler and easier messages were found to be more effective among the target group. Although many issues exist with the continuous use of ICT-based tools, the main purpose is to improve the delivery of evidence-based information to the public.

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ABSTRACT

Background and Purpose: Non-communicable diseases (NCDs) are a major public health problem in the Philippines and around the world. Preventive measures to reduce its continuous rise require improvement in the health system. Utilization of information and communication technology-(ICT)-based tools will allow dissemination of evidenced-based information in the population. This case report contains the description of the development process of a Web-based nutrition Website. **Case Description:** ICT-based tools were explored as means of communicating nutrition information to the public because of the increasing access and usage of the Internet among Filipinos. An iterative process with five major phases were followed in the development. **Outcome:** The Website HELP Online can be accessed through (<http://i.fnri.dost.gov.ph/helponline>). There is integration of two modules: one for the general public and the other for registered nutritionist dietitians (RND) of the Food and Nutrition Research Institute (FNRI). The first module contained the nutrition counseling platform that connects and records all interactions of online and walk-in clients with their RNDs. The second module contained nutrition calculators, a health tracker, and nutrition education materials. **Discussion:** The developed HELP Online Website was used for online users to easily access nutrition information and services offered by Department of Science and Technology (DOST)-FNRI. The user-centered design focus in combination with a responsive Web platform resulted in improved user satisfaction. In terms of content, use of the current and accepted scientific information translated to simpler and easier messages were found to be more effective among the target group. Although many issues exist with the continuous use of ICT-based tools, the main purpose is to improve the delivery of evidence-based information to the public.

Keywords: nutrition, internet, website development, nutrition counseling

INTRODUCTION

Non-communicable diseases (NCDs) are a major public health problem worldwide.¹ In the Philippines, the leading causes of death are cardiovascular diseases (CVD), cancer, and diabetes.² The NCDs among Filipinos is linked to the changing lifestyle practices, physical inactivity, and unhealthy dietary habits.^{3,4} The impact of the NCD epidemic is widespread because the effects are not only in terms of the health and nutrition but also because it adds to the economic burden on the country.^{1,5} Thus, preventive measures to reduce the prevalence of NCDs require major improvements in the health system through research and policy formation.⁶

The use of information and communication technology (ICT) has greatly improved the provision of health services because ICT can fast track the dissemination of correct nutrition information as well as overcome the barriers of traditional health infrastructures and systems.^{7,8} An Internet search for locally developed nutrition websites showed that there were only 3 nutrition-focused websites that exist in the Philippines. Among these 3 websites, one has been discontinued while the two remaining showed limited features to provide adequate nutrition information focused on NCDs. With the online food exchange lists (FEL), a website was created to assess nutrition status and calculate the energy and macronutrient requirement of an individual. However, this website requires a strong background in nutrition and use of common tools for the estimation of energy. Meanwhile, the eNutrition website contains databases and reports related to the national nutrition survey. Although remote data access and dietary evaluation system for evaluation of food and nutrient intake are offered, these features were not accessible during the time of the review. A non-local nutrition website, My Fitness Pal, was also included in the review because it was an extremely popular website/mobile application used by Filipinos during the conceptualization of the project. My Fitness Pal includes various food and nutrition information, including an extensive food database for tracking of food intake of an individual. Because this site was used for users to add information on the food database, verification of the source and content is not clearly documented. In addition, there were no published literature found on the development process of these websites.

As a tool to combat the NCD problem, the Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI), conceptualized the project titled "Healthy Eating and Lifestyle Program (HELP) Online." The purpose of this case report is to describe the development process of a web-based nutrition website, which will modernize the nutrition delivery channel of the DOST-FNRI. With the use of ICT, improvement in the promotion, dissemination, and implementation of important health, nutrition and lifestyle guidelines and practices, tools, and other resources specially designed for Filipinos will be easier and faster, which can be achieved by tapping the limitless opportunities offered by the Internet and Filipino consumer's active use of the Internet and social media, which could strengthen citizens' engagement in practicing a healthy lifestyle.⁹

