BUKTI KORESPONDENSI ARTIKEL PADA JURNAL NASIONAL TERAKREDITASI SINTA

PENGUSUL:
dr. RR. Sri Ratna Rahayu, M.Kes., Ph.D. / NIDN 0018057207

UNIVERSITAS NEGERI SEMARANG

Yth. Penilai
Pada Usulan PAK

Bersama dengan surat ini, saya bermaksud menyertakan bukti bukti korespondensi proses artikel pada Jurnal Nasional dengan judul ""Gizi COVID-19 Bagi Remaja" Application as A COVID-19 Prevention", yang dimuat pada Jurnal Kesehatan Masyarakat (KEMAS) edisi Vol. 17 Issue. 1, Juli 2021, pISSN: 1858-1196, eISSN: 2355-3596, hal : 109-119.
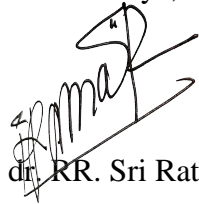
Adapun susunan kronologi bukti korespondensi terdiri dari beberapa poin, pada tabel berikut:

No	Tanggal	Aktivitas
1	5 Januari 2021	Mendapat review manuskrip dan permintaan untuk merevisi manuskrip sesuai catatan reviewer
2	25 Januari 2021	Submit manuskrip yang telah direvisi
	6 Juni 2021	Manuskrip revisi telah diterima
3	23 Juli 2021	Manuskrip revisi telah diterima
4	1 Juli 2021	Artikel terpublikasi di Jurnal Kesehatan Masyarakat (KEMAS)
5	9 November 2021	Melakukan pembayaran publikasi

Demikian, agar dapat menjadi periksa. Terimakasih.
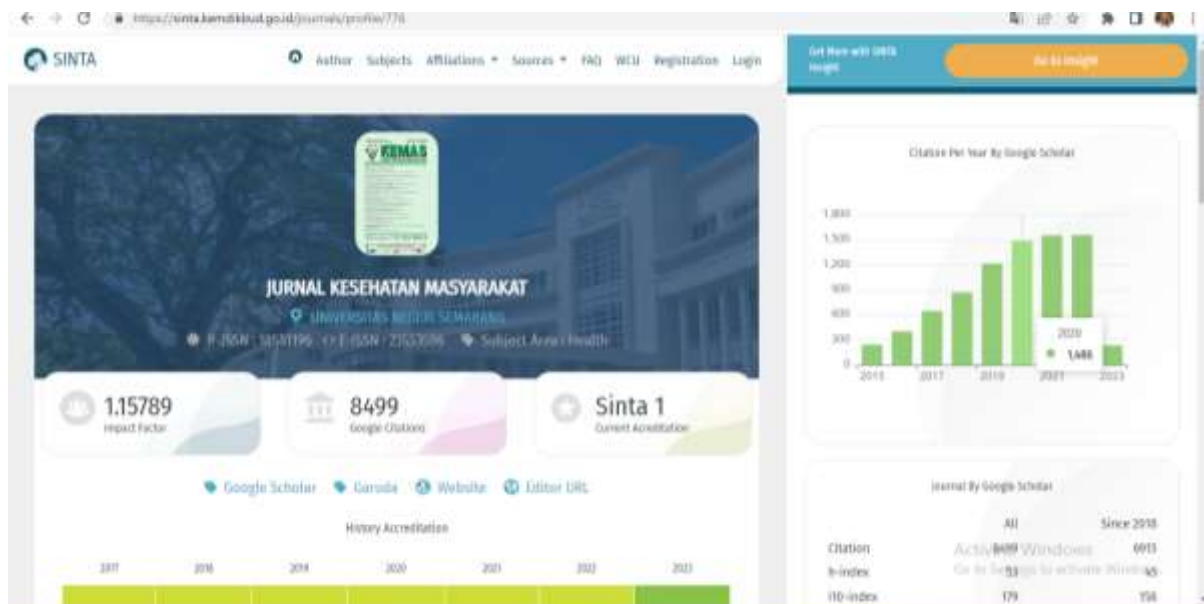
Semarang, 28 April 2023
Hormat saya,

dr. RR. Sri Ratna Rahayu, M.Kes., Ph.D.

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"Gizi COVID-19 Bagi Remaja" Application as A COVID-19 Prevention

Sri Ratna Rahayu[1], Dwi Sulistiani[2], Ari Yuniastuti[3], Aufiena Nur Ayu Merzistya[4],

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Abstract

Adolescents are a vulnerable group in fulfilling nutrition for body defence as an effort to prevent COVID-19. Nutrition education is needed for adolescents to increase their knowledge of nutrition consumption. One of the models to improve nutrition knowledge used the Android-based smartphone nutrition application model. This research aimed to design and develop a nutrition android application model to increase adolescents' nutritional knowledge in the prevention of COVID-19. The method used Research & Development with four stages: the analysis stage, the design stage, the development stage, and the testing stage. This research produced the "Gizi COVID-19 Bagi Remaja" as a nutrition application android-based with 3 main menus, namely BMI and calories checking, nutrition info, and COVID-19 info. The N-Gain test results show that this application effectively increases nutritional knowledge in 10 high school adolescents (N-Gain=88.21%). The Android-based â€œGizi COVID-19 Remajaâ€ application is expected to be a comprehensive media for adolescents nutrition education during the COVID-19 pandemic in Indonesia to prevent the transmission of COVID-19.

RINCIAN KRONOLOGI KORESPONDENSI PUBLIKASI ARTIKEL PADA JURNAL NASIONAL TERAKREDITASI SINTA

Mendapat review manuskrip dan permintaan untuk merevisi manuskrip sesuai catatan reviewer (5 Janruari)

FIGURE 1. Research diagram of Nutrition Android Application Model

Comments

Efa Nugroho January 05, 2021
In RnD research, every step must be clear, this table needs to be explained in more detail using narration.

adequacy (Sari, 2018). From the explanation above, it is stated that one of the preventions is by maintaining the immune system, eating nutritious food, and maintaining personal hygiene. The community is encouraged to implement a regular diet every day by fulfilling the principles of balanced nutrition consisting of carbohydrates/staple foods, animal protein, vegetable protein and vegetables, and fruits that can be used as healthy snacks. (Sety, Syaridddin, Tina, & Majid, 2020).

The limitation on the research is the Nutrition Android Application that we have produced only up to the development stage, namely the validation by experts in the field of nutrition and media. This application has not been tested in the field as it is not possible to know further its use in the field, in a wider group. Therefore, it is necessary to have further research on this product so that its effectiveness and use in a wider target group can be determined.

CONCLUSION

The result of the development product is smartphone media based on an android studio. This product is packaged in the form of an application with the advantages of including students being more enthusiastic and interested in the process of finding information about nutrition and calculating the nutrients needed by the body because the products used contain information about checking body BMI, checking nutritional needs, COVID-19 info and nutritional info, and easier to understand because the use of the language is easy to understand. This product is very practical to use because of its small file size and can be used for nutritional purposes.

ACKNOWLEDGEMENT

Our gratitude goes to the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia who has provided research funding assistance so that this research was carried out, as well as nutritionists and media who have provided critical suggestions for the development of the products we produce. Besides, to programmers who have helped design and design to produce this Android Nutrition Application product and to Universitas Negeri Semarang who have provided permission and facilities during this research, we thank you.

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Comments

Efa Nugroho January 05, 2021
A journal article will be read by many people. In my opinion, the results of this RnD study are not ready to be published because this research is only at the design validation stage. This research has not had a major impact on knowledge.

this can be improved by explaining the application model in more detail, what are the menus, what are the benefits of each menu, what are the advantages of this application with existing applications, and so on.

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Editor Decision

Select decision	Accept Submission ∨ Record Decision
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A Nutrition Android Application[EN1] Model for the COVID-19 Prevention

Duwi Sulistiani[1, b)], Sri Ratna Rahayu[2, a)], Ari Yuniastuti[3, c)], Aufiena Nur Ayu Merzistya[2, d)]

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Abstrak. ~~Kasus COVID-19 saat ini masih terus meningkat dan dapat menginfeksi segala usia.~~ Remaja merupakan kelompok rentan dalam memenuhi gizi untuk pertahanan tubuh sebagai upaya pencegahan COVID-19. Diperlukannya edukasi gizi bagi remaja untuk meningkat pengetahuan akan konsumsi gizi. Salah satunya dengan model aplikasi gizi smartphone berbasis android. Tujuan penelitian ini adalah untuk merancang dan mengembangkan model aplikasi android gizi remaja sebagai upaya pencegahan COVID-19. Metode yang digunakan yaitu *Research & Development* dengan tiga tahapan, meliputi tahap analisis berupa mencari informasi dan literatur, tahap desain yaitu merancang produk aplikasi (UML, *Flowchart, Storyboard,* dan Antara Muka), dan tahap pengembangan (validasi ahli dan revisi produk). Hasil penelitan ini yaitu terproduksinya Aplikasi Android Gizi Remaja dengan 4 menu utama yaitu cek IMT, cek kebutuhan gizi, info gizi, dan info COVID-19. Aplikasi Android Gizi ini praktis untuk digunakan karena ukuran file yang kecil dan bisa digunakan dalam kepentingan pengetahuan tentang gizi.

Kata kunci: COVID-19, Gizi, Aplikasi *Android*, *Research & Development*

Abstract. ~~COVID-19 cases are currently still increasing and can infect all ages.~~ Adolescents are a vulnerable group in fulfilling nutrition for body defense as an effort to prevent COVID-19. Nutrition education is needed for adolescents to increase their knowledge of nutrition consumption. One of them is an android based smartphone nutrition application model. The purpose of this research ~~is~~ was to design and develop a teen nutrition android application model as an effort to prevent COVID-19. The method used ~~is~~ was Research & Development with three stages, including the analysis stage in the form of searching for information and literature, the design stage, namely designing application products (UML, Flowchart, Storyboard, and Interface), and the development stage (expert validation and product revision). The results of this research ~~are~~ were the production of the Android Nutrition Adolescent Application with 4 main menus, namely checking BMI, checking nutritional needs, nutritional info, and COVID-19 info. This Android Nutrition application is practical to use because of its small file size and can be used for nutritional knowledge purposes.

