



## A Mobile Application for Calculating Nutrition of Cervical Cancer Patient

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### ABSTRACT

Nutritional balance is one of the complex problems that can occur in cervical cancer patients. This problem can lead to a decrease in the quality of life of patients during treatment, so the nutritional needs of cervical cancer patients must be controlled and maintained in order to improve the quality of life of patients. It takes a nutrient that cervical cancer patients can use to help them calculate and balance these nutritional needs. This study aimed to create an application to help cervical cancer patients manage their nutritional needs. Research and development research was carried out using the ADDIE method. A limited test of this application was carried out by involving 30 cervical cancer patients who meet the inclusion criteria, namely, cervical cancer patients who had received curative treatment in the form of chemotherapy or radiotherapy in the Cancer Information and Support Center (CISC). The average score of the System Usability Scale used in this limited test was obtained with a value of 79.90 which was in the good and acceptable category. This application can certainly be one way to help cervical cancer patients in managing nutrition and improving their quality of life.

**Keyword:** Application, Nutrition, Cancer, Cervix

## 1. Introduction

Cervical cancer can cause complex physical, psychological, social, and spiritual problems for patients. Psychologically, the patient will have a sense of fear, anxiety, and stress that stimulates catecholamine hormones. The hormones affect appetite, resulting in reduced appetite (anorexia) (Fitriana and Ambarini, 2012). Patients with cervical cancer will have several therapies or treatments, namely surgery, chemotherapy, and radiotherapy. Chemotherapy, in particular, is a cancer treatment that uses a series of drugs aimed at inhibiting the growth of cancer cells and the patient's nutrition (Caesandri and Adiningsih, 2015; Adhisty, Rizona and Hudiyati, 2021).

Patients undergoing chemotherapy often experience side effects such as nausea and vomiting, which affect their appetite (Dwi Wahyuni, Nurul Huda, 2015). Nausea and vomiting cause them difficulty eating, raising their nutritional imbalance. Although there are also patients who do chemotherapy but have no impact on their nutritional needs. Even so, prevention will be significant and still needed for the needs of the patient's body (Adawiyah, 2019; Adhisty, Rizona and Hudiyanti, 2019; Adhisty, Rizona and Hudiyati, 2021).

The effect of nausea and vomiting is also supported by preliminary studies conducted on members of the CISC (Cancer Information and Support Center) community. They explained that the first and most effect patients feel after completing chemotherapy is nausea and vomiting, which occurs around three days. It can be concluded that chemotherapy has an effect that disrupts the metabolic system, which will affect the patient's

nutritional intake so that patients experience nutritional imbalances. This can also be seen with an average weight loss of 6 kg (Regyna, Adriani and Rachmah, 2021).

Chemotherapy also affects the appetite of cancer patients. Patients will experience drastic weight loss, which can affect the incidence of Cachexia, an imbalance between intake and nutritional needs (Darmawan, A. R. F., Adriani, 2019). Prevention should be done as soon as possible to avoid an imbalance of food intake in the body. The study explained that patients were given interventions that could address the problem, where the results showed that 38% of patients had poor nutritional status resulting in an imbalance in food intake (Hardiano, 2015). Interventions were provided to ensure that patients consumed 50% of staple foods, 25% of animal side dishes, 50% of vegetables and 25% of vegetables to meet their nutritional needs. Meanwhile, the average energy intake in cervical cancer patients was 65.15% compared to their needs (Ni nyoman, 2018). Interventions to meet nutritional needs are needed in the management of nutritional disorders in order to achieve the food components required by the body (Ardi, 2019).

Realizing this problem, researchers created an application using technological advances and highly developed information. Patients' limited information about their health makes researchers try to find solutions to dealing with patient problems. This program acts as a consultant to provide calculations following existing problems or circumstances. Researchers designed an application program that uses an expert system based on the above phenomena regarding nutritional needs and handling of cervical cancer patients. The features of this application align with the calculation result of nutrition and an example of applying the type and number of calories. This application allows patients to gain real-life experience in meeting nutritional needs and is a novelty of this study.

## 2. Method

This study used the Research and Development method in developing a method for calculating diet in cancer patients. The stages of the research and development method in this study include research and information gathering, planning (research planning), developing a preliminary form of product (initial product development), preliminary field testing (limited field test), and primary product revision (main product revision).

The development model taken in this study is the ADDIE model developed by Dick & Carry, where there are five stages of development: analysis, design, development, and implementation. At this stage, the implementation is carried out using application usability testing in this test made by J.R Lewis called the System Usability Scale (SUS). SUS has a universal questionnaire that can be used to assess a product. This questionnaire itself amounts to 10 questions. The final stage is an evaluation of all stages of development. To find out the results of this system usability scale (SUS) test, there are criteria from this system usability scale (SUS) model, including the following.