Case Description: Target Setting

Development of a nutrition website was the chosen platform because of the increasing number of Filipino Internet users in the past years. An increase in the number of Internet users were observed from 2014 (37 million) to 2017 (60 million) while its penetration jumped from 36% to 58%, respectively. At the same time, Filipinos' average hours spent connected to the Internet using a desktop or tablet increased from 6 hours 12 minutes to 9 hours, which is the highest among the surveyed nations. Access of the Internet using mobile devices also showed an increase of 68 minutes during the same time period.^{10,11} Reports from government and private agencies that examined social media data showed that new technologies and innovations in communication have been well received and used by the Filipinos.¹² The Internet is also widely used in acquiring information from government organizations by various business establishments in the Philippines.¹³

DEVELOPMENT OF THE PROCESS

Study and Development Team Composition

The technical working group (TWG) was composed of 5 registered nutritionist dietitians (RND) and one programmer. Additional support in the development of the website was obtained through consulting services of 3 clinical RNDs, one web designer, and one graphics artist. All contents of the website were further reviewed by the DOST-FNRI's ICT committee and several RNDs who were not involved in the development of the website.

Development Process

A five-phase iterative process guided by the Internet intervention model designed by Ritterband et al. was followed in the development of the HELP Online Website (Figure 1).¹⁴

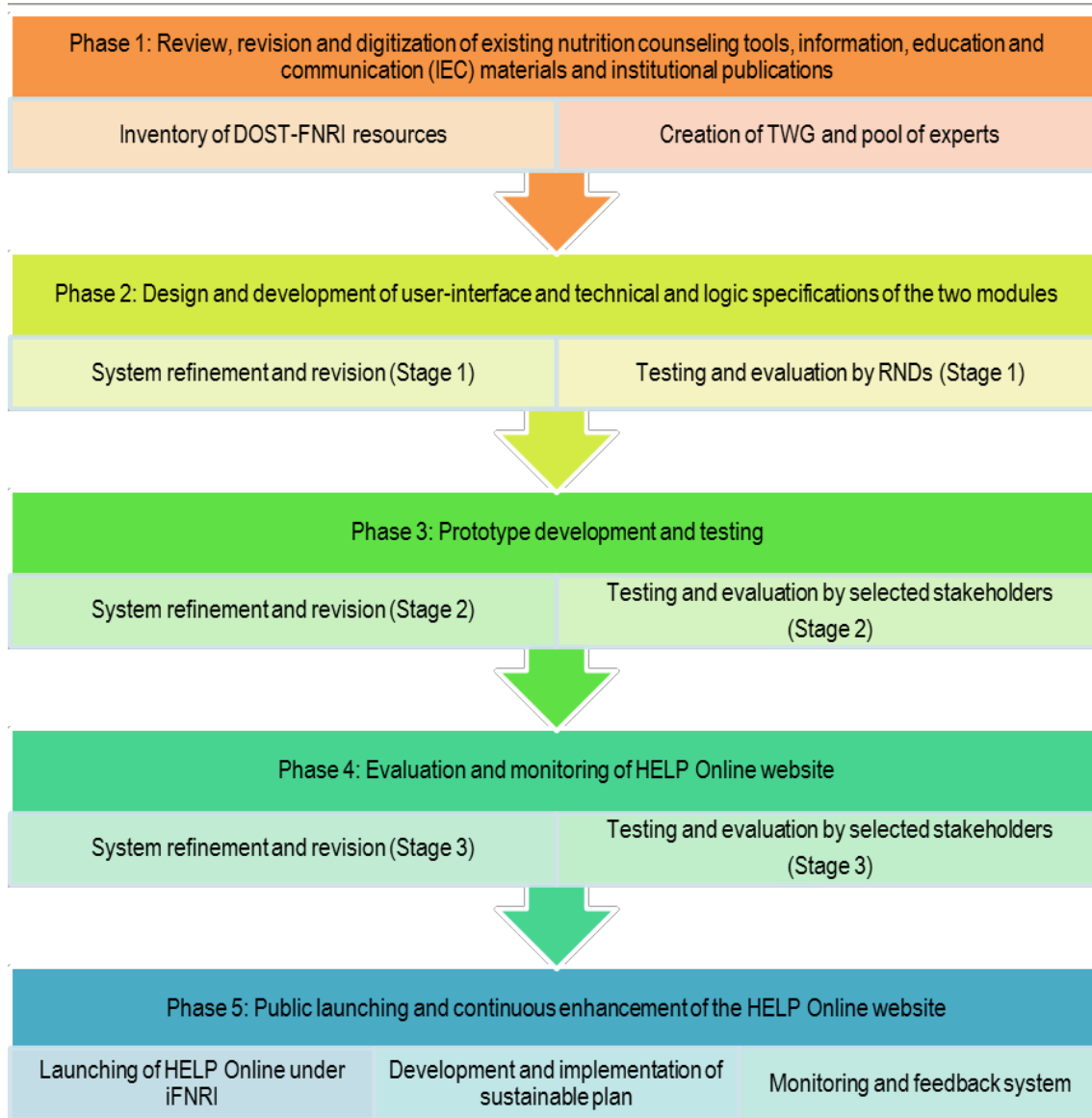


Figure 1. Five-phase iterative process applied in the development of HELP Online Website