Keywords: COVID-19, Nutrition, Android Application, Research & Development

INTRODUCTION

More than 200 countries in the world have experienced the COVID-19 problem. The total number of COVID-19 cases until October 5th, 2020, as many as 34,804,348 cases exposed to the coronavirus, cumulative cases with 1,030,738 deaths (WHO, 2020). Indonesia is one of the countries with the highest number of cases in the world. Recorded until October 8th, 2020, confirmed cases in Indonesia were 320,564 cases with 11,580 deaths and 244,060 recoveries. The four provinces with the highest cases in Indonesia are DKI Jakarta, East Java, West Java, and Central Java. Central Java Province contributed to 25,259 cases (NDMA, 2020). One of the areas with the highest cases in Central Java is Semarang City. There were a total of 8,808 confirmed cases with 817 deaths in Semarang City until October 9th, 2020 (Semarang City Health Department, 2020).

The high number of COVID-19 cases requires prevention efforts. One of them is the fulfillment of nutrition. Nutrition plays a role in shaping the work of the immune system and reducing risk factors for COVID-19 (Ausrianti, Andayani, Surya, & Suryani, 2020). The immune system against viruses must be strengthened by eating nutritious foods, physical activity, and always happy thinking (Ministry of Health, 2020). [EN2]Nutritious eating contains A, B, C, D, E, omega 3 fatty acids, and minerals such as selenium, zinc, iron, copper, and vegetable and animal protein. (He et al., 2020).

Adolescents are one of the nutritionally vulnerable groups, where they are vulnerable to high nutritional needs for growth, lifestyle, and diet, and are vulnerable to environmental influences (Devine & Lawlis, 2019; Forthing, 1991; Perry-Hunnicuft & Newman, 1993). A study found that food consumption by adolescents currently does not meet the criteria for a nutritionally balanced diet and causes obesity in adolescents (Rouhani, Salehi-Abargouei, Surkan, & Azadbakht, 2014). The consumption pattern of adolescents who do not meet balanced nutrition is caused by a lack of knowledge about nutrition (Wang, Stewart, Chang, Ji, & Shi, 2014). Therefore, there is a need for nutrition education for adolescents. One of the ways or methods that health experts can use to increase adolescent knowledge about nutrition to prevent COVID-19 is by promoting health about nutrition (Notoatmodjo, 2014).

Technology in the communication process is always developing. According to data from the Indonesia Central Statistics Agency (in *Bahasa Indonesia: Badan Pusat Statistik*, BPS) 2018, 39.9% of Indonesia's population has accessed the internet. The high use of the internet in Indonesia reflects the openness of society to technological developments (BPS, 2018). One of the fastest-growing mobile communication technologies in society is a smartphone (Nasution, Neviyarni, & Alizamar, 2017). A study found that the highest number of smartphone users per month was in the 15-25 years old 85.6%). On average they use to surf the internet and send messages (AkanlisikumAkanferi, Kwami Aziale, & Asampana, 2014). The high use of smartphones among young people can be used as a medium for health promotion, especially for improving adolescent nutrition in preventing COVID-19. So, this research aims to design and develop a teen nutrition android application model as an effort to prevent COVID-19.

METHOD[EN3]

The method used in this research is Research & Development (R&D) referring to the method from Borg and Ball. The method has a 10-step process, but this research only reaches the expert validation stage. The three main stages are the analysis stage, the design stage, and the development stage. The stages of this research are presented in Figure 1.

At the analysis stage, the researcher begins by looking for literature studies and gathering information to strengthen the design of the product to be produced. The design stage is the stage of starting to plan and design an Android application design to get parts including UML, Flowchart, Storyboard, and Interface. Furthermore, the final stage is the development stage, where the Nutrition Android application that has been designed begins to be produced. To find out the validity of this application, we validated it with experts in the field of nutrition and media.

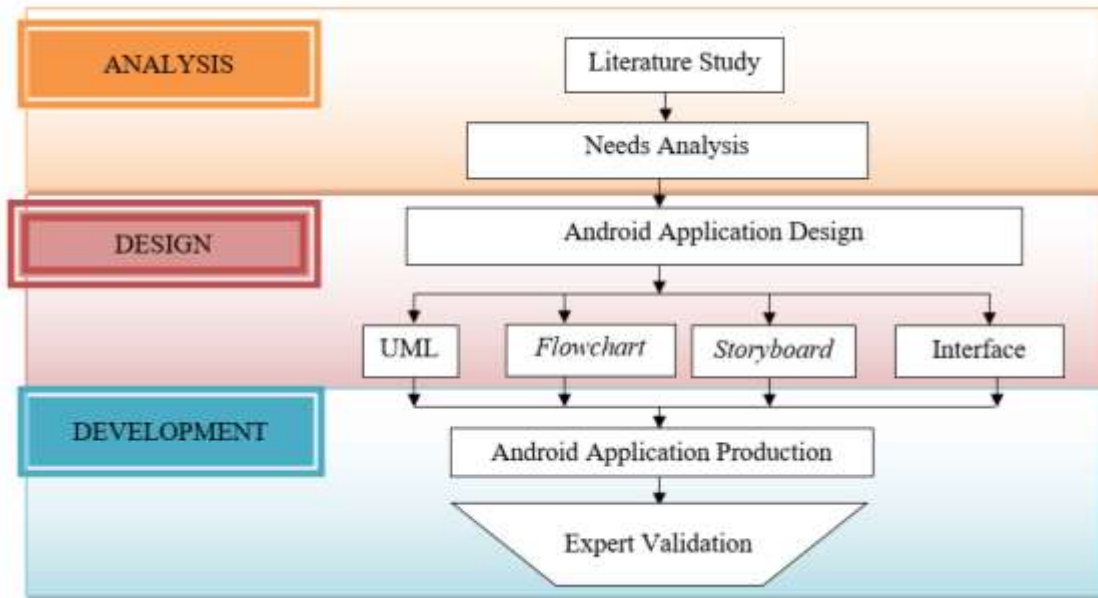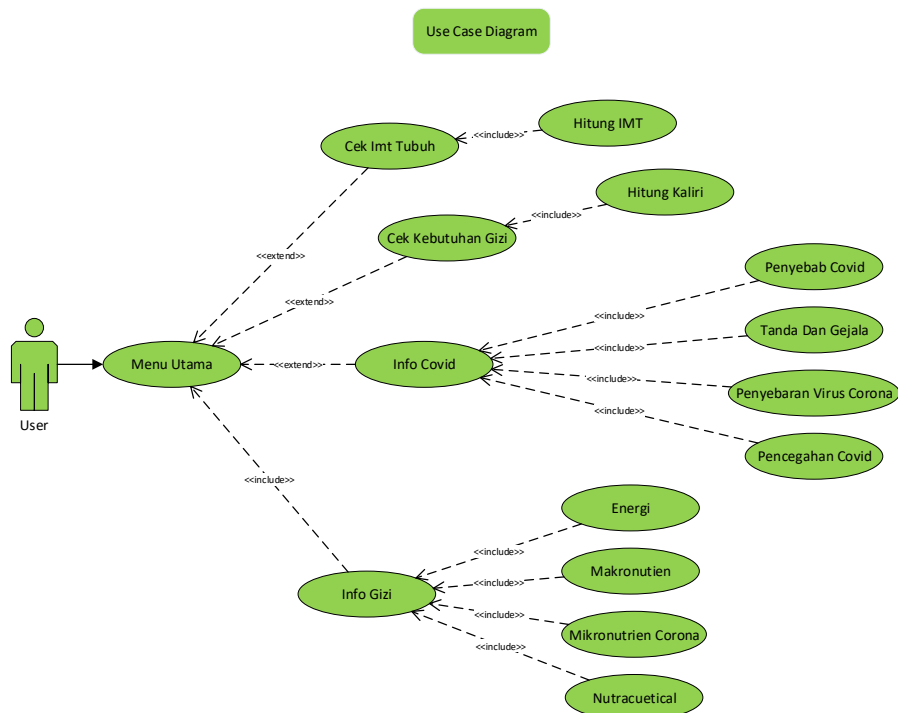**FIGURE 1.** Research diagram of Nutrition Android Application Model

FIGURE 2. Flowchart Use Case Diagram for Teenage Nutrition Android Application
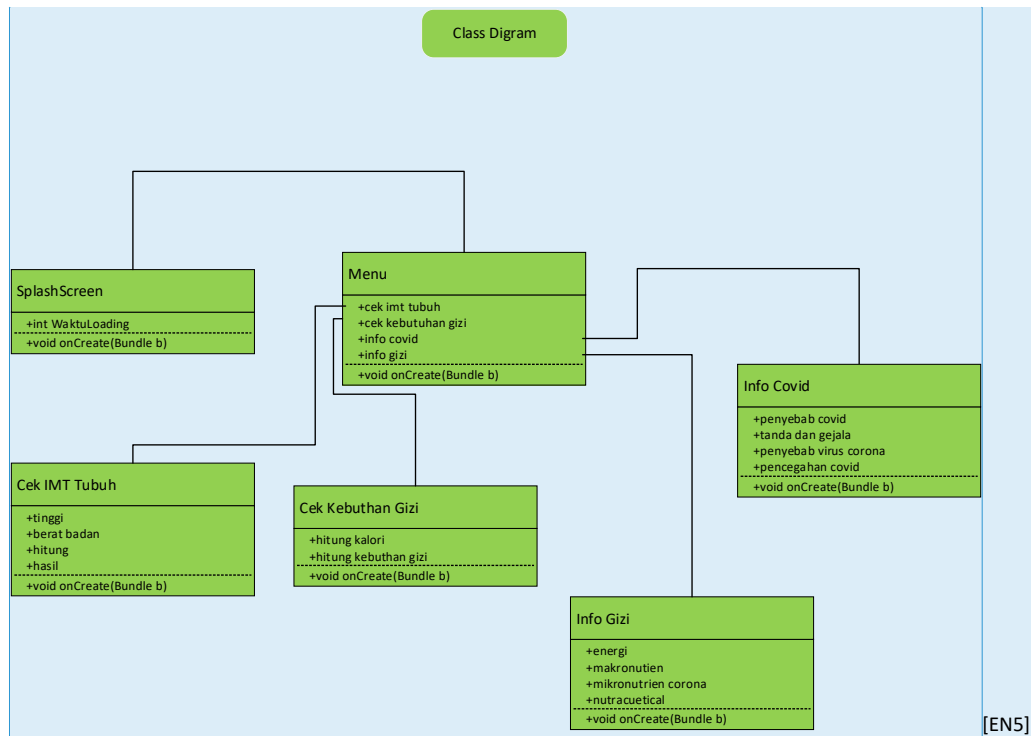
FIGURE 3. Flowchart Use Case Diagram of Nutrition Android Application

The validity of the instrument or model developed is obtained from expert judgment or in other terms is content validation. Testing The reliability test of the android application model for nutritional problems uses the reliability of observations or by finding the coefficient of agreement among observers. The following table shows the results of the validation assessment by experts.

