

Information Quality Requirements for a Nutrition App Based on Experts Interviews

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Abstract. Many people nowadays are using nutrition and dietary apps to manage their health by monitoring their food and calorie intake. Online health information enables people to search for specific health-related information that may concern them in the comfort and privacy of their home. Thus, the quality of such information is crucial to ensure people are getting the right and reliable information. The objective of this paper is to present the information quality requirements for nutrition app by analysis of experts' interviews. The interview was conducted using semi structured interview with five nutritionists. The finding from the interviews show that a nutrition app should include a complete, reliable, accurate and updated information.

Keywords: Information quality, Nutrition app

1 Introduction

There is an increasing number of nutrition health applications which are reaching more and more people with a new kind of nutrition information [1][2]. Many internet users are seeking for information on diet, nutrition, vitamins or nutritional supplements [3]. Consequently, credibility and reliability of the massive information produced in nutrition app has become the major concern to the healthcare providers [1]. Due to outdated references or sources from the food composition database, several applications have failed to offer exact, dependable and consistent information about specific foods to their users [4][5] and lack of quality-control procedures [6]. Nutritionists and system developers should collaborate early on in the development process to implement the information quality criteria [6][7] in order to avoid rework and poor information in nutrition apps. Most research on nutrition apps information are focusing on the user's behavior change and influence of the use of nutrition information to healthy eating [1][5]. However, research on the kind of quality information that are required in order to have a quality by design nutrition app is still limited. As a result, this paper goal is to suggest the dimensions of information quality for nutrition apps. The significance of this research is that users with inadequate internet skills and lower computer literacy might unknowingly access inaccurate information that is potentially dangerous to their health. Searching online nutrition or

dietary information are becoming a trend as many people are trying to manage their own nutrition intakes nowadays and willing to change their lifestyle [1].

2 Information Quality for Online Health Information

Information quality is known as fitness for use, which means that the information must corresponds with user tasks according to the context usage [8][9]. The information should also have clear purpose and created under certain policies and procedures [10]. In terms of online health information, Health on the Net (HON) is a quality instrument that certifies medical and health websites, which provides high quality and transparent health information [11][12]. Table 1 explains the HON principles [13].

Table 1. The HON principles and their definition. (Source [13])

Principle	Definition
Authoritative	Medical and health information provided are only given by medically trained and qualified professionals.
Complementarity	The information is meant for supplementary rather than replace the user-physician interactions.
Privacy	Information of the users are kept confidential.
Attribution	The information is supported by clear references to source data and the most recent date of updated information is clearly mentioned .
Justifiability	Any claims about the efficacy of a treatment, a product or a service must be backed up by scientific proof.
Authorship transparency	Contact information should be available for users who require additional information or assistance from the site or app.
Financial disclosure	Identities of the funder for the site or app should be acknowledged.
Advertising policy	Advertising policy should be displayed.

Nevertheless, poor information quality can still be found in some nutrition apps. Several existing studies that evaluated nutrition apps highlighted the common issues found often related to accuracy, completeness, timeliness and reliability of the information, in which this research has chosen to investigate further. For example, [14] and [15] found that the information on food composition in some free nutrition apps are inaccurate. Poor information was found in five apps, where the information from food database are not relevant and are not based on reliable sources [5][14]. As for [16], they found that some food database information are not updated regularly.

3 Methodology

This research uses qualitative method to get in-depth understanding of nutrition information and the quality requirements from nutrition experts by applying Goal-Questions-Metric (GQM) approach to design a semi structured interview questions. GQM is a suitable approach to design an interview protocol for a specific measurement setting [17].

3.1 The Objective of The Interview

The main objective of the interview is to investigate the perception of the experts on the important information requirements for a nutrition application based on the chosen information quality dimensions. Table 2 presents the interview protocol based on GQM approach, including the aim of the interview, the questions to investigate and the metrics to support the purpose of each inquiry.

