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**RESEARCH** **Open Access**

# The Effectiveness of Web-Based E-WoHealth on Compliance with Consumption of Iron Tablets in Young Women

**Desak Made Yulianti[1a*], Mardiana Ahmad[1b], Yusring Sanusi Baso[2c], Andi Wardihan Sinrang[1d], Andi Nilawati Usman[1e], Prihantono[3f]**

[1] Department of Midwifery, Graduate School, Hasanuddin University, Makassar, South Sulawesi, Indonesia
[2] Learning Media Center, Learning Resource and E-Learning, Hasanuddin University, Makassar, South Sulawesi, Indonesia
[3] Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi Indonesia

[a] Email address: yuliantidm21p@student.unhas.ac.id
[b] Email address: mardianaahmad@pasca.unhas.ac.id
[c] Email address: yusring@unhas.ac.id
[d] Email address: wardihan@pasca.unhas.ac.id
[e] Email address: andinilawati@pasca.unhas.ac.id
[f] Email address: prihantono.md@gmail.com

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## Abstract

Utilization of technological media in the field of education and health can increase public knowledge in efforts to prevent anemia, especially in young women. One of the efforts to prevent anemia and increase adherence to taking iron tablets is by using Web-based educational media (E-WoHealth) about iron tablets supplemented with a tablet supplement consumption control card. This research aims to develop Web-based E-WoHealth media and its effect on the level of adherence to the consumption of blood supplement tablets. This study used the Research and development (R&D) method with the Borg & Gall development model and the Pre-experimental Design quantitative method using the One Group Pretest-Postest approach. The sample in this study was 80 girls in grades VII and VIII of SMP Negeri 11 Gorontalo City, determined by purposive sampling technique. Statistical tests used the McNemar test and the Chi-Square test. The results of the McNemar test showed differences in the measurement results before and after being given the Web-based E-WoHealth media with a p-value of 0.000 <0.05 meaning that the Web-based E-WoHealth media was effective in increasing adherence to consumption of iron supplement tablets (TTD) in class VII and class VIII girls and the results of the Chi-Square P-Value test were 0.822 > 0.05 meaning that there was no difference in adherence between class VII and VII girls. This study recommends the application of WEB-based E-WoHealth media equipped with an iron supplement control card to increase adherence and monitor iron supplement consumption.

**Keywords:** Educational Media, Website, Blood Supplement Tablets, Young Women, Obedience.

***Corresponding Author:***

Desak Made Yulianti
Department of Midwifery, Graduate School, Hasanuddin University, Makassar, South Sulawesi, Indonesia
Email: yuliantidm21p@student.unhas.ac.id

## 1. INTRODUCTION

Anemia is a serious health problem in the world, especially in children, pregnant women, and young women (Andriastuti et al., 2020). Globally, the prevalence of anemia according to *the World Health Organization* (WHO) in 2019, anemia in women of childbearing age is 29.9%, and as much as 36.5% in pregnant women (World Health Organization, 2021). In the African and Southeast Asian regions the prevalence of anemia in women of childbearing age is reported to be more than 35% (Dubik et al., 2019; WHO, 2018). The results of the 2018 RISKESDAS showed an increase in the number of cases of anemia in pregnant women by 48.9% compared to 2013, which was 37.1% of cases. This is due to the high incidence of anemia in young women, which is 25%, and in women of childbearing age, 17% (Amir & Djokosujono, 2019; Kementerian Kesehatan Republik Indonesia, 2018).

In young women, iron deficiency anemia can reduce endurance, concentration, enthusiasm for learning, and academic abilities which can hinder progress at school and can cause them to drop out of school (Dubik et al., 2019). In the future, it can increase pregnancy complications, such as impaired fetal growth, low birth weight, premature birth, and neonatal death as well as high morbidity and mortality rates (Gosdin, et al., 2022; World Health Organization, 2023). Adolescent girls are the next generation of the nation, so a fast and appropriate handling of the problem of anemia deficiency in adolescents is needed. WHO at the 65th *World Health Assembly* (WHA) agreed to reduce the anemia rate by 50% from the prevalence of anemia in women of childbearing age in 2025 (WHO, 2018). Based on this commitment, the Indonesian government provides a policy of administering 1 tablet of iron supplement per week throughout the year, for the prevention and treatment of iron deficiency anemia (Madestria et al., 2021).