TABLE 1. The results of the validation of the Nutrition Android Application by experts

Expert	Evaluation result
Nutritionists	Based on the results of the evaluation of material experts, a percentage of 83.87% was obtained and it was included in the good criteria
Media Expert	Based on the results of the evaluation of material experts, the percentage was 92.8% and it was included in the good criteria

RESULTS AND DISCUSSION[EN6]

This research resulted in a product in the form of a Nutrition Android Application which is specifically intended for adolescents to be able to control their nutritional needs and to help increase their daily nutritional needs during the current pandemic. The appearance of the Nutrition Android Application for adolescents that we have produced is presented in Figure 1.

This Android Nutrition application displays 4 main menus, namely: 1) check Body Mass Index (BMI), 2) check nutritional needs, 3) COVID-19 info and 4) nutrition information. The splash page (front view) will appear when the application is opened, after which 4 main menus will appear. Users can view the contents of the menu by pressing the image button on the menu, then the sub-menu page will be displayed. To see further entries, users can press which menu they want to see first and the contents page of the menu will be displayed.

Smartphones are currently a trend that is growing so rapidly, namely Android. Android is a Linux-based operating system specifically for mobile devices such as smartphones or tablets (Ibrahim & Ishartiwi, 2017). The

use of android as the operating system used in Indonesia has grown to 92.14% until August 2020 and dominates the smartphone market (Statista, 2020). The choice of Android as the operating system is due to its ease of use. This Android operating system is open source so that many programmers have flocked to create applications or modify this system. Programmers have a very big opportunity to be involved in developing android applications for this open reason. Most of the applications on the Play Store are free and some are paid. Research conducted by Horace H. Dedue published by inet.detik.com on 3 February 2014 shows that Indonesia occupies the fifth position in the list of largest smartphone usage in the world (Azmi, Joebagio, & Suryani, 2017).

(a)

(b)

(c)

(d)

(e)

(f)

FIGURE 4. Nutrition Android Application Display; (a) splash page (front view); (b) and (c) the main menu includes checking Body Mass Index (BMI), checking nutritional needs, COVID-19 info, nutrition information; (d) display a BMI check; (e) calorie count display; (f) nutrition info display

The large use of android in Indonesia makes the development of learning media for Android-based applications quite promising. This research was conducted to create an application called the Android application. This Android application is a nutrition application model in an android based smartphone. This application model is designed to help adolescents, starting from calculating energy needs, planning meals, evaluating the adequacy of nutritional intake, monitoring nutritional status by anthropometry, to feedback on adolescents and how to wash their hands. The purpose of making this application model is to prevent transmission of COVID-19. Health education methods influence respondents' awareness of obstetric complications (Prakasa, 2019). The smartphone media in this case has proven to be an effective tool in providing health education to the public by enabling the transfer of knowledge easily and conveniently. With information available at your fingertips, and with the affordability of the mobile internet, mobile phones have become effective channels.

Lack of knowledge of adolescents about the nutritional needs of the body can result in susceptibility to disease. Therefore, there is a need for nutrition education for adolescents. Medical doctors and doctors need to hold counseling or professional nutritional consultations to help adolescents' knowledge about calculating nutritional adequacy (Sari, 2018). From the explanation above, it is stated that one of the preventions is by maintaining the immune system, eating nutritious food, and maintaining personal hygiene. The community is encouraged to implement a regular diet every day by fulfilling the principles of balanced nutrition consisting of carbohydrates/staple foods, animal protein, vegetable protein and vegetables, and fruits that can be used as healthy snacks. (Sety, Syarifuddin, Tina, & Majid, 2020).

The limitation in the research is the Nutrition Android Application that we have produced only up to the development stage, namely the validation by experts in the field of nutrition and media. This application [EN7]has not been tested in the field so it is not possible to know further its use in the field, in a wider group. Therefore, it is necessary to have further research in this product so that its effectiveness and use in a wider target group can be determined.

CONCLUSION

The result of the development product is smartphone media based on an android studio. This product is packaged in the form of an application with the advantages of including students being more enthusiastic and interested in the process of finding information about nutrition and calculating the nutrients needed by the body because the products used contain information about checking body BMI, checking nutritional needs, COVID-19 info and nutritional info. and easier to understand because the use of the language is easy to understand. This product is very practical to use because of its small file size and can be used for nutritional purposes.

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"Gizi COVID-19 Bagi Remaja" Application as A COVID-19 Prevention

Duwi Sulistiani[1, b)], Sri Ratna Rahayu[2, a)], Ari Yuniastuti[3, c)], Aufiena Nur Ayu Merzistya[2, d)]

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Abstrak. Remaja merupakan kelompok rentan dalam memenuhi gizi untuk pertahanan tubuh sebagai upaya pencegahan COVID-19. Diperlukannya edukasi gizi bagi remaja untuk meningkat pengetahuan akan konsumsi gizi. Salah satunya dengan model aplikasi gizi smartphone berbasis android. Tujuan penelitian ini adalah untuk merancang dan mengembangkan model aplikasi android gizi remaja sebagai upaya pencegahan COVID-19. Metode yang digunakan yaitu *Research & Development* dengan tiga tahapan, meliputi tahap analisis berupa mencari informasi dan literatur, tahap desain yaitu merancang produk aplikasi (UML, *Flowchart, Storyboard,* dan Antara Muka), dan tahap pengembangan (validasi ahli dan revisi produk). Hasil penelitan ini yaitu terproduksinya Aplikasi Android Gizi Remaja dengan 4 menu utama yaitu cek IMT, cek kebutuhan gizi, info gizi, dan info COVID-19. Aplikasi Android Gizi ini praktis untuk digunakan karena ukuran file yang kecil dan bisa digunakan dalam kepentingan pengetahuan tentang gizi.

Kata kunci: COVID-19, Gizi, Aplikasi *Android*, *Research & Development*

Abstract. Adolescents are a vulnerable group in fulfilling nutrition for body defense as an effort to prevent COVID-19. Nutrition education is needed for adolescents to increase their knowledge of nutrition consumption. One of them is an android based smartphone nutrition application model. The purpose of this research was to design and develop a teen nutrition android application model as an effort to prevent COVID-19. The method used was Research & Development with three stages, including the analysis stage in the form of searching for information and literature, the design stage, namely designing application products (UML, Flowchart, Storyboard, and Interface), and the development stage (expert validation and product revision). The results of this research were the production of the Android Nutrition Adolescent Application with 4 main menus, namely checking BMI, checking nutritional needs, nutritional info, and COVID-19 info. This Android Nutrition application is practical to use because of its small file size and can be used for nutritional knowledge purposes.

Keywords: COVID-19, Nutrition, Android Application, Research & Development, Adolescents

INTRODUCTION

More than 200 countries in the world have experienced the COVID-19 problem. The total number of COVID-19 cases until October 5th, 2020, as many as 34,804,348 cases exposed to the coronavirus, cumulative cases with 1,030,738 deaths (WHO, 2020). Indonesia is one of the countries with the highest number of cases in the world. Recorded until October 8th, 2020, confirmed cases in Indonesia were 320,564 cases with 11,580 deaths and 244,060 recoveries. The four provinces with the highest cases in Indonesia are DKI Jakarta, East Java, West Java, and Central Java. Central Java Province contributed to 25,259 cases (NDMA, 2020). One of the areas with the highest cases in Central Java is Semarang City. There were a total of 8,808 confirmed cases with 817 deaths in Semarang City until October 9th, 2020 (Dinas Kesehatan Kota Semarang, 2020).

The high number of COVID-19 cases requires prevention efforts. One of them is the fulfillment of nutrition. Nutrition plays a role in shaping the work of the immune system and reducing risk factors for COVID-19 (Ausrianti, Andayani, Surya, & Suryani, 2020). The immune system against viruses must be strengthened by eating nutritious foods, physical activity, and always happy thinking (Kemenkes RI, 2020). [EN1]Nutritious eating contains vitamins C, D, E, omega 3 fatty acids, and minerals such as selenium, zinc, iron, copper, and vegetable and animal protein. (He et al., 2020).

Adolescents are one of the nutritionally vulnerable groups, where they are vulnerable to high nutritional needs for growth, lifestyle, and diet, and are vulnerable to environmental influences (Devine & Lawlis, 2019; Forthing, 1991; Perry-Hunnicuft & Newman, 1993). A study found that food consumption by adolescents currently does not meet the criteria for a nutritionally balanced diet and causes obesity in adolescents (Rouhani, Salehi-Abargouei, Surkan, & Azadbakht, 2014). The consumption pattern of adolescents who do not meet balanced nutrition is caused by a lack of knowledge about nutrition (Wang, Stewart, Chang, Ji, & Shi, 2014). Therefore, there is a need for nutrition education for adolescents. One of the ways or methods that health experts can use to increase adolescent knowledge about nutrition to prevent COVID-19 is by promoting health about nutrition (Notoatmodjo, 2014).