Table 2. The interview protocol based on GQM approach.

Goal: To investigate the information quality requirements for nutrition apps	
Question	Metric
Q1: Tell me what kind of information should be included in the nutrition app?	M1: Personal opinion on including the actual use of information the nutrition app
Q2: Who are responsible for providing the information?	M2: Personal opinion on the information ownership or authorship - relating to reliability dimension
Q3: How do you make sure the information in a nutrition app always available to the users?	M3: Personal opinion on the information completeness in the nutrition app - relating to completeness and accuracy dimension
Q4: What are the information that needs to be updated from time to time?	M4: Personal opinion on updated information that should be in the app - relating to timeliness dimension

3.2 Selection of Experts

The experts from this interview were 5 nutritionists. The selection criteria includes within 5 years of experience in the nutrition field, has practicing or non-practicing background with formal education background in nutrition. Purposive sampling was used because it is the most effective method when one needs to study a certain domain with knowledgeable experts [18]. Table 3 explains the background of nutritionists based on years of experience and relevance.

Table 3. Background of nutritionists.

Nutritionist	Relevance	Years of experience
N1	Nutritional science officer	5+
N2	Nutritional science officer	5+

N3	Lecturer and researcher for nutrition and diets	5+
N4	Lecturer and researcher for nutrition and diets	15+
N5	Researcher and developer for nutrition apps	9+

3.3 Data Collection and Analysis

All conversations during the interview were audio recorded. The duration for each interview lasted between 45 minutes to 1 hour. Every recorded interview was transcribed carefully into text document for analysis. Thematic analysis was used to analyze the collected data for interpretation.

4 Results

The result from thematic analysis are divided into three. First, the stakeholders and their roles, which indicate to reliability or authorship of the information. Second is types of information required for a nutrition app to ensure the accuracy, completeness and timeliness of the information, and third is the overall information quality requirements for a nutrition app.

4.1 Stakeholders and Roles

According to the nutritionist experts, there are three types of stakeholders for a nutrition app. First stakeholder is the nutritionist. The nutritionist is the person who provides the app with food, nutrition and weight management information. Nutritionist is responsible of ensuring that the information offered in the nutrition app is of high quality. The information provided should come from valid sources such as the World Health Organization (WHO) and Malaysia Food Composition Database (MyFCD). MyFCD includes all the food composition targeting for Malaysia local population. The second stakeholder is the app developer. According to all the experts, the app developer is responsible to ensure that all the provided information coming from the nutritionists should be translated into the app accurately and completely, while the app end-user is the third stakeholder that will provide information relating to his or her nutrition intake, weights, calories, physical activities and diets including feedback in the app. Nutritionist 1 and 2 explained that end-users are also responsible for the accurate and complete information of their own personal data and the information on their food intake, which they provide through the app in order to manage their weight. Other than that, users also can provide comments and feedback in the app if they find any inaccurate and incomplete information from the app. This will help the nutritionist to always improve the quality of the app information.

4.2 Types of Information

The major functions that should be included in a nutrition app, according to all the nutritionist experts, are the Body Mass Index (BMI) calculator, food calorie dictionary, meal diary, weight record and the user's calorie intake. All experts believe

that the information should include a variety of local and popular food lists, as well as a BMI classification and calculation based on Asian or International standards. Expert 1 said the current MyFCD that is being used currently in Malaysia is dated back in 1997. He agrees that the food database needs to be updated as there are many food recipes are being invented in the market and restaurant, especially on hipster food as the people nowadays call.

4.3 Information Quality Requirements

All the experts agree that accuracy, completeness, timeliness and reliability are among the important dimensions that indicate the quality of information in nutrition app. Table 4 depicts the definition of each dimension with regard to the information that should be in a nutrition app. These four dimensions are also among the existing issues that contribute to the poor information quality as found in the literature.

Table 4. Information quality requirements for nutrition app.