Phase 1: Review, Revision, and Digitization of Existing Nutrition Counseling Tools and Institutional Publications. The first phase of the study involved inventory of available and useful DOST-FNRI resources in the form of information, education, and communication (IEC) materials (ie, handbooks, manuals, brochures, and flyers), all forms of ICT materials and tools (ie, software and applications), and ICT equipment. Identified materials that were deemed useful by the TWG underwent review for soundness of content; revision if some information were already out-of-date, using newer information, or data recommended by local and international institutions; and then conversion to digital formats. Moreover, review of other locally developed nutrition Website created by private and public institutions (which includes the Website created by FNRI) was also conducted to identify gaps that must be addressed in the development of HELP Online Website.

Phase 2: Design and Development of User-Interface and Technical and Logic Specifications of the Two Modules. Major activities for the second phase involved the design and development of the creative, technical, and logic specifications following a modified method by Sharat and Hearst as summarized in Figure 2.¹⁵ Because the HELP Online Website was composed of two major modules, nutrition counseling services (NCS) and HELP, a system flow diagram was created to guide the study team in the development of the entire system. Initial draft designs for the user interface (front end) were created to serve as a base in the development of the whole website. Meanwhile, the back-end logic specifications were screened by the programmer for gaps in terms of step-by-step activities and correct formula usage and output.

The review of related literature for technical contents covered current and accepted published information for nutrition standards, cut-off values, requirements, diet recommendations, and definition of terms from reputable sources.^{2,3,6,16-18} These technical contents were then translated into layman's term, followed by focus testing and content refinement and revision. Because an iterative development process was followed, all contents were subjected to multiple review and revision by the TWG and experts to ensure that the final product was acceptable to the target users: the Filipino adults.

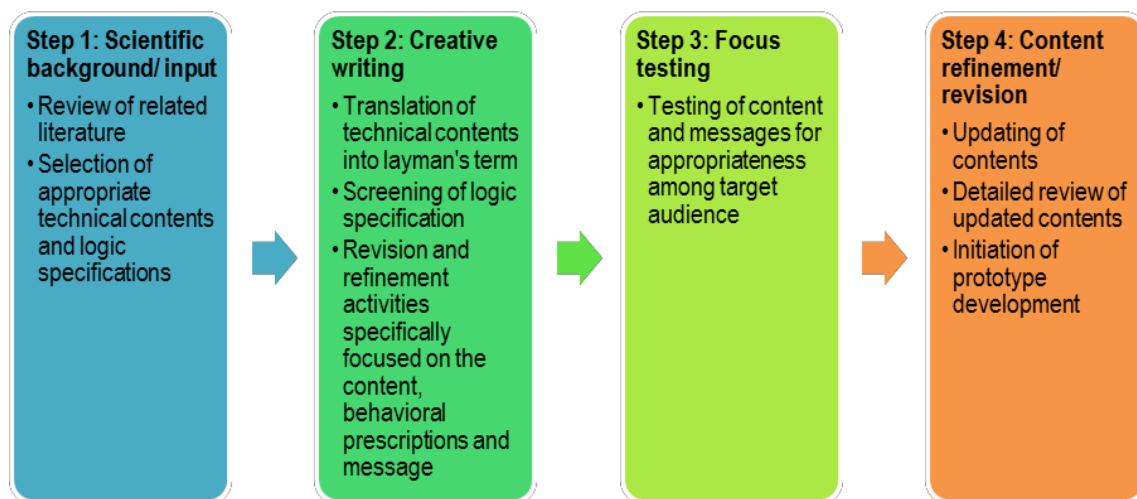


Figure 2. Design and Development of User-Interface and Technical and Logic Specifications of the 2 Modules

