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# WhatsApp-based anemia e-leaflet for young women as a media for adolescent health promotion

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## Abstract:

**BACKGROUND:** Adolescence is the right time to intervene in overcoming anemia because it is an important period for growth and development. One of the causes of anemia is nutritional disorders, which can be caused by a lack of information about nutrition or the inability to apply the information obtained in daily life. The implementation of health promotion cannot be separated from the media. E-leaflets based on WhatsApp Messenger are one of the media that is easily accessed and understood by teenagers to reduce the number of anemia problems in young women. Therefore, this study was conducted to produce WhatsApp-based e-leaflet products as a medium for health promotion in adolescents.

**MATERIALS AND METHODS:** This research is a type of research and development (RnD). The research subjects were media experts and 20 young women who met the inclusion criteria using a purposive sampling technique. Validation sheets by media experts and response questionnaires for young women were used to test the feasibility of the product. A quantitative descriptive analysis technique was applied for expert validation.

**RESULTS:** The results showed that the WhatsApp-based anemia e-leaflet for young women was very feasible as media for promoting youth health based on the results of validation from media experts (96%) and small group trials (88%).

**CONCLUSION:** WhatsApp-based anemia e-leaflets for young women are very appropriate as a medium for promoting adolescent health. It is recommended to do a trial in a large group and test the effectiveness of the WhatsApp-based anemia e-leaflet product for young women as a medium for promoting adolescent health.

## Keywords:

Anemia, e-leaflet, health promotion, WhatsApp, young women

## Introduction

Human blood contains a red pigment called hemoglobin, which is rich in iron and carries oxygen throughout the body. Lack of iron in food results in a decrease in the amount of hemoglobin so that the blood becomes thin and less red, which reduces the supply of oxygen throughout the body. This condition is known as anemia.<sup>[1]</sup> Anemia is directly affected by the daily consumption of foods that lack iron. In general, food consumption

is closely related to nutritional status. If the food consumed is of good value, then the nutritional status is also good. Conversely, if the food consumed has low nutritional value, it will cause malnutrition and can cause anemia.<sup>[2]</sup> According to the 2018 Basic Health Research Results (Riskesdas), the prevalence of anemia in Indonesia is 48.9% and the prevalence of anemia based on the characteristics of the age group is the highest in the age group 15–24 years, which includes adolescents as much as 84.6%.<sup>[3]</sup>

Adolescence is the right time to intervene in overcoming anemia because it is an

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important period for growth and development. Lack of education about nutrition and iron supplementation can encourage adolescents to become more iron deficient and anemic. Adequate iron intake before and during pregnancy is important for young women, in addition to growth needs.<sup>[1]</sup>

Adolescent girls of reproductive age who have low iron stores and become pregnant during their teenage years or later have a greater risk of giving birth to babies with low birth weight and premature babies. Babies are born with low iron stores, and if the baby's feeding is poor, the baby will likely enter adolescence with low iron stores.<sup>[1]</sup> The high rate of malnutrition in pregnant women also contributes to the high rate of stunting in Indonesia. Anemia in pregnancy causes stunting in toddlers, and this is due to insufficient nutritional intake. The results of the study showed that there was a significant relationship between the history of anemia in pregnancy and the incidence of stunting in toddlers.<sup>[4]</sup>

Nutritional disorders can be caused by a lack of information about nutrition or the inability to apply the information obtained to be applied in everyday life. The implementation of health promotion cannot be separated from the media. Health promotion media are divided into three types, namely print media, electronic media, and outdoor media.<sup>[5]</sup> One form of electronic media that is used as a health promotion effort is to utilize technology in the form of smartphones, which have been researched and proven to be effective in improving the health status of the community.<sup>[6]</sup>

At this time, digital platforms have become a new tool for health promotion and communication. Digital health promotion can be used to optimally improve public health, especially adolescents. More than half of adults in the world use the Internet to find information. Social media have also become a very important channel of information for teenagers and adults. This digital education program has a positive impact on knowledge, attitudes, and behavior regarding health.<sup>[7]</sup>