Table 1. Classification of *System Usability Scale* (SUS)

SUS	Classification	Criteria
Score $\geq 80,3$	A	Very good
Score 68 - 80,3	B	Good
Score 68	C	Fair
Score 51 - 68	D	Poor
Score $< 51$	E	Failure

The criteria for the SUS method to be above  $> 80.3$  is very good, but the lowest score is smaller  $< 51$ , resulting in a lesser value. How to calculate the SUS (System Usability Scale) method score with the formula is as follows

$$\bar{x} = \frac{\sum x}{n}$$

$$\begin{aligned} \bar{x} &= \text{Average score} \\ \sum x &= \text{Total Score SUS} \\ n &= \text{Total Respondent} \end{aligned}$$

Limited field tests were conducted for selected samples based on purposive sampling criteria. The study sample was cervical cancer patients according to the inclusion criteria: cervical cancer patients aged 35-55 years and in a state of consciousness—sample calculation based on the minimum sample response with a

sample size of 30 respondents. Data collection was obtained in several ways; first, by collecting primary data, i.e. data obtained directly from the research subject, the subject will follow the directions from researchers to use this application in approximately 30 minutes. Second, secondary data collection was obtained from statistical data; third, with a questionnaire guide; and finally, using an application usage guide. This research confirms the ethical clearance from the medical faculty of Sriwijaya University number: 356-2021.

### 3. Result

The research resulted in an android-based application to calculate nutritional needs in managing nutritional problems in cervical cancer patients. The development of technology and information supports this application. Applications developed by information technology are collaborating with the world of health, especially in the field of nursing, to help cervical cancer patients and health workers overcome nutritional problems. The realization and function of the application can be seen as follows:

#### Application link

The researcher sends a link prepared for the application downloading process, which is sent via WhatsApp.



Figure 1. application link

#### Main page

The page that contains the main display of the application



Figure 2. Front View when App is Opened

#### Introduction page of nutrition and types of nutrition

This page contains an explanation of what nutrition is and what types included in nutrition are.

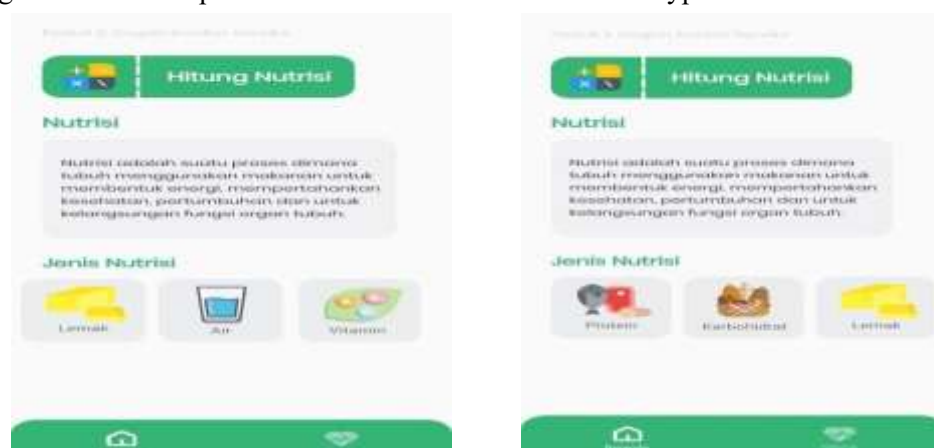


Figure.3 (a) Data filling column; (b) Sample data filling column

### Data entry page for calculating daily nutritional requirements

The calculation menu page displays several columns for the user to fill in, such as name, age, weight, height, and cancer stage. After filling in the columns, the user can click Calculate (*Hitung*)

Figure 4. (a) Data Filling Column (b) Sample Data Filling Column

### Calculation result page

This page will display the calculation results on the previous page, in which the results are the number of calories needed per day, the amount of protein needed per day, the amount of carbohydrates required per day, and the amount of fat needed by the body per day.