Phase 3: Prototype Development and Testing. The two modules were separately created, but these modules were interlinked for the users to avail themselves of either module without leaving the Website. The entire Website and its features were run under the HTML5 coding language, which is the latest version of Hypertext Markup Language. Hypertext Markup Language 5 is an open-source, web development program that allows development of a responsive web design for cross-platform usage.¹⁹

Components that required programming, such as the inquiry and response system and customer database under the NCS, and the Fast Assessment and Screening Tools (FAST) and HELP Tracker, were handed to the programmer for prototype development. On the other hand, other materials like the nutrition brochures, infographics, and short audio-visual presentations were out-sourced to a graphics designer. TWG and nutrition-expert-panel-approved initial designs and technical contents during phase 2 of the study were used as starting points in the prototype development.

Each prototype produced was also guided by the Internet intervention model designed by Ritterband et al.¹⁴ The same criteria were also used in the prototype testing as shown in Table 1 that aimed to determine the need, usefulness, comprehension, name, and look of the material/tool; the material/tool's applicability to a range of audiences; and if it aroused interest in supporting, promoting, distributing, and incorporating the material/tool into personal practice. The multiple testing was done to check for soundness of contents and ease of use. Similar to the activities in phase 2, each prototype was subjected to multiple revision and refinement based from the prototype testing results. All relevant testing results were

incorporated in the improved version of the prototype. Afterwards, all final outputs for each component that were approved by the TWG and experts were incorporated in the website.

Table 1. Prototype development and testing guide criteria as set by Ritterband et al.¹⁴

Appearance	Burdens	Delivery	Participation	Assessment
Color	Difficulty of use	Animations	Interaction	Personalization
Usage	Length	Audio	Reinforcement	Tailoring
Organization		Illustrations	Testing	
Screen size		Text		
		Video		
		Vignettes/testimonials		

Phase 4: Evaluation and Monitoring of the Nutrition Website. Aside from the multiple testing conducted for each prototype, several public tests were also conducted, especially during the development of the FAST, HELP tracker, nutrition brochures, infographics component under the HELP module, and customer database for the NCS module. Evaluation of each prototype used a specific testing method that allowed for extraction of important information needed in the further refinement or revision of each prototype. Examples of these methods range from hands-on experience testing, survey, and focus group discussions.

Nonetheless, each component or module that underwent public testing was evaluated for correctness of contents, ease of use, attractiveness, effectiveness in disseminating health and nutrition information, and overall user experience. Public testing participants were composed of health and nutrition experts, professionals, consumers, college students, and lay people who were given access to the component or Website to test and review all the features incorporated in it. Results of these evaluations became the basis for the final refining and fine tuning of the Web-based program and downloadable documents. All procedures and tools used in the development and evaluation of the different products were also documented.

After integration of all testing results, the entire website was then incorporated to the iFNRI Website (<http://i.fnri.dost.gov.ph/>). Final evaluation of the HELP Online Website was done through a hands-on experience testing during the 41st FNRI Seminar Series conducted in July 2015. Participants from the seminar series were invited to explore the iFNRI Website, which includes HELP Online. Furthermore, each participant was then asked to complete an online survey questionnaire, which was used as the basis for further refinement activities of the website before public launching.

Phase 5: Public Launching and Continuous Enhancement of the Nutrition Website. The HELP Online Website together with the other components of iFNRI Website was publicly launched in 2016, but continuous improvement of the HELP Online Website from feedback and comments embedded in the system were noted. To date, on-going enhancement of the Website is done to cater the needs of the other age groups aside from the adult population.

Application of the Process

Phase 1: Review, Revision, and Digitization of Existing Nutrition Counseling Tools and Institutional Publications. A total of 8 FNRI-developed materials/tools were assessed for use in the development of the HELP Online Website. Half of the materials/tools were in printed form while the rest were computer-run software. For the study, only 6 of the materials/tools were utilized and/or adapted in the project. Furthermore, all existing nutrition counseling brochures underwent technical content review and revision (Table 2).

Table 2. List of reviewed existing nutrition counseling tools and institutional publications

DOST-FNRI Resources	Status of Technical Content	For Utilization in The Project
Food Exchange Lists for Meal Planning	Latest version	Yes
Philippine Dietary Reference Intakes 2015	Latest version	Yes
2012 Nutritional Guidelines for Filipinos	Latest version	Yes
Nutrition counseling brochures CVD Hypertension Diabetes mellitus Cancer Purine disorders Renal diseases Weight management	Outdated version, for revision	Yes
Energy calculator software (e-calc)	Outdated version	No
Philippine Food Composition Table (FCT), 1997	Latest version	Yes
Philippine FEL (software)	Outdated version	No
FCT + Menu Eval	Outdated version, for revision	Yes

Four nutrition-related Website were also reviewed to assess the strengths and identify the gaps that can be addressed in the development of the HELP Online Website's different modules as described in Table 3.