Teenagers and the use of smartphones based on WhatsApp Messenger are two things that cannot be separated, so health promotion media must adapt to technological developments. WhatsApp Messenger-based e-leaflets are one of the media that is easily accessed and understood by adolescents to reduce the number of adolescent health problems, especially anemia in young women. Based on the survey results, the WhatsApp Messenger application is the most widely used in various countries. It is the most popular app in over 100 countries and reaching 2.2 billion active users in 2021. The average user checks WhatsApp Messenger more than 23 times per day.<sup>[8]</sup> This application can be a medium for loading adolescent

girls' health content, which has the potential to help add information about their health.<sup>[9]</sup> This is in line with the National Research Master Plan for 2017–2024 that the vision and mission of the research are to create an innovative society based on science and technology and to increase scientific and technological literacy to be able to increase knowledge about adolescent health, especially young women as prospective mothers who will produce superior Indonesian people.

Community readiness such as digital health literacy supports the implementation of digital technology in the health sector to achieve goals, optimize health service performance, and prevent infodemics and miss information. Society still needs guidance to carry out activities in the digital environment. Increasing digital health literacy in the community is urgently needed to control the lack of dissemination and misinformation that can exacerbate a pandemic.<sup>[10]</sup>

## Materials and Methods

### Study design and setting

This research is a type of research development or research and development (RnD) that is used to produce a certain product and test the effectiveness of certain products.<sup>[11]</sup> In this study, the 4D development model was used, namely define, design, develop, disseminate, or adapted into a 4 Ps model, namely defining, designing, developing, and deploying. From this research, a WhatsApp-based e-leaflet product will be produced as a media for health promotion for adolescents, which will be developed in the Linggasari Village, Ciamis District.

### Study participants and sampling

WhatsApp-based e-leaflet development research was media experts and 20 young women who met the inclusion criteria using a purposive sampling technique in Linggasari Village, Ciamis District, because the products that have been developed need to be tested on 10–20 people who can represent the target.<sup>[12]</sup>

### Data collection tool and technique

The instruments used in this study were a validation sheet by media experts and a response questionnaire for young women to assess the feasibility of the WhatsApp-based e-leaflet as a medium for promoting youth health that had been developed by researchers. The percentage of research was obtained from a Likert scale with an assessment score of 5 including very good criteria, a score of 4 with good criteria, a score of 3 with good enough criteria, a score of 2 with poor criteria, and a score of 1 with very poor criteria.<sup>[13]</sup>

The research process begins with the definition stage, which includes literature study and information

gathering. Furthermore, the design stage includes drafting and making e-leaflet products. After the e-leaflet product is finished, it will proceed to the development stage, which includes review and validation by media experts, revisions, and limited trials. Researchers did not do this until the deployment stage because researchers only aim to develop WhatsApp-based e-leaflets as adolescent health promotion media that will be developed in the Linggasari Village as a place of research without conducting research wider spread.

Limited trials on young women began with filling out consent forms to become respondents. Furthermore, respondents were distributed e-leaflets based on WhatsApp and given time to assess for 20 minutes. Then, the respondents were given a response questionnaire and asked to fill in the questionnaire for  $\pm 10$  minutes.

### Ethical consideration

This study was approved by the Health Research Ethics Committee of STIKes Muhammadiyah Gombong with the number: 232.6/II.3.AU/F/KEPK/VIII/2022.

### Statistic analysis

Data analysis techniques in this study were expert validation analysis techniques and youth response questionnaires to assess the feasibility of a product design and make improvements based on the validation results. In the analysis technique of expert validation and youth response questionnaires, quantitative descriptive analysis techniques are used to process the data obtained from the questionnaire scoring scores that have been filled in with the formula for calculating the percentage of quantitative data,<sup>[14]</sup> as follows:

$$\text{Eligibility percentage (\%)} = \frac{\text{Score Obtained}}{\text{Expected Score}} \times 100\%$$

After obtaining the feasibility percentage, the percentage is converted into qualitative data with the product feasibility assessment criteria in Table 1.<sup>[14]</sup>

Based on the analysis of the data obtained from the media expert validation sheet and the youth response questionnaire, it can be said that it is suitable for use in health promotion if the value obtained meets the interpretation criteria of  $\geq 61\%$  in the very feasible or feasible category.