Dimension	Description
Reliability	<ul style="list-style-type: none"> • Reliability of nutrition and dietary guidelines for the local population. For example, MyFCD • Reliability of the food database, food diary, its servings and nutrition facts • Reliability of the references and sources originality • Reliability of authority to the nutrition app. For example, Ministry of Health
Accuracy	<ul style="list-style-type: none"> • Accuracy of the nutrition information • Accuracy of the provided information coming from valid references or sources • Accuracy of the BMI, ideal weight range index and calorie intake calculations • Accuracy of the user feedback in the app
Completeness	<ul style="list-style-type: none"> • Complete records of food composition data and nutrition facts provided in the app • Complete records of food servings, calorie intakes, weight by the app user for BMI calculation • Complete information on frequently asked questions (FAQs) in the app for the users
Timeliness	<ul style="list-style-type: none"> • Update frequency of the nutrition information • Timeliness of the information provided • Timeliness for the food composition database and its nutrition facts • Timeliness of users provided information and feedbacks

In terms of authorship and reputation, all experts agree that the information in nutrition app must be trustworthy and reliable. As Nutritionist 4 mentioned “*..user will trust the information as long as the nutritionist able to give the correct information and can validate that the information comes from reliable reference..*”.

Nutritionist 3 also agreed that reliability is an important criterion for a nutrition app as according to him, “*..the issues that we have found with many app, less than 50% of the apps, the data and information they have are not really reliable..*”.

As for accuracy, the information is considered true and free from errors with respect to valid and reliable sources. Nutritionist 3 mentioned “*Accuracy of the content must go into proper procedure...we have to go into validation with nutritionist expert as well as the users...*”.

The completeness of the input records by the nutritionists and the app users in the nutrition app are perceived importance as Nutritionist 4 mentioned “*..the information from the app should cater on user needs including food portions and calorie intake that can manage the eating habit of the user*”. On the other hand, Nutritionist 3 said completeness of information also include the frequent question and answer feature so that expert can always add new information in order to make it complete and available to the users. “*..there should be something like Q&A in which user can ask whatever information that are not there (in the app)..*” as mentioned by Nutritionist 3.

In term of timeliness, the nutrition app’s information must constantly be up to date for the users and must be based on the most recent evidence. Nutritionist 3 mentioned that even the data used by Malaysia nutritionists is from MyFCD, which is last updated in 1997, the information are still valid. It is the responsibility of the nutritionist to make sure the information is always recent and to answer the user feedback and queries with the latest information.

5 Discussion

This research is conducted to investigate the information quality requirements for a nutrition app. Identifying the quality requirement at the early stages of development is crucial to ensure high quality information in the app. This research found that inaccurate and untrustworthy content such as unavailable references and authorship can make the user misunderstand [19] as well as complicating their decision making options to manage their health [20]. Other than that, the findings shows that information quality can be achieved when all the stakeholders - nutritionist, app developer and app end-user are aware of their responsibility in providing the correct and complete input into the app. Information quality is important and need to be defined in the early phase of system/app development to avoid rework. The app has to be designed in such a way it fits the usage of various stakeholders, otherwise becomes useless or lack of use.

6 Conclusion

This research presents the information quality requirements by analysis of experts’ opinions on the meaning of reliability, accuracy, completeness and timeliness for developing a nutrition app. Lack of study has been focusing on identifying the quality requirements at the beginning of system or app development, which becomes the motivation for conducting this research. The overall results show that in order to

determine the quality requirements, stakeholders and their roles will also determine the quality of the information. All the experts agree that reliability, accuracy, timeliness and completeness are important in order to have quality information in nutrition app. Our future research is to develop a nutrition app that is based on the information quality requirements from this study.

Acknowledgments

We would like to express gratitude to the Ministry of Higher Education Malaysia to fund this project under Fundamental Research Grant Scheme (FRGS19-075-0683) and to our university, International Islamic University Malaysia (IIUM) for the invaluable support.

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