Technology in the communication process is always developing. According to data from the Indonesia Central Statistics Agency (in *Bahasa Indonesia: Badan Pusat Statistik*, BPS) 2018, 39.9% of Indonesia's population has accessed the internet. The high use of the internet in Indonesia reflects the openness of society to technological developments (BPS, 2018). One of the fastest-growing mobile communication technologies in society is a smartphone (Nasution, Neviyarni, & Alizamar, 2017). A study found that the highest number of smartphone users per month was in the 15-25 years old 85.6%). On average they use to surf the internet and send messages (AkanlisikumAkanferi, Kwami Aziale, & Asampana, 2014). The high use of smartphones among young people can be used as a medium for health promotion, especially for improving adolescent nutrition in preventing COVID-19. So, this study aims to design and develop educational media based on android applications as an effort to increase adolescent knowledge about nutrition in preventing COVID-19.

METHOD

The method used in this research was Research & Development (R&D) referring to the method from Gall, et al (Gall, Borg, & Gall, 1983) . This study applied the 10 steps of Gall, et al's method into four main steps. The four main stages were the analysis stage, design stage, development stage, and testing stage. The four-stages of this study are presented in Figure 1.

The first main stage was analysis stage. We began by looking for literature studies and gathering information to strengthen the design of the product to be produced. It includes review of literatures about mobile systems, android application, COVID-19 and the prevention, and nutrition especially for adolescent. Need analysis includes software functional analysis, software interface design, and some. This stage to meet user needs (targets). Besides, this process was carried out by finding and reviewing information about the tools being developed. The next stage was design stage. This stage was carried out by modeling the system in accordance with object-oriented software development modeling. The modeling used is UML (Unified Modeling Language) which aims to facilitate developers in coding the software being developed. At the design stage, flowcharts, storyboards, and interface designs are also made. A flowchart was a comprehensive depiction of the program flow created with a certain symbol in order to provide an overview of the flow and process path of software so that it is easy for users to understand. Storyboard as a tool at the design stage or graphic organization in the form of illustrated images that are displayed sequentially for visualization purposes.

The development process was carried out in accordance with the design and planning described. In this process, we test the feasibility through validation by the experts related to this product, namely Nutritionist and Media Expert. The validation was carried out by means of a desk evaluation by the experts to assess the feasibility of the draft model, both the basic feasibility of the concept and the suitability of the theory. From the results of expert validation, the draft application model was refined.

The next stage was preliminary field training, which is a trial for the application media of "Gizi COVID-19 Bagi Remaja" limited to users, namely high school adolescents. The purpose of this trial was to test the appropriateness of this application in increasing adolescent knowledge about nutrition as an effort to prevent COVID-19. We used a pre-experimental method with a one-group pretest-posttest design on 10 adolescents in one High School at Semarang City, aged 16-19 years. The instrument used was the application media for the "Gizi COVID-19 Bagi Remaja" as media for intervention and pre-post to measure the level of knowledge and the effectiveness of media use in increasing adolescent nutritional knowledge. Data were analyzed using Paired Sample T-Test and N-Grain Score Test. After that, we revised the product according to the results of the trials conducted.
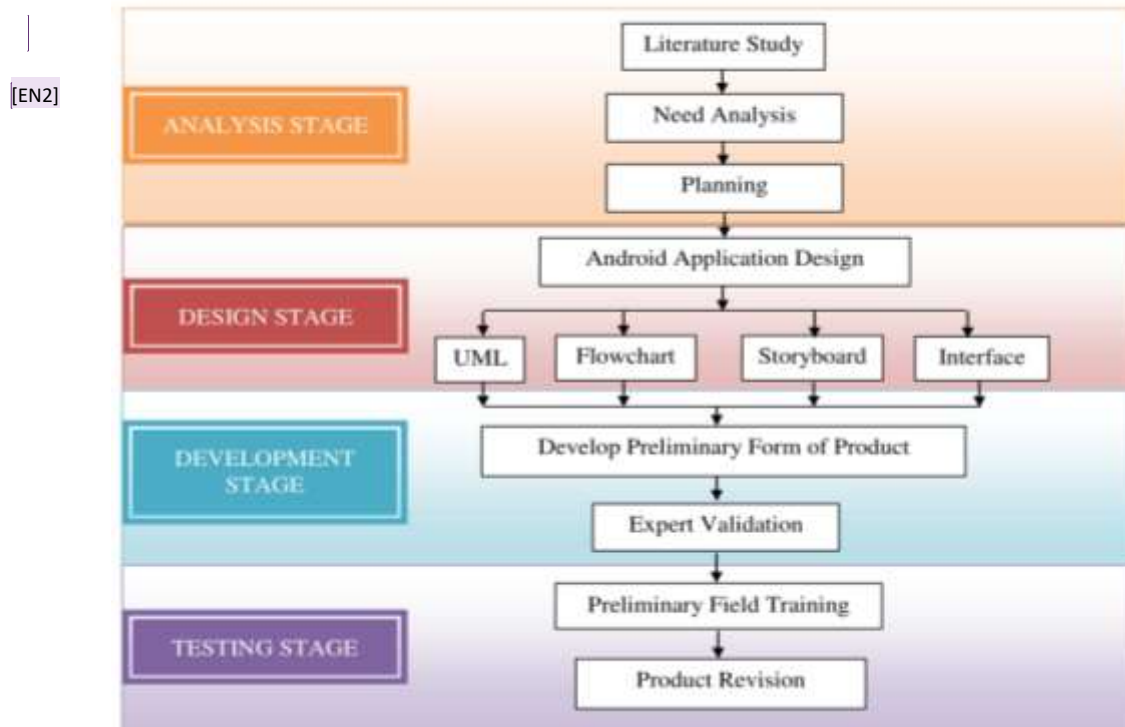
[EN2]

FIGURE 1. Research diagram of Nutrition Android Application Model

RESULTS AND DISCUSSION[EN3]

This research resulted in a product in the form of a Nutrition Android Application which is specifically intended for adolescents to be able to control their nutritional needs and to help increase their daily nutritional needs during the current pandemic.

The Development of "Gizi COVID-19 Bagi Remaja" Mobile Application

"Gizi COVID-19 Bagi Remaja" is an android-based nutrition application was developed to make it easier for today's teenagers to find information about ideal nutrition for adolescents as well as to provide education in preventing COVID-19 through fulfilling nutrition. This educational application is designed to be as simple, easy and attractive as possible to be operated by teenagers of school age. In today's technological era, teenagers spend more

and more time with their gadgets, especially smartphones (Kim, 2013). Especially with the current COVID-19 pandemic, all school children in Indonesia are required to do online learning, forcing them to deal with gadgets and more time to study independently at home. So with the development of nutrition education media in preventing COVID-19 through this application, it is hoped that it can help increase knowledge and information about adolescent nutrition and the prevention of COVID-19. The use of such technology can be applied to various programs because it is able to provide positive execution in learning and understanding concepts (Harjunowibowo, Jamaluddin, Hartati, Yuana, & Ahmadi, 2015).
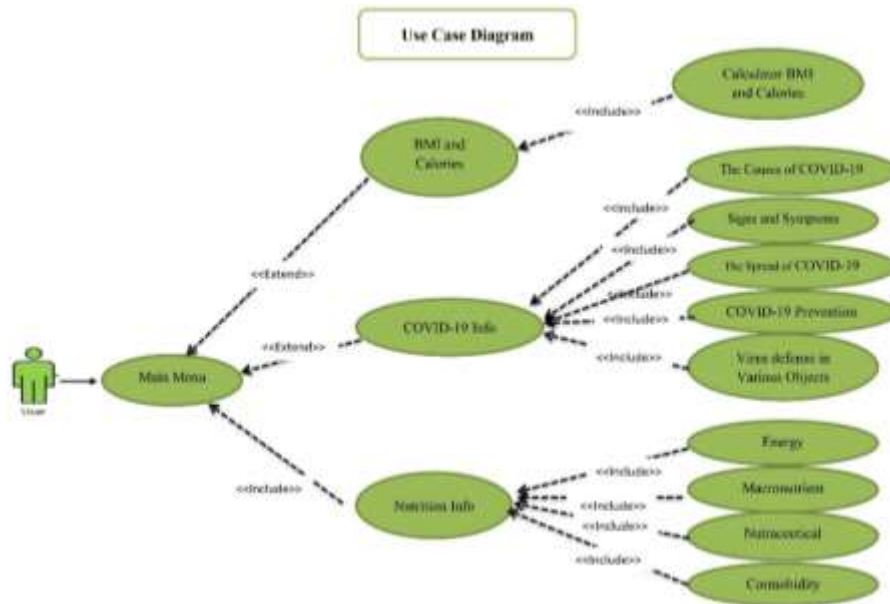

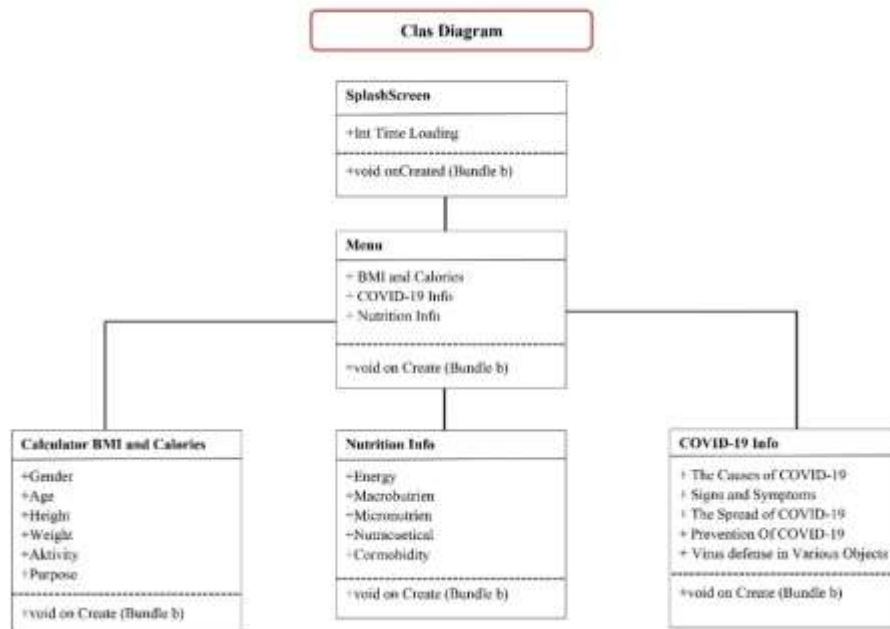**FIGURE 2.** Use Case Diagram Flowchart of "Gizi COVID-19 bagi Remaja" Application