## Results

### Defining stage

This stage includes literature study and information gathering to support the research process. The researcher looked for various theoretical references and conducted a review of previous studies related to this research. This

anemia e-leaflet for young women is sourced from the Technical Handbook on Anemia in Adolescents from the World Health Organization (WHO).

### Design stage

This stage begins with designing youth health promotion media products in the form of e-leaflets that are made by the researchers themselves with the help of the Canva application as in Figure 1. Next, the researchers designed the dissemination to media experts during validation and small groups during trials using the FlipHTML5 application in Figure 2.

### Development stage

At this stage, testing is conducted to determine the eligibility level of the e-leaflet. This stage consists of validation by media experts, revision, and small group trials by young women.

### Validation by media experts

The first step in the product development stage was validation by media experts, namely Mr. Wendi Arifiana and S.Kom as an information technology (IT) staff at STIKes Muhammadiyah Ciamis, which was performed on August 9, 2022. Aspects validated by media experts were visible, interesting, simple, useful, accurate, legitimate, and structured (VISUALS) adopted by Hidayat *et al.*, (2019).<sup>[15]</sup>

Based on Table 2, it is known that the validation results of the VISUALS aspect by media experts show that overall a mean score of 4.8 is obtained, where this value is included in the very good category. The feasibility percentage shows a value of 96%, which means that the e-leaflet design is included in the very feasible category.

- Product Revision
- Small Group Trial

Based on the validation results from media experts, there are several suggestions related to the e-leaflet. The input is listed in Table 3. Then, the researcher made improvements according to the input as seen in Figure 3.

A small group tryout on 20 young women was conducted on August 14, 2022. The aspects assessed in the response questionnaire were the quality of appearance and aspects of content and material adopted from Laksono (2017).<sup>[16]</sup>

**Table 1: Eligibility assessment criteria**

Aspect	Information
81%–100%	Very worth it
61%–80%	Worthy
41%–60%	Decent enough
21%–40%	Less eligible
0%–20%	Not feasible

Source: Personal data



Based on Table 4, it is known that the results of the trial in the small group obtained an average score of 4.4, where this value is included in the very good category. The feasibility percentage shows a value of 88%, which means that the e-leaflet design is included in the very feasible category.

Based on the results of the RnD of the feasibility of the WhatsApp-based anemia e-leaflet design for young women as a media for adolescent health promotion, it can be concluded that the assessment by media experts and the results of small group trials that the WhatsApp-based anemia e-leaflet for young women

is very appropriate as a media for health promotion teenager.

## Discussion

Based on the results of RnD on the feasibility of the WhatsApp-based anemia e-leaflet design for young women as a medium for promoting adolescent health, the assessment by media experts was a score of 4.6 for visible aspects, a score of 4.6 for interesting, a score of 5 for simple, a score of 5 for useful, score of 5 for accurate, score of 4.8 for legitimate, and score of 4.5 for structure. The results of the small group trial got a score of 4.3 for display quality and a score of 4.5 for content and material aspects.

The results of the validation test that has been performed by media experts can be concluded that the average score is 4.8 and is included in the very good category, with a feasibility percentage of 96% or a very feasible category. The results of the small group tryout can be concluded that the mean score is 4.4 and is included in the very good category, with an eligibility percentage of 88% or a very appropriate category according to the eligibility assessment criteria according to AY Utomo and D. Ratnawati (2018). So, it can be concluded that the WhatsApp-based anemia e-leaflet for young women is very appropriate to be used as a medium for promoting adolescent health.