Table 3. Similar nutrition website review

Nutrition Website/Developer	Strengths	Gaps Identified
Online FEL Developed by the students of AMA Computer College Manila Branch (2008)	Detailed list of food items per category Automatic calculation of body mass index (BMI), desirable body weight (DBW), total energy expenditure (TER) and sample meal plan Free for use Interactive	Requires knowledge on nutrition and common tools used in the estimation of energy and macronutrients Calculations are not interconnected Results cannot be modified
Nutri-coach Centrum	Automatic calculation of BMI and nutritional status Uses "virtual plate" in the estimation of usual food intake Contains an extensive list of Filipino food items Interactive	Discontinued
eNutrition DOST-FNRI	Extensive database and reports related to the national nutrition survey Remote data access Dietary evaluation system for evaluation of food and nutrient intakes	Some main features of the Website are not available

My Fitness Pal MyFitnessPal, Inc. (Non-local developed Website)	Available as Web-based tool and mobile application Automatic calorie counter that integrates calories gained or lost through food intake and physical activity Extensive food database with nutrition information Interactive	Extensive food database consisting of mostly imported or non-local food items
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Phase 2 to 4: Prototype Development, Testing, Evaluation, and Monitoring. The final outputs of phases 2 to 4 of the development process produced five components incorporated in the two major modules of the HELP Online Website. The products can be accessed through (<http://i.fnri.dost.gov.ph/helponline>).

Module 1: Nutrition counseling services. The first module of the HELP Online Website contained the NCS platform, which featured two main components: the inquiry and response system and the customer database system.

Inquiry and response system. The inquiry and response system had easier access to the Institute's nutrition counseling service that was previously made only by telephone, snail mail, or email to the Institute's director. The developed system had direct communication between the RNDs and customers, resulting in shortened response time. In addition, the system can accommodate nutrition counseling sessions for groups.

Customer database. The main function of the customer database is to store all nutrition counseling information of the customers who availed of the free service. The system was patterned from the Nutrition Care Process (NCP), which is comprised of nutritional assessment, nutritional diagnosis, nutrition intervention, and nutrition monitoring and evaluation. Meanwhile, the documentation procedure adapted the subjective information, objective, assessment, and plan (SOAP) format.¹⁶

Major features of the system cover automatic nutrition calculators (BMI, DBW, waist and hip circumferences and ratios, and waist-height ratio) with assessment functions, personalized energy and nutrient calculator, FEL calculator, and automated meal planner. All nutrition recommendations provided to the customer can be saved and printed on-site. Tracking functions related to weight, waist and hip circumferences, BMI, and calorie and macronutrient recommendations are also available for quick reference for the next visit of the customer. Access to the current system was restricted to selected RNDs to protect customer's personal information.

Module 2: Healthy eating and lifestyle program. The second module contained 3 major components that can be freely accessed by online users. For the first 2 components, FAST and HELP Tracker, website visitors can interactively use the different calculators and tracking functions integrated in the system. These components were developed to facilitate faster calculations of dietary requirements, which is usually done manually that consumes more time. Further, other developed systems did not integrate a systematic flow of assessment procedure, which leads to repetitive input of information. Meanwhile, the publications component houses innovative information materials that can be used for nutrition education and counseling.

Fast assessment and screening tools. Five nutrition calculators namely BMI, DBW, TER, waist and hip circumference and ratio, and waist height ratio were developed to help Website users to quickly assess their current nutritional status with the aid of the automatic display of results upon data entry. All information and cut-off values used in the module were based on current classifications being used in both the local and international health and research community. Moreover, all technical contents for the FAST module were made simpler for easy understanding. Further, pop-up information about the different diseases was also included for additional reference to the users.

Healthy eating and lifestyle program tracker. The HELP tracker is a personal counter designed to account the calories gained from food intake and calories lost during physical activities. The current component contains the weight and

nutrition tracker and the metabolic equivalents of the physical activities that clients performed in a day. To date, a beta version of the food intake calculator was released but is still undergoing continuous improvement to include changes incorporated in the Menu Eval Plus and Philippine FCTs.