FIGURE 3. Class Diagram Flowchart of "Gizi COVID-19 bagi Remaja" Application

Figure 2 and 3 presents a flowchart on operating the "Gizi COVID-19 Bagi Remaja" application. The flowchart illustrates the main menu consisting of 3 menus, namely 1) BMI and Calories, 2) Information media about COVID-19 and 3) information media about nutrition. All main menus can return to the initial menu (extend), which is included in the first menu, namely the BMI and calorie calculator. In the second menu there are (include) sub-menus, namely the causes of COVID-19, signs and symptoms, the spread of the corona virus, prevention of COVID-19 and the defense of the corona virus in various objects. The third menu contains (include) energy, macronutrients, micronutrients, nutraceuticals and comorbidities. After finishing the menu, the user can return to the nutrition info sub menu and return to the main menu.

"Gizi COVID-19 Bagi Remaja" Mobile Application

This Android Nutrition application displays 3 main menus, namely: 1) Check Body Mass Index (BMI) and Calories, 2) Media Information about COVID-19, and 3) Recommendations for Management of COVID-19 Nutritional Therapy. A splash page will appear when the application is opened, as shown in Figure 4a.

The initial display when opening the application will appear the title, image, university logo and the name of the researcher. Next, 3 main menus will be displayed. Seen in Figure 4b. User can view the contents of the menu by pressing the image button on the menu. In general, this media component is displayed on the main menu, there are BMI and calories, information media about Covid-19 and information media about nutrition.

When the user selects and presses the *"BMI dan Kalori"* menu button, then a sub-menu will be displayed for calculating the user's BMI and calories, as in Figure 4c. The initial menu presents the gender, age, height, weight, activity and desire. Height is filled in centimeters (cm) and body weight is entered in kilograms (kg), which is the unit of measurement commonly used in Indonesia. This measurement of height and weight is for calculating BMI. In the *"Aktivitas"* sub-menu, there are various choices of activities in the form of relaxing activities, light, moderate, high, and very high activities. Users can choose one according to the activity at that time. Furthermore, the sub-menu *"Ingin"* is a sub-menu that presents several choices of goals that the user wants to achieve in terms of body weight. Some of these options include losing weight, gaining weight, and maintaining weight. After the data is filled in, the calculation results will appear regarding the Basal Metabolic Rate (BMR), Total Daily Energy Expenditure (TDEE) and Body Mass Index (BMI). Calculation results can be saved and viewed again in the *"Lihat Riwayat"* menu.

In the second main menu *"Media Informasi tentang COVID-19"* presented in Figure 4d, there is information about COVID-19 that is presented in the menu. This sub-menu aims to provide information to teenagers about all general matters about COVID-19 and the efforts that can be made to prevent it so that their knowledge increases. Several sub-menu options that users can choose according to their wishes, namely the causes of COVID-19, signs and symptoms, the spread of the corona virus, prevention of COVID-19, and the defense of the corona virus in various objects. If the user presses the COVID-19 spread menu, it will display an explanation of the causes of COVID-19 in a brief, clear, and easily understood way for teenagers. Likewise, the sub-menu of signs and symptoms of eating will display an explanation of the signs and symptoms of COVID-19 that are often encountered along with pictures to make them attractive and easily understood by teenagers as users. The COVID-19 prevention menu contains an explanation of how to prevent transmission of the corona virus and the correct cough etiquette. And in the corona virus defense sub-menu in various objects including plastic, paper, glass, wood, iron, cardboard, gloves, aluminum, copper, and air along with how long the virus survives on these objects.

Figure 4e is the main menu of *"Rekomendasi Penatalaksanaan Terapi Nutrisi COVID-19",* where there is information media about nutrition and recommendations on management of COVID-19 nutritional therapy. The menu explains energy, macronutrients, micronutrients, nutraceuticals and comorbids. At the energy point, it contains any type of food that contains energy. The next point is macronutrient, which is about animal protein sources and vegetable protein sources. Furthermore, at the micronutrient point, there is an explanation of vegetables and waste containing vitamins (A, B, C, D, E and K), containing zinc, selenium, and calcium. Point nutraceutical contents regarding whole foods, food products and ingredients in food. And the last point is comorbid/congenital disease that can exacerbate the condition if exposed to COVID-19. Click the back menu to go to the previous menu.
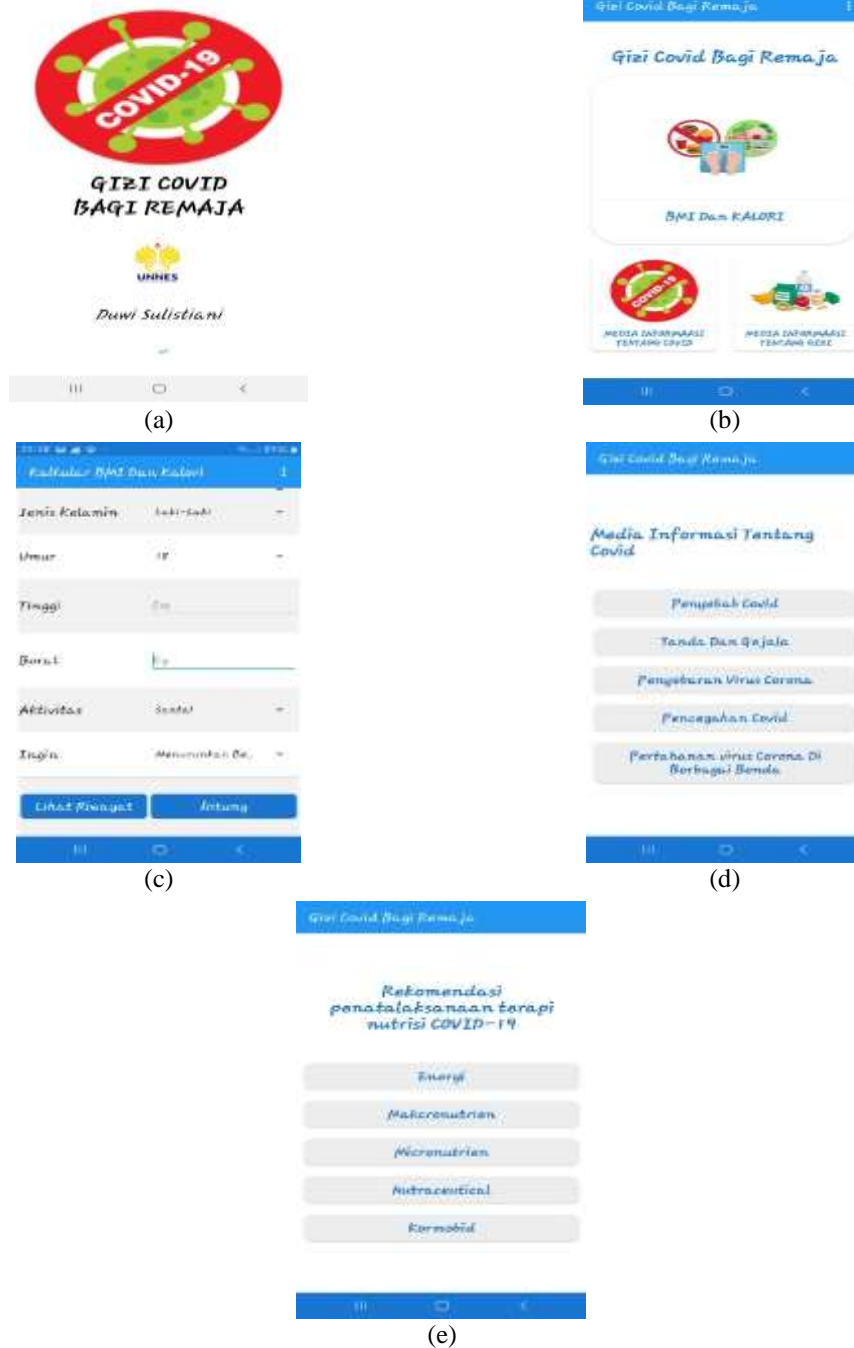
FIGURE 4. Nutrition Android Application Display; (a) splash page (front view); (b) the main menu includes checking Body Mass Index (BMI) and Calorie, COVID-19 information, and recommendations for managing covid nutritional therapy; (c) display BMI and Calorie check; (d) COVID-19 information display; (e) recommendations for managing covid nutritional therapy display

Experts Validation

The validity of the instrument or model developed is obtained from expert judgment or in other terms is content validation. The reliability test of the android application model for nutritional problems uses the reliability of

observations or by finding the coefficient of agreement among observers. The following table shows the results of the validation assessment by experts.