Figure 5. Example Calculation Result

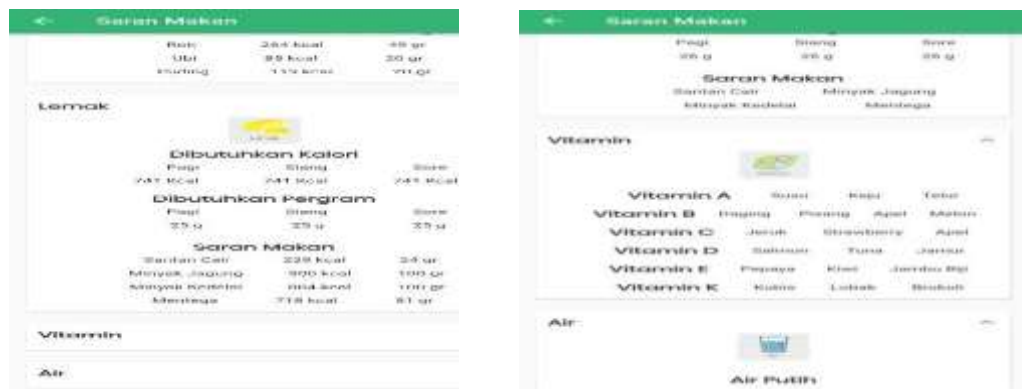
### Food advice page

This page contains which food components are served

Protein	Stage	Protein	Stage
841 kcal	1	247 kcal	2
841 kcal	2	247 kcal	3
841 kcal	3	247 kcal	4
841 kcal	4	247 kcal	5
841 kcal	5	247 kcal	6

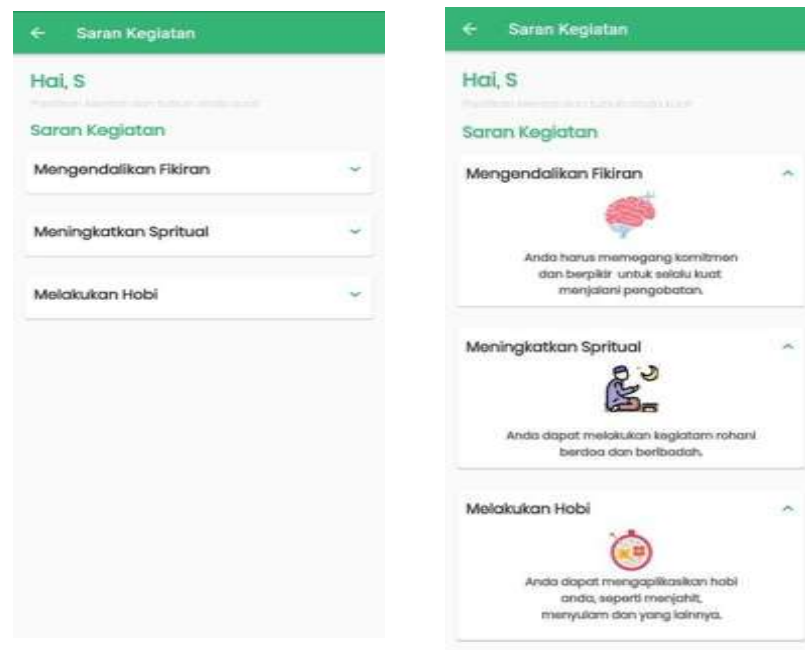
Carbohydrate	Stage	Carbohydrate	Stage
280 g	1	280 g	2
280 g	2	280 g	3
280 g	3	280 g	4
280 g	4	280 g	5
280 g	5	280 g	6

Figure 6. (a) Recommended food components (b) Protein Requirement (c) Carbohydrate Requirement



### Activity suggestion page

This page displays activity suggestions for the users



The next step is to calculate SUS. The results of the system usability scale (SUS) determine the degree of the feasibility of a product system based on effectiveness, efficiency and satisfaction in a particular context. The context of use consists of users (hardware), tasks (software) and equipment (material). The following are the calculation results to determine the extent to which the application can be developed:

Table 2. Respondent's SUS (System Usability Scale) Score  
(According to total multiplied by 2.5)

No	Respodent	SUS Score
1.	Respondent 1	87,5
2.	Respondent 2	72,5
3.	Respondent 3	82,5
4.	Respondent 4	77,5
5.	Respondent 5	80
6.	Respondent 6	87,5
7.	Respondent 7	82,5
8.	Respondent 8	72,5
9.	Respondent 9	75
10.	Respondent 10	85