The potential of using the Internet as a health promotion tool cannot be ignored. Unlike the paper-based health promotion materials of the past, the Internet has triggered a growth in the provision of more interactive health promotion messages, which are likely to enhance the potential for behavior change.<sup>[17]</sup> Digitalization as a good educational digital resource can be used as a tool for health promotion. One of the effects of digitalization is social networking. Social networks show good quality, which can be considered a good tool for health outreach.<sup>[18]</sup>

The use of media in health promotion can make the health messages conveyed interesting and easy

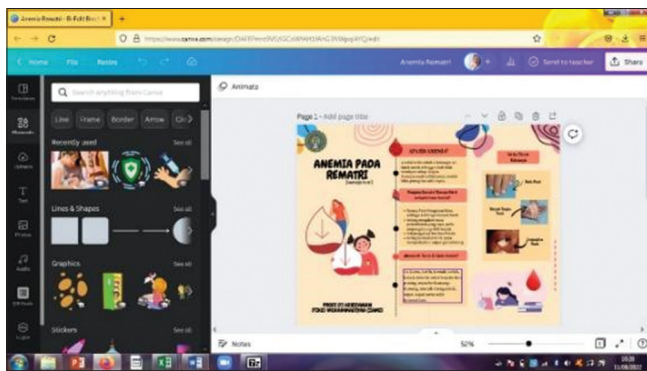


Figure 1: Development of youth health promotion media product designs in the form of e-leaflets using the Canva application (Source: Personal data)



Figure 2: Development of the deployment design using the FlipHTML5 application (Source: Personal data)

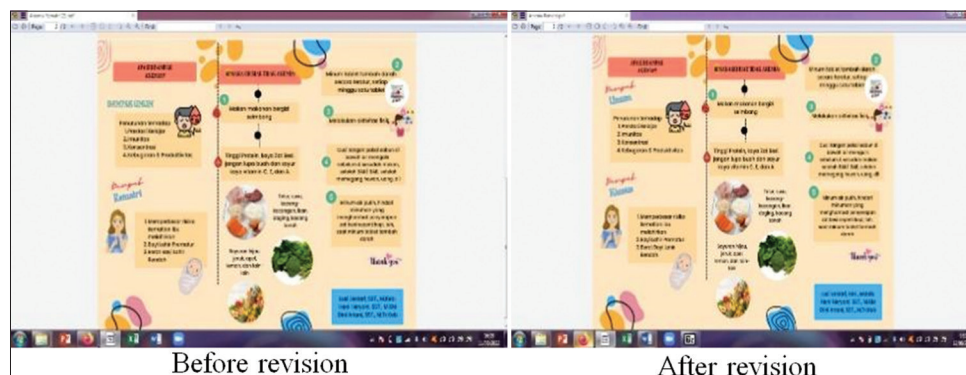


Figure 3: Product revision results from media experts (Source: Personal data)

**Table 2: Results of validation by media experts**

Rated aspect	Average score	Category	Eligibility percentage
Visible	4,6	Very good	96% (Very worth it)
Interesting	4,6	Very good	
Simple	5	Very good	
Useful	5	Very good	
Accurate	5	Very good	
Legitimate	4,8	Very good	
Structure	4,5	Very good	
Total score	33.5	Very good	
Average score	4,8		

Source: Personal data

**Table 3: Revision of media experts**

Revision	Follow-up
More consistency in selecting or delivering subtitles, such as general impact and young women's impact	Improvements have been made, and the subtitles become general impact and special impact
The form of writing subtitles to be more assertive and equalized for convenience when viewed	Improvements have been made, and the form of writing subtitles is more assertive and equalized

Source: Personal data

**Table 4: Small group trial results**

Rated aspect	Average score	Category	Eligibility percentage
Display quality	4,3	Very good	88% (Very worth it)
Content and material aspects	4,5	Very good	
Total score	8,8	Very good	
Average score	4,4		

to understand so that the target can easily receive messages.<sup>[5]</sup> Messages, ideas, ideas, or information conveyed by the teacher or speaker will be easily accepted if delivered with appropriate and useful methods and media.<sup>[19]</sup> One form of media in health promotion is a leaflet. Leaflets are a form of conveying health information or messages through folded sheets, the contents of which are sentences or pictures, or a combination.<sup>[20]</sup>

Leaflets are a form of print media containing a summary of a promotion. The contents of the promotion are taken from several books and Internet sources, which are made into leaflets. Leaflets are carefully designed and equipped with illustrations using language that is easy to understand and short. The advantage of printed leaflet teaching materials is that there is no need for special and expensive tools to use them.<sup>[21]</sup>