TABLE 1. The results of the validation of the Nutrition Android Application by experts

Expert	Evaluation result
Nutritionists	Based on the results of the evaluation of material experts, a percentage of 83.87% was obtained and it was included in the good criteria
Media Expert	Based on the results of the evaluation of material experts, the percentage was 92.8% and it was included in the good criteria

Application Trial

This tool was tested on high school adolescents to analyze and evaluate the usefulness of this application according to its purpose, namely as an educational medium to increase nutritional knowledge in adolescents in an effort to prevent COVID-19. We conducted this trial on 10 high school teenagers. Teenagers who participate are aged 16-19 years and have a smartphone with the Android operating system. This trial was carried out by giving a pre-test and post-test in the form of questions related to nutritional measurement and according to those available in the application "Gizi COVID-19 Bagi Remaja". A pre-test is given before the application is installed and operated by them. After they have completed the pre-test, they are then invited to operate the application with guidance and direction from us. When they understood and finished operating the application, a post-test is given to them. These pre and post-test aimed to measure the increase in knowledge about adolescent nutrition before and after being given the nutrition application media.

TABLE 2. The results of pre and post-test, the effect, and the effectiveness on increasing nutritional knowledge in adolescents (N=10)

	Mean	Correlation (p-value)	p-value	N-Grain Score (%)		
				Mean	Min.	Max.
Pre-Test	6.40	0.11	<0.01	88.21	66.67	100
Post-Test	15.80					

The test results are presented in table 2. Based on these results it is known that the mean pre-test score of the 10 adolescents is 6.40, while for the post-test average score is 15.80. However, there was no difference between pre-test variable and post-test variables, which can be seen from the p value on correlation (0.11) was more than 0.05. The p value (signification value) is known to be <0.01, so it can be concluded that there was an average difference between the pre-test and post-test results, which means that there was an effect of providing educational media based on the android application "Gizi COVID-19 Bagi Remaja" in increasing nutritional knowledge in adolescents.

Based on the results of the N-Grain test in Table 2, it is known that the average N-Grain score of 10 high school adolescents was 88.21%. If the N-Grain score is above 75% then it is categorized as an effective medium or product. This means that providing educational media in the form of the application "Gizi COVID-19 Bagi Remaja " was effective in increasing nutritional knowledge in high school adolescents. The minimum score for the N-Grain score for adolescents was 66.67, while the maximum score was 100.

Smartphones are currently a trend that is growing so rapidly, namely Android. Android is a Linux-based operating system specifically for mobile devices such as smartphones or tablets (Ibrahim & Ishartiwi, 2017). The use of android as the operating system used in Indonesia has grown to 92.14% until August 2020 and dominates the smartphone market (Statista, 2020). The choice of Android as the operating system is due to its ease of use. This Android operating system is open source so that many programmers have flocked to create applications or modify this system. Programmers have a very big opportunity to be involved in developing android applications for this open reason. Most of the applications on the Play Store are free and some are paid. Research conducted by Horace H. Dedue published by inet.detik.com on 3 February 2014 shows that Indonesia occupies the fifth position in the list of largest smartphone usage in the world (Azmi, Joebagio, & Suryani, 2017).

The large use of android in Indonesia makes the development of learning media for Android-based applications quite promising. This research was conducted to create an application called the Android application. This Android application is a nutrition application model in an android based smartphone. This application model is designed to help adolescents, starting from calculating energy needs, planning meals, evaluating the adequacy of nutritional intake, monitoring nutritional status by anthropometry, to feedback on adolescents and how to wash their hands. The purpose of making this application model is to prevent transmission of COVID-19. Health education methods influence respondents' awareness of obstetric complications (Prakasa, 2019). The smartphone media in this case has proven to be an effective tool in providing health education to the public by enabling the transfer of knowledge easily and conveniently. With information available at your fingertips, and with the affordability of the mobile internet, mobile phones have become effective channels.

Lack of knowledge of adolescents about the nutritional needs of the body can result in susceptibility to disease. Therefore, there is a need for nutrition education for adolescents. Medical doctors and doctors need to hold counseling or professional nutritional consultations to help adolescents' knowledge about calculating nutritional adequacy (Sari, 2018). From the explanation above, it is stated that one of the preventions is by maintaining the immune system, eating nutritious food, and maintaining personal hygiene. The community is encouraged to implement a regular diet every day by fulfilling the principles of balanced nutrition consisting of carbohydrates/staple foods, animal protein, vegetable protein and vegetables, and fruits that can be used as healthy snacks. (Sety, Syarifuddin, Tina, & Majid, 2020).

The limitation in the research is the Nutrition Android Application that we have produced only up to the development stage, namely the validation by experts in the field of nutrition and media. This application [EN4]has not been tested in the field so it is not possible to know further its use in the field, in a wider group. Therefore, it is necessary to have further research in this product so that its effectiveness and use in a wider target group can be determined.

CONCLUSION

The result of the development product is smartphone media based on an android studio. This product is packaged in the form of an application with the advantages of including students being more enthusiastic and interested in the process of finding information about nutrition and calculating the nutrients needed by the body because the products used contain information about checking body BMI, checking nutritional needs, COVID-19 info and nutritional info. and easier to understand because the use of the language is easy to understand. This product is very practical to use because of its small file size and can be used for nutritional purposes.

ACKNOWLEDGEMENT

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Jurnal Kesehatan Masyarakat

"Gizi COVID-19 Bagi Remaja" Application as A COVID-19 Prevention

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Article Info	Abstract
	Adolescents are a vulnerable group in fulfilling nutrition for body defence as an effort to prevent COVID-19. Nutrition education is needed for adolescents to increase their knowledge of nutrition consumption. One of the models to improve nutrition knowledge used the Android-based smartphone nutrition application model. This research aimed to design and develop a nutrition android application model to increase adolescents' nutritional knowledge in the prevention of COVID-19. The method used Research & Development with four stages: the analysis stage, the design stage, the development stage, and the testing stage. This research produced the "Gizi COVID-19 Bagi Remaja" as a nutrition application android-based with 3 main menus, namely BMI and calories checking, nutrition info, and COVID-19 info. The N-Grain test results show that this application effectively increases nutritional knowledge in 10 high school-adolescents (N-Grain=88.21%). The Android-based "Gizi COVID-19 Remaja" application is expected to be a comprehensive media for adolescents nutrition education during the COVID-19 pandemic in Indonesia to prevent the transmission of COVID-19.

Introduction

More than 200 countries in the world have experienced the COVID-19 problem. The total number of COVID-19 cases until October 5th, 2020, were 34,804,348 instances exposed to the coronavirus, cumulative cases with 1,030,738 deaths (WHO, 2020). Indonesia is one of the countries with the highest number of cases in the world. Recorded until October 8th, 2020, Indonesia's confirmed cases were 320,564 cases with 11,580 deaths and 244,060 recoveries. The four provinces with the highest Indonesia cases are DKI Jakarta, East Java, West Java, and Central Java. Central Java contributed to 25,259 cases (NDMA, 2020). One of the areas with the highest cases in Central Java is Semarang City. A total of 8,808 confirmed cases with 817 deaths in Semarang City until October 9th, 2020 (Dinas Kesehatan Kota Semarang, 2020).

The high number of COVID-19 cases requires prevention efforts. One of them is the fulfilment of nutrition. Nutrition plays a role in shaping the immune system's work and reducing risk factors for COVID-19 (Ausrianti et al., 2020). The immune system against viruses must be strengthened by eating nutritious foods, physical activity, and always happy thinking (Kemenkes, 2020). Nutritious eating contains vitamins A, B, C, D, E, omega three fatty acids, and minerals such as selenium, zinc, iron, copper, and vegetable and animal protein (He et al., 2020).

Adolescents are one of the nutritionally vulnerable groups, where they are vulnerable to high nutritional needs for growth, lifestyle, and diet and are vulnerable to environmental influences (Devine & Lawlis, 2019; Forthing, 1991; Perry-Hunnicuft & Newman, 1993). A study found that adolescents currently do not

meet the criteria for a nutritionally balanced diet and causes obesity in adolescents (Rouhani et al., 2014). The consumption pattern of adolescents who do not meet balanced nutrition is caused by a lack of knowledge about nutrition (Wang et al., 2014). Therefore, there is a need for nutrition education for adolescents. One of the strategies for changing behaviour is providing information through health promotion. Health promotion will increase public knowledge, and then awareness will arise and cause them to behave by their understanding (Laverack, 2017).

Technology in the communication process is always developing. According to data from the Indonesia Central Statistics Agency (in Bahasa Indonesia: Badan Pusat Statistik, BPS) 2018, 39.9% of Indonesia's population has accessed the internet. The high use of the internet in Indonesia reflects society's openness to technological developments (BPS, 2018). One of the fastest-growing mobile communication technologies in society is smartphones (Nasution et al., 2017). A study found that the highest number of smartphone users per month was 15-25 years old, 85.6%). On average, they surf the internet and send messages (Akanferi et al., 2014). The high use of smartphones among young people can be used

as a media for health promotion, especially for improving adolescent nutrition in preventing COVID-19. This study aimed to design and develop educational media and Android-based applications to increase adolescent knowledge about nutrition in preventing COVID-19.

Method

The method used in this research was Research & Development (R&D), referring to Gall's technique (Gall et al., 1983). This study applied four main stages, including the analysis stage, design stage, development stage, and testing stage. The four-stages of this study are presented in Figure 1.