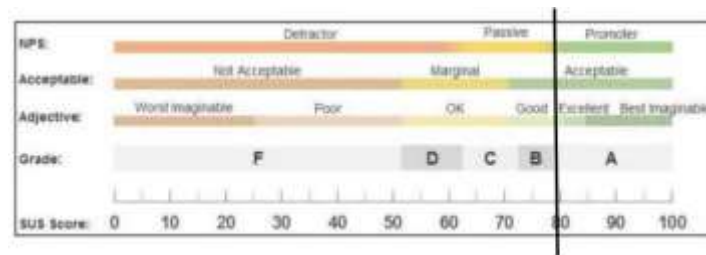
11.	Respondent 11	80
12.	Respondent 12	80
13.	Respondent 13	72,5
14.	Respondent 14	75
15.	Respondent 15	80
16.	Respondent 16	85
17.	Respondent 17	85
18.	Respondent 18	75
19.	Respondent 19	77,5
20.	Respondent 20	72,5
21.	Respondent 21	80
22.	Respondent 22	72,5
23.	Respondent 23	87,5
24.	Respondent 24	85
25.	Respondent 25	77,5
26.	Respondent 26	80
27.	Respondent 27	80
28.	Respondent 28	85
29.	Respondent 29	87,5
30.	Respondent 30	77,5
<b>Total score =</b>		<b>2.397</b>

The results of calculating the SUS score of each respondent can be seen that the highest score obtained is 87.5, and the lowest score is 72.5, while the scores that appear a lot are 80, 85, and 77.5.

The total SUS score of respondents in this study is 2,397, as shown in Table 4.5, obtained from 30 respondents. Based on this formula, the average value of the SUS score is then obtained as follows:

$$x = \frac{2.397}{30} = 79,90$$

The results of the average value obtained are then interpreted with the SUS score scale to determine the feasibility level of the cervical cancer patient nutrition application. The results of the SUS score scale are shown in Figure 9.



Based on this scale, it can be interpreted that the application of nutrition for cervical cancer patients is acceptable/feasible.

#### 4. Discussion

This dietary calculation application for cervical cancer patients is simple and effective because users do not have to worry about fulfilling their dietary needs. When users operate this application, they only need to enter the data required by the application display. Attributed to the current modern era, calculating nutritional needs and information on IT technology-based nutrition is very important. This application can ensure the accuracy of the information obtained and reduce the risk of misinformation in solving existing problems.



Researchers argue that with the development of the current era, all circles have used electronic media as a necessity and become an attraction, including among ordinary people, especially cervical cancer patients who are also familiar with smartphones (Rianto Rahadi, 2014). The resulting application is still limited to cancer only, namely cervical cancer. Previously patients have never known how to calculate their nutritional needs.

Based on the description of the calculation of the system usability scale (SUS) and interpretation, it can be seen that the prototype of nutritional applications for cervical cancer patients in handling android-based nutritional problems has significance, namely that this application is very instrumental in helping cervical cancer patients in solving the problems they experience (Nioga, Brata and Fanani, 2019). Also, this application can become a support system for cervical cancer patients.

The final result of this study found that the application of nutrition for cervical cancer patients in dealing with android-based nutritional problems dramatically affects the health level of cervical cancer patients, especially in the nutrition section (Pamungkas, Isnanto and Martono, 2016). Research that has been done before says that in meeting nutritional needs, it is necessary to manage nutritional disorders in order to achieve the nutrients needed by the patient's body. Therefore the application provided becomes a medium for managing nutritional disorders experienced by cervical cancer patients (Ardi, 2019).

A study on the fulfilment of nutrition for cervical cancer patients using Android media found that nutrition-related applications can be a place as support in dealing with nutritional problems of cervical cancer patients (Tjahjono, 2011). The feasibility of nutritional applications for cervical cancer patients in handling android-based nutritional problems is based on the research results that the application is feasible to use as one of the handlings of nutritional problems faced by cervical cancer patients. That research emphasizes that the support system, which in this study itself acts as a support system, is the application that has been provided, proving that patients who get the right support system can restore nutrition to the patient's body (Tjahjono, 2011).

Thus, after the research was conducted, cervical cancer patients who previously had nutrition problems received a solution to the problems they faced, and this solution became a necessity for them as support to solving existing problems, especially nutritional problems.

## 5. Conclusion and Recommendation

This research uses the development of Research and Development with five stages, where this stage reaches the revision of the 1st model, namely, the researcher revises the results of the test evaluation that has been carried out. The shortcomings in the previous stage are corrected in the revision stage. The revision stage of the application has been re-entered, and the previously revised parts have been added. This stage is tested using the SUS (System Usability Scale) method. An overview of the validation of the development of applications for the nutrition of cervical cancer patients in dealing with android-based nutrition problems, for the feasibility of applications with operational processes based on System Usability Scale testing after being tested with several respondents to get optimal results. The application aligned with the researcher's expectations and was successfully executed correctly. This means that the application is needed and helps users deal with problems.

It is expected that this Android-based cervical cancer patient nutrition calculation will be developed even better, improving the application both in terms of application menus and making the application even more complete. For future researchers, it is hoped that they can add parts to the application and operate the application on more respondents and conduct more profound research into the functions and objectives of the cervical nutrition calculation application.

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