Publications. The publications component contains graphic materials, which provide information that included topics about NCDs and its management. Infographic materials were developed to easily convey information about the disease, its nutrition consequences, and nutrition tips on 6 selected nutrition problems (ie, CVD, gout, cancer, overweight and obesity, type 2 diabetes, and chronic kidney disease).

On the other hand, the updated nutrition brochures include enhanced photos, current data, such as prevalence and prevention tips on selected NCDs; and a one-day meal was created to aid RNDs in their patient education. A total of 7 nutrition brochures were developed to cover dietary management for the following: low calorie, high calorie, type 2 diabetes, low fat, low cholesterol, low purine, and low sodium diets. Technical contents for the nutrition-related brochures and infographics include professionally photographed images and incorporation of peer-reviewed (technical personnel and other stakeholders) information.

Outcomes

Following the iterative process, the main outcomes of this research are the current version of the HELP Online Website with 5 components that were pretested and evaluated. To date, the website is now accessible to the public and is still continuously being enhanced.

Limitations

The research team acknowledges certain limitations in developing the said website. First, basis for the website's content were primarily designed for the needs of the Institute and common feedback received from nutrition counseling customers. Thus, there is a lack of a substantial needs analysis of the target users during the initial phase of the development that could have slowed down the conceptualization and development process of nutrition website components. However, the research team believed that during the prototype development and testing phase, the needs of the target users were covered and incorporated in the revisions and fine tuning.

Second, there may have been an existing participant bias during the testing of the website's components because most participants should be knowledgeable in the use of a computer and the Internet. Nonetheless, the researchers recruited participants from various socio-economic sectors during the multiple public testing conducted to lessen the identified research bias.

Third, the website's outcome evaluation in terms of its impact on the users' nutrition knowledge and attitude will be done in the next steps following the development process.

Lastly, the rapid changes in consumer trends and technologies may act as a hindrance towards technology-based health promotions because the whole process of conceptualization, design, development, and testing could take several months to years before completion. Even so, coping with the changes can be done through continuous enhancement of the product to survive the extremely competitive market.

DISCUSSION

The iterative process in combination with the Internet intervention model and guidelines for content development were used for the development of an innovative and interactive nutrition Website designed for Filipino adults.^{14,15} All contents of the website were built on user's feedback and comment during the testing phases, which makes each component more user friendly and user centered. Furthermore, co-designing the creative and technical contents of the website together with the researchers, nutrition professionals, and various stakeholders streamlined the delivery of the information and messages to the website's intended users. The iterative process also was used for the development of the final design for the user interface that was considered acceptable towards its target users in terms of comprehensibility, attractiveness, acceptability, relevance, persuasiveness, and ease of use.

Published studies used in the design and development of nutrition and health tools were used to create better products that were more user friendly.^{20,21} Furthermore, the user-centered design concept, which integrates the needs of the users^{22,23} as well as the point of view of health professionals,^{24,25} was used to produce technology-based tools that are more suitable to the needs of target group. For countries with the limited availability of traditional health infrastructure and systems like the Philippines, ICT-based tools may bridge the gap in providing important health and nutrition messages because it can surpass barriers related to geography, time constraints and poor access to resources.^{26,27} Although, many issues exist with the continuous use of ICT-based tools, the main purpose is to improve the delivery system of evidence-based information to the public.

We documented the step-by-step process in the development of a nutrition Website and its features. Because of the dearth of local publications related to development of technology-based tools, it is important to document the process to aid future researchers. Moreover, most publications related to technology-based interventions are often focused on the outcomes of the study and less on the development process, which is also an important aspect.²⁰

The developed HELP Online Website created a new channel that allowed online users to easily access nutrition information and services offered by the DOST-FNRI. The user-centered design focus in combination with a responsive Web platform resulted to improved user satisfaction. In terms of content, use of the current and accepted scientific information translated to simpler and easier messages were found to be more effective among the target group.

Because one of the purposes of the Website is to take advantage of ICT's capability to reach more audience, the research team recommends that a thorough needs analysis should be conducted because the current study only addressed the needs of the Institute and selected stakeholders. Conduct of an impact assessment on target users should also be done as basis for further enhancement to continuously attract users to regularly visit the Website.

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