The first main stage was the analysis stage. We began by looking for literature studies and gathering information to strengthen the product's design to be produced. It includes reviewing literature about mobile systems, android application, COVID-19 prevention, and nutrition, especially for adolescents. Need analysis has software functional analysis and software interface design. This stage to meet user needs (targets). Besides, this process was conducted by finding and reviewing information about the tools being developed. The second stage is the design stage, which is modelling object-oriented software development. The
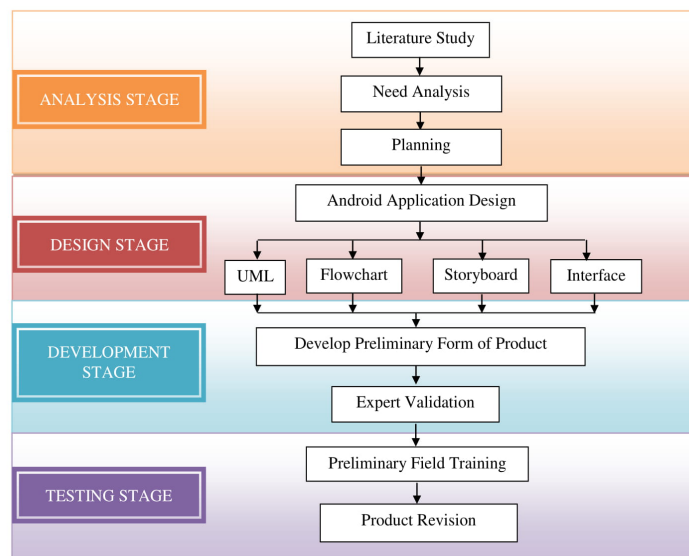

FIGURE 1. Research diagram of Nutrition Android Application Model

modelling used UML (Unified Modeling Language) to facilitate developers in coding the software being developed. At the design stage, we made flowcharts, storyboards, and interface designs. A flowchart was a comprehensive depiction of the program flow created with a specific symbol to provide an overview of the flow and process path of software to comfortable users to understand. The storyboard is the graphic organizer in the form of illustrated images displayed sequentially for visualization purposes.

The development process was undertaken by the design and planning described. In this process, we tested the feasibility of the experts related to this product, namely Nutritionist and Media Expert, through a desk evaluation to assess the feasibility of the draft model, both the basic feasibility of the concept and the suitability of the theory. From the results of expert validation, the draft application model was refined.

The next stage was preliminary field training, a trial for the application media of "Gizi COVID-19 Bagi Remaja" limited to users, namely high school adolescents. The purpose of this trial was to test the appropriateness of this application in increasing adolescent knowledge about nutrition as an effort to prevent COVID-19. We used a pre-experimental method with a one-group pretest-posttest design on ten adolescents in one of the High School in Semarang City, aged 16-19 years. The instrument used was the application media for the "Gizi COVID-19 Bagi Remaja" as media for intervention and pre-post to measure the level of knowledge and the effectiveness of media use in increasing adolescent nutritional understanding. Data were analyzed using the Paired Sample T-Test and N-Grain Score Test. After that, we revised the product according to the results of the trials conducted.

Results and Discussion

This research resulted in a product in the form of a Nutrition Android Application specifically intended for adolescents to control their nutritional needs and help increase their daily nutritional needs during the current pandemic.

The Development of "Gizi COVID-19 Bagi Remaja" Mobile Application

"Gizi COVID-19 Bagi Remaja" is an android-based nutrition application that was developed to make it easier for teenagers to find information about ideal nutrition for adolescents as well as to provide education in preventing COVID-19 through fulfilling nutrition. This educational application was designed to be as simple, easy, and attractive as
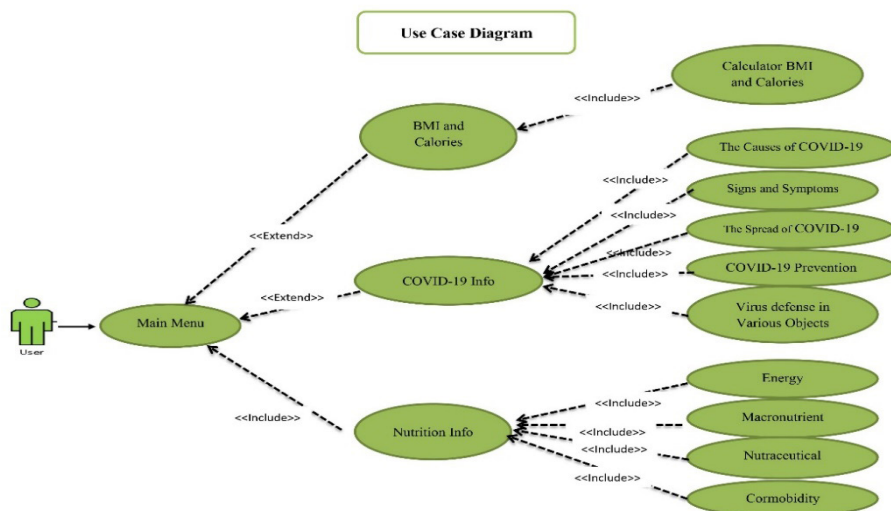

FIGURE 2. Use Case Diagram Flowchart of "Gizi COVID-19 Bagi Remaja" Applicati

possible to be operated by teenagers of school age. In today's technological era, teenagers spend more and more time with their gadgets, especially smartphones (Kim, 2013). Especially with the current COVID-19 pandemic, all school children in Indonesia were required to do online learning, forcing them to deal with gadgets and more time to study independently at home. With the development of nutrition education media in preventing COVID-19 through this application, it is hoped that it can help increase knowledge and information about adolescent nutrition and the prevention of COVID-19. Such technology can be applied to various programs because it can provide favourable execution in learning and understanding concepts (Harjunowibowo et al., 2015).

Figures 2 and 3 presents a flowchart on operating the "Gizi COVID-19 Bagi Remaja" application. The flowchart illustrates the main menu consisting of 3 menus, namely 1) BMI and Calories, 2) Information media about COVID-19, and 3) information media about nutrition. All main menus can return to the initial menu (extend), which is included in the first menu, namely the BMI and calorie calculator. There is the second menu (include) sub-menus, namely the causes of COVID-19, signs and symptoms, the spread of the coronavirus, prevention of COVID-19, and the coronavirus's defence in various objects. The third menu contains (include) energy, macronutrients, micronutrients, nutraceuticals, and comorbidities. After finishing the menu, the user can return to the nutrition info sub-menu and return to the main menu.

"Gizi COVID-19 Bagi Remaja" Mobile Application

This Android Nutrition application displays 3 main menus, namely: 1) Check Body Mass Index (BMI) and Calories, 2) Media Information about COVID-19, and 3) Recommendations for Management of COVID-19 Nutritional Therapy. A splash page will appear when the application is opened, as shown in Figure 4a.

When opening the application, the initial display will appear the title, image, university logo, and researcher's name. Next, 3 main menus will be displayed, seen in Figure 4b. Users can view the contents of the menu by pressing the image button on the menu. In general, this media component is displayed on
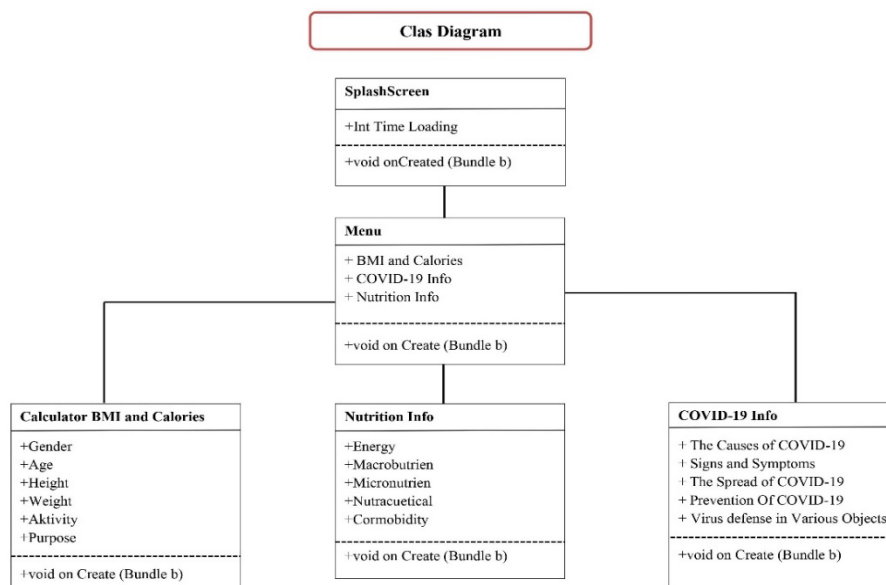

FIGURE 3. Class Diagram Flowchart of "Gizi COVID-19 Bagi Remaja" Application

the main menu; there are BMI and calories, information media about COVID-19 and information media about nutrition.

When the user selects and presses the *"BMI dan Kalori"* menu button, then a sub-menu will be displayed for calculating the user's BMI and calories, as in Figure 4c. The initial menu presents the gender, age, height, weight, activity, and desire. Height is filled in centimetres (cm), and body weight is entered in kilograms (kg), which is the unit of measurement commonly used in Indonesia. This measurement of height and weight is for calculating BMI. In the *"Aktivitas"* sub-menu, there are various activities in relaxing activities, light, moderate, high, and very high activities. Users can choose one according to the action at that time.

Furthermore, the sub-menu *"Ingin"* is a sub-menu that presents several goals that the user wants to achieve in terms of body weight. Some of these options include losing weight, gaining weight, and maintaining weight. After the data is filled in, the calculation results will appear regarding the Basal Metabolic Rate (BMR), Total Daily Energy Expenditure (TDEE), and Body Mass Index (BMI). Calculation results can be saved and viewed again in the *"Lihat Riwayat"* menu.

In the BMI measurement, we applied BMI adjusted for the adolescent's age and sex or called the adjusted-BMI (Adj-BMI). This calculation is used in the application media that we have developed because it is proven to have a reasonable correlation with adiposity (National Health and Medical Research Council, 2013; Todd et al., 2015). Besides, BMI is an essential indicator of nutritional status and nutritional needs, such as micronutrients (Sumarmi et al., 2017). The World Health Organization (WHO) recommends screening children for overweight and obesity using BMI measurements because BMI correlates with body fat and is easy to apply (Clemente et al., 2011; WHO, 2021). Many studies have measured BMI as an indicator in determining children in the under, normal, overweight, and obese categories and linking them to various variables related to nutrition. As in the research of Eker et al., who used the measurement of BMI in children to determine the prevalence of obesity among boys and girls.