Leaflets have the advantage of being able to adapt and learn independently, can provide detailed information, and are easy to create, reproduce, and revise. Leaflets are one of the teaching aids that are arranged based on the principle that human knowledge is received or captured through the five senses. Leaflets can be

widely distributed and are a useful way of conveying information to women and their families or supporting the information they receive.<sup>[20]</sup>

Another advantage of leaflets is that messages can be studied according to the needs, interests, and speed of each recipient of the message, can be studied at any time, and can be taken anywhere. The results of the study stated that leaflet media were more influential and effective because these media only relied on sight so respondents could focus more on the flow of the material. Leaflet media are more effectively used as a media for health education about the dangers of smoking in adolescents than video media.<sup>[22]</sup>

In today's technological era, most people have used smartphones and computers extensively in their daily lives. This is probably the fastest way to access all the necessary medical information.<sup>[23]</sup> Information search dominated by the utilization of the Internet through smartphone media is an opportunity for health practitioners to convey health information effectively and more easily.<sup>[24]</sup> Health education or mobile-based education is seen as a more cost-effective approach when compared to conventional methods. The use of smartphones can improve public health status and change people's behavior according to health references.<sup>[25]</sup>

Mobile learning technology (m-learning) can make learning easier anywhere and anytime according to the time you have. WhatsApp as one of m-learning has enormous potential to be used as a medium for sharing information because it can be used for rapid dissemination of information, namely broadcasts and groups.<sup>[26]</sup> WhatsApp is a medium that can help someone add or improve their understanding of knowledge and attitudes because WhatsApp tends to be easier to use and has complete features with WhatsApp you can send text, images, videos, and sound.<sup>[27]</sup> This WhatsApp application is a means to be able to send leaflets as a medium for health promotion. With WhatsApp users, you can more easily send text messages and various video and voice messages and images over the Internet network.<sup>[26]</sup>

Leaflets that are created and redesigned in digital form can increase the effectiveness of reading. The advantage of digital leaflets is that it takes a shorter time to access the right information.<sup>[23]</sup> Researchers use the FlipHTML5 application to display e-leaflets. FlipHTML5 is a Web-based flipbook application that can be used to convert Portable Document Format (PDF) files to flipbooks. FlipHTML5 can create magazines, catalogs, e-brochures, eBooks, or e-newspapers in 3D.<sup>[28]</sup> Using FlipHTML5, teenagers can easily and practically access these materials online anywhere and anytime. Users

do not need to download, and they can directly open the e-leaflet, so it would not fill up storage space on their cellphones or laptops, and computers. Apart from that, users of this application can reduce the boredom of teenagers who are bored with delivering material in Word or PDF format, because in general teenagers are happy with new and interesting things.<sup>[29]</sup>

Interesting use of technology can increase usability and accessibility in the health context. Recently, many industries have also begun to adopt this technology to increase the efficiency of healthcare services and improve patient satisfaction. Technology designed to simulate virtual human conversations using natural language similar to imitating human conversations through artificial intelligence (AI)-based digital platforms serves to increase health literacy by providing users with intelligent tools that make health information easily accessible and reduce repetition. The same information is not useful.<sup>[30]</sup>

This study only examines the feasibility of e-leaflets conducted by media experts and should also be tested by material experts related to the topic of the e-leaflet. The trial was also limited to a small group only. However, based on the test results, the WhatsApp-based anemia e-leaflet for young women is appropriate to be used as a medium for promoting adolescent health. It is recommended to do a trial in a large group and test the effectiveness of the WhatsApp-based anemia e-leaflet product for young women as a medium for promoting adolescent health.

## Conclusion

The results of the development of WhatsApp-based anemia e-leaflets for young women as a media for promoting adolescent health based on validation from media experts obtained an average percentage of 96% or very decent. Furthermore, based on the small group trials that have been conducted, the average percentage of the assessment is 88% or very feasible. It is recommended to do a trial in a large group and test the effectiveness of the WhatsApp-based anemia e-leaflet product for young women as a medium for promoting adolescent health.

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## Patient consent statement

The authors certify that they have obtained all appropriate young women's consent forms. In the form, the young women have given their consent for information to be reported in the journal. Young women understand that their names and initials will not be made public and that every effort will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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