Developing a new Software for increasing knowledge about nutritional needs during pregnancy

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Abstract. This study aimed to increase the knowledge of pregnant women about nutritional needs during pregnancy through an Android-based learning media. This study was an experimental study that intends to innovate in the form of an application called Mattampu in pregnant women for all trimesters to increase their knowledge about nutrition during pregnancy. Research sites are the Kanjilo Health Center and Pallangga Health Center in Gowa Regency as long as one month. Measurement of knowledge is carried out twice, namely before and after the provision of education with the application. Before providing education, training was held in advance on how to use the application by the research team. Knowledge of nutrition of pregnant women regarding nutrition during pregnancy at all trimester levels shows that the category is less before education was given through the application of mattampu, and after that, the knowledge of pregnant women at all trimester levels increases to be good. Android-based educational application is able to improve knowledge about nutrition in mothers both in the first, second, and third trimesters.

1. Introduction
Knowledge of pregnant women about nutrition has an important role in fulfilling maternal nutrition. Adequate nutrition of pregnant women is needed so that fetal growth runs rapidly and does not experience obstacles. The problem that occurs in the community is that there are still many local communities whose knowledge is inadequate so that people do not know about the importance of nutrition, low education, and neglect of nutrition in pregnant women. One way to reduce the prevalence of health problems related to nutrition is to increase nutritional knowledge in the community. For that, access to information is needed to assist health workers in providing knowledge and advice about pregnancy [1,2].

Nutrition information and education is the foundation of prenatal care for all pregnant women and is a method or effort to increase knowledge about nutrition. Current technological developments make it possible for a person to be able to maximize the function of a cell phone or smartphone with an application that can make it easier to provide information to its users [3,4]. The era of the industrial revolution 4.0 made the technology very close to humans. The use of technology will positively help in the promotion of health and ease in changing the way people think, including pregnant women. Android-based application Mattampu developed by the research team is an application that contains education and information about nutritional needs during pregnancy.
2. Methods
This study was an experimental study that intends to innovate in the form of an application called Mattampu in pregnant women for all trimesters to increase their knowledge about nutrition during pregnancy. Mattampu was adopted from the Bugis language in Indonesia, which means Pregnant, a regional language deliberately used so that the acceptance of higher applications. The application contains information about the nutritional needs of pregnant women, first-trimester, second-trimester, and third trimester. Research sites are the Kanjilo Health Center and Pallangga Health Center in Gowa Regency as long as one month.

Applications were tested for use after obtaining recommendations from the ethics approved by the Health Research Ethics Commission of the Ministry of Research, Technology, and Higher Education Hasanuddin University Faculty of Medicine Hasanuddin University Makassar Hospital with number: 586 / UN4.6.4.5.3.1 / PP36 / 2019 and UH19060386 protocol number.

Measurement of knowledge is carried out twice, namely before and after the provision of education with the application. Before providing education, training was held in advance on how to use the application by the research team.

3. Results
Table 1 shows that there were no significant differences in characteristics between all pregnant mothers given the intervention in terms of age, occupation, or education.

| Variable            | Pregnant Women |                  |                  | P-Value |
|---------------------|----------------|------------------|------------------|---------|
|                     |                | First Trimester  | Second Trimester | Third Trimester |
| Age Mean (Year)     | 27.0           | 26.2             | 26.1             | 0.81*   |
| Education (n%)      | 0.72           |                  |                  |         |
| High                | 16 (17.8)      | 19 (21.1)        | 17 (18.9)        | 0.72*   |
| Low                 | 14 (15.6)      | 11 (12.2)        | 13 (14.4)        |         |
| Occupation (n%)     | 0.37           |                  |                  |         |
| Working             | 10 (11.1)      | 15 (16.7)        | 11 (12.2)        |         |
| No Work             | 20 (22.2)      | 15 (16.7)        | 19 (21.1)        |         |

* Chi-square Test

The results of the analysis show that there was a change in the frequency of the level of knowledge before the intervention was given with less knowledge by 20 people (86.6%) and after the intervention was given three people left (13.04%). For good knowledge shows that there was a change in the frequency of increased knowledge before given intervention by 10 (27.03%) and after given the intervention increased to 27 people (72.97%). The changes in the level of knowledge is significant statistically (p=0.00, p<0.05) (Table 2).

| Education Time | Level of Knowledge | P-Value |
|----------------|--------------------|---------|
|                | Less (n%)          | Good (n%) |       |
| Before         | 20.0 (86.96)       | 10.0 (27.03) | 0.000* |
| After          | 3.0 (13.04)        | 27.0 (72.97) |       |

* McNemar Test

The results of the analysis show that there was a change in the frequency of increased knowledge before being given an intervention that lacked knowledge by 22 people (73.3%), and after being given the intervention 4 people left (13.3%) whereas good knowledge shows that there was a change in frequency before being given an intervention by 8 people (28.9%) and after being given an
The intervention increased by 26 people (28.9%). The changes in the level of knowledge is significant statistically (p=0.00, p<0.05) (Table 3).

Table 3. Changes of knowledge of Second-trimester pregnant women after being given education through “mattampu” application.

| Education Time | Level of knowledge | P-Value |
|----------------|--------------------|---------|
|                | Less (n%)          | Good (n%)|         |
| Before         | 22 (73.3)          | 8 (26.6) | 0.00*   |
| After          | 4 (13.3)           | 26 (86.6)|         |

*Mc Nemar Test

The results of the analysis show that there was a change in the frequency of the level of knowledge before being given an intervention that lacked knowledge of as many as 20 people (66.6%) and after being given the intervention the remaining five people (16.6%). For good knowledge shows that there was a change in the frequency before the intervention was given by ten people (33.3%) and after being given the intervention increased by 25 people (83.3%). The changes in the level of knowledge is significant statistically (p=0.00, p<0.05) (Table 4).

Table 4. Changes of knowledge of third-trimester pregnant women after being given education through “mattampu” application.

| Education Time | Level of knowledge | P-Value |
|----------------|--------------------|---------|
|                | Less (n%)          | Good (n%)|         |
| Before         | 20 (66.6)          | 10 (33.3)| 0.00*   |
| After          | 5 (16.6)           | 25 (83.3)|         |

*Mc Nemar Test

4. Discussion
The use of the application mattampu can increase knowledge about nutritional needs during pregnancy, both in pregnant women at all trimester levels. This shows the positive effect of using technology for the community as well as showing that pregnant women in the area of Pallangga and Kanjilo health centers have the ability to access technology. The limitations of this study only measure the level of knowledge but not to the level of actions of pregnant women regarding their nutritional needs.

Technology is indeed no stranger to the world of health and is becoming a trend in this era. However, the innovations carried out by health service in enhancing their role in the health of mothers and children are still something new. This positive thing is expected to continue to develop and experience improvement [5,6].

Usually, those who do innovations are people from the information and technology section, while people who are engaged in the world of health become more users. This application shows that collaboration between health workers with information technology or engineering will be positive for the development of educational media [7,8].

5. Conclusion
Android-based educational application is able to improve knowledge about nutrition in mothers both in the first, second, and third trimesters.

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