From his research results, the BMI value in boys is higher than girls (3.32 kg/m2) (Eker et al., 2018).Similarly, the study by Buscemi et al. Linked changes in BMI to desire and calorie intake. The results found a relationship between changes in food craving and BMI changes that varied depending on the change in calorie intake (Joanna Buscemi et al., 2017). It explains that BMI is an essential indicator in determining nutritional status. Even in the conditions of the COVID-19 pandemic, obesity is a risk factor for COVID-19 infection and worsening disease if COVID-19 infection occurs (CDC, 2020). Besides, BMI is used in determining health policy (Nuttall, 2015).

In the second main menu, *"Media Informasi tentang COVID-19"* presented in Figure 4d, there is information about COVID-19 presented in the menu. This sub-menu aims to provide information to teenagers about all general matters about COVID-19 and the efforts that can be made to prevent it so that their knowledge increases. The menus, including COVID-19's cause, signs and symptoms, the spread of the coronavirus, COVID-19 prevention, and the defence of the COVID-19 viruses in various objects. If the user presses the COVID-19 spread menu, it will explain the causes of COVID-19 in a brief, clear, and easily understood way for teenagers. Likewise, the sub-menu of signs and symptoms of eating will explain the signs and symptoms of COVID-19 that are often encountered, along with pictures to make them attractive and easily understood by teenagers as users. The COVID-19 prevention menu contains an explanation of preventing transmission of the coronavirus and the correct cough etiquette. The coronavirus defence sub-menu in various objects, including plastic, paper, glass, wood, iron, cardboard, gloves, aluminium, copper, and air, the virus survives.

Figure 4e is the main menu of *"Rekomendasi Penatalaksanaan Terapi Nutrisi COVID-19"* where information media about nutrition and recommendations on COVID-19 nutritional therapy management. The menu explains energy, macronutrients, micronutrients, nutraceuticals, and comorbidities. At the energy point, it contains any food that has life. The next issue is a

FIGURE 4. Nutrition Android Application Display; (a) splash page (front view); (b) the main menu includes checking Body Mass Index (BMI) and Calorie, COVID-19 information, and recommendations for managing COVID-19 nutritional therapy; (c) display BMI and Calorie check; (d) COVID-19 information display; (e) recommendations for managing COVID-19 nutritional therapy display.

macronutrient, which is about animal protein sources and vegetable protein sources. Furthermore, at the micronutrient point, there is an explanation of vegetables and waste containing vitamins (A, B, C, D, E, and K), including zinc, selenium, and calcium. Point nutraceutical contents regarding whole foods, food products, and ingredients in food. And the last point is comorbid/congenital disease that can exacerbate the condition if exposed to COVID-19. Click the back menu to go to the previous menu.

Experts Validation

The validity of the instrument or model developed is obtained from expert judgment or, in other terms, is content validation. The reliability test of the android application model for nutritional problems uses the reliability of observations or by finding the coefficient of agreement among observers. The following table shows the results of the validation assessment by experts.

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TABLE 1. The results of the validation of the Nutrition Android Application by experts

Expert	Evaluation result
Nutritionists	The nutrionistst's validation assessment was 83.87%, and it was included in the good criteria.
Media Expert	The media expert's validation assessment was 92.8%%, and it was included in the good criteria.

TABLE 2. The results of pre and post-test, the effect, and the effectiveness on increasing nutritional knowledge in adolescents (N=10)

	Mean	Correlation (p-value)	p-value	N-Grain Score (%)		
				Mean	Min.	Max.
Pre-Test	6.40	0.11	<0.01	88.21	66.67	100
Post-Test	15.80					

Application Trial

This tool was tested on high school-adolescents to analyze and evaluate this application's usefulness according to its purpose, namely as an educational medium to increase adolescents' nutritional knowledge to prevent COVID-19. We conducted this trial on ten high school-adolescents. Adolescents who participate were aged 16-19 years and had a smartphone with the Android operating system. This trial was carried out by giving a pre-test and post-test in the form of questions related to nutritional measurement and those available in the application "Gizi COVID-19 Bagi Remaja". A pre-test was given before the application was installed and operated by them. After completing the pre-test, they were invited to use the application with guidance and direction from us. When they understood and finished using the application, a post-test was given to them. These pre and post-test aimed to measure the increase in knowledge about adolescent nutrition before and after being given the nutrition application media.

The test results are presented in Table 2. Based on these results, the ten adolescents' mean pre-test score is 6.40, while the post-test average score is 15.80. However, there was no difference between the pre-test, and post-test variables, which can be seen from the p-value on correlation (0.11) was more than 0.05. The p-value is known to be <0.01. It can be concluded that there was an average difference between the pre-test and post-test results, which means that there was an effect of providing educational media based on the android application "Gizi COVID-19 Bagi Remaja" in increasing nutritional knowledge in adolescents.

Based on the results of the N-Grain test in Table 2, it is known that the average N-Grain score of 10 high school-adolescents was 88.21%. If the N-Grain score is above 75%, it is categorized as an effective medium or product. It means that providing educational media in the form of the application "Gizi COVID-19 Bagi Remaja" effectively increased nutritional knowledge in high school adolescents. The minimum score for the N-Grain score for adolescents was 66.67, while the maximum score was 100.

Provision of nutrition education through the application "Gizi COVID-19 Bagi Remaja" in the trial proved to affect increasing nutritional knowledge of high school adolescents positively. Adolescent knowledge on nutrition and prevention of COVID-19 increased after being given intervention with this application. The practical and attractive design makes it easy for adolescents to operate the application and understand their nutritional needs more. Interventions such as nutrition education are recommended to improve adolescent nutritional status (Hill et al., 2020; Kroeze et al., 2006; Oenema et al., 2001; Pérez-Rodrigo & Aranceta, 2001; Story et al., 2002). Adolescents

who lack knowledge of nutritional needs lead to uncontrolled food intake into the body so that it will be easy for malnutrition and obesity. During this pandemic, obesity is a significant concern because obesity is a risk factor for the severity of COVID-19 and increases death likelihood (Cuschieri & Grech, 2020). So, knowledge of nutrition must be given to adolescents from an early age to avoid obesity in the future. Previous research stated that misinformation and knowledge were related to people's healthy diets (Dickson-Spillmann & Siegrist, 2011).

This android-based application product, "Gizi COVID-19 Bagi Remaja" is an educational medium developed with a design that is attractive to teenagers, easy, and practical to use. Android-based development is carried out because, currently, technological developments are increasingly advanced and fast. Smartphones with Linux-based operating systems specifically for mobile devices are like a mobile phone technology proliferating (Ibrahim & Ishartiwi, 2017). The use of Android as the operating system used in Indonesia has grown to 92.14% as of August 2020 and dominates the smartphone market (Statista, 2020). The choice of Android as the operating system is due to its ease of use. This android operating system is open source and has a vast opportunity to develop applications. Research conducted by Horace H. Dedue shows that Indonesia ranks fifth in the list of the world's largest smartphone users (Azmi et al., 2017). The highest number of smartphone users per month is in the 15-25 year age group (85.6%) (Akanferi et al., 2014).

"Gizi COVID-19 Bagi Remaja" application as an educational medium for solving research problems, especially in nutrition for the prevention of COVID-19, is an innovation by the target group's characteristics. Adolescence is a transition period to adulthood, where reaching a healthy adult requires adequate nutritional intake. Nutrition plays an essential role in this process. Malnutrition in adolescents is often associated with child growth, cognitive maturation, impaired intellectual intelligence, and behavioural problems. Not only that, the risk of contracting both infectious and non-communicable diseases will be greater (Onyango, 2013; Salam et al., 2020). Even a

systematic review study concluded that not half of the adolescents, especially girls in low and middle-income countries, have a balanced intake of foods such as milk, fruit, meat, and vegetables and do not meet the WHO dietary guidelines. (Keats et al., 2018).

In the current state of the COVID-19 pandemic, the use of online platforms among adolescents is more intensive and is increasing by about five hours per day compared to before the COVID-19 pandemic (Pietrobelli et al., 2020). They will stare more at the screen to play games, access social media, and do lessons. It can raise concerns for their mental and physical health. Reduced physical activity in children and increased consumption of light to heavy metals are associated with grown children's weight (Cuschieri & Grech, 2020; Marsh et al., 2013). Pietrobelli's research found that since the COVID-19 pandemic occurred, children's exercise activities decreased significantly 2-4 hours per week. There was a correlation with changes in exercise activity, changes in the amount of food consumed per day, and screen time changes. Boys had more food consumption per day than girls (Pietrobelli et al., 2020).

Given these conditions, the application "Gizi COVID-19 Bagi Remaja" will help children increase their knowledge of nutrition. The high intensity of using online platforms to smartphones in adolescents will be favourable if this application is included in their activities. It is hoped that the easy use of the application "Gizi COVID-19 Bagi Remaja" can be applied by all adolescents, especially adolescents, to improve healthy behaviour, especially in COVID-19 conditions. Even so, parental assistance is still needed, in using smartphones and this application. Parents' role is essential in fulfilling children's nutrition and choosing children's food (Cohen et al., 2020; Fadare et al., 2019). Parents can use this application to study together with children so that children are more interested in learning the menus in the application "Gizi COVID-19 Bagi Remaja". Besides, parents can monitor and explain the application to children.

The research limitation is that the application "Gizi COVID-19 Bagi Remaja" has been developed and tested on adolescents and has proven to increase adolescent nutrition

knowledge. Still, this application is only created with the android operating system. A smartphone/device with an operating system other than Android cannot install and operate this application. It is hoped that we can register this application on Google Playstore so that all teenage smartphone users can use this application easily.

Conclusion

The development of an android-based product in the form of the "Gizi COVID-19 Bagi Remaja" application has been proven effective in increasing adolescent nutrition knowledge as an ongoing effort to prevent COVID-19. The "Gizi COVID-19 Bagi Remaja" application was developed in 3 main menus, namely checking BMI and calories, nutritional information, and COVID-19 information that is friendly to use for adolescents can become an android-based educational media. This application is expected to be used on a broader and comprehensive scale for all adolescents by registering on the Google Playstore and available for all operating systems so that high smartphone use in adolescents positively impacts this nutritional health education insert.

Acknowledgement

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