Studies conducted in several regions in India revealed that weekly supplementation of iron and folic acid was effective in reducing anemia (Shah et al., 2016) (Abu-Ouf, 2015; Vir, et al., 2008). Providing iron and folic acid supplements during adolescence and continuing into adulthood improves iron status, and reduces the risk of iron deficiency anemia (Ghana Health Service, 2017; Sajna & Jacob, 2017; Dhikale, et al., 2015).

Data from the 2018 RISKESDAS, Gorontalo Province, young women aged 10-19 years who received iron supplement tablets were 78.4%, and at school 74.9% with the coverage obtained and drunk less than 52 tablets as much as 100% (Kementerian Kesehatan Republik Indonesia, 2018). This is caused for several reasons such as bad taste and smell, forgetting, feeling unnecessary, nausea, and vomiting (Harding et al., 2017). Indonesia's health profile, Gorontalo Province in the last 3 years has seen a decline in the coverage of giving iron tablets to young women, namely in 2019 as much as 58.3%, in 2020 16.4%, and in 2021 Gorontalo Province ranks 2nd lowest, namely 2.3 %. Likewise, in the city of Gorontalo, the coverage of iron tablets in young women in 2019 was 15.1% and decreased in 2021, namely 15.2%. (Kementerian Kesehatan Republik Indonesia, 2021; Kementerian Kesehatan Republik Indonesia, 2022).

The East City Health Center is one of the Health Centers with low achievement in administering blood-added tablets in Gorontalo City. One of the working areas of the Kota Timur Health Center is SMP Negeri 11 Kota Gorontalo. The initial survey was conducted randomly on 10 students in classes VII and VIII who were given questions regarding knowledge and adherence to taking iron supplement tablets. The average knowledge and adherence to consuming blood supplement tablets for female students were still low. The results of cross-sectoral joint FGDs (school heads, teachers, health center nutrition officers,

and health promotion officers) provided education to young women, namely by counseling using the lecture method and using flipchart media.

Many factors cause the low coverage of blood supplement tablet consumption, among them caused by a lack of knowledge about the benefits of blood supplement tablets (Sitohang et al., 2022). Knowledge is closely related to the behavior of young women to consume iron tablets (Dubik et al., 2019). Efforts to increase adherence to blood supplement consumption in young women are through health education using the media as an educational tool. The media plays an important role in determining the success of the message transmission process. The selection of the right media supports the success of the process of conveying messages to the public (Rumiyati et al., 2018). The implementation of health education is inseparable from the media because the health messages to be conveyed are more interesting, and easy to understand, making it easier for the target to receive the messages conveyed (Jatmika et al., 2019)

In the current era of globalization, technological developments are increasingly advanced and the use of *smartphones* is increasing. Smartphones as a medium of communication technology have a fairly important role in human life, one of which is teenagers who are currently having a hard time getting away from using gadgets (Sudiarto et al., 2019). The use of technological media in the fields of education and health can increase the knowledge of students and the community to be more actively involved with the content and media provided (Logan et al., 2021). Therefore we need an information system that can help adolescents to get access to information about blood supplement tablets which can be accessed via smartphones and desktops that do not require qualifications or certain types of smartphones and can be reached by everyone (Herliah et al., 2022 )

This media is designed in the form of website-based educational media (E-WoHealth) regarding anemia tablets which are interactive, and equipped with animated video material, discussion forums, and control cards for monitoring anemia tablets. This is what distinguishes it from previous research. This research aims to develop Web-based E-WoHealth media and its effect on the level of adherence to the consumption of blood supplement tablets.

## 2. RESEARCH METHOD

This study uses the Research and development (R&D) method with the Borg and Gall development model by designing E-WoHealth media according to needs, and expert validation tests are carried out, then user trials are carried out before the product is used to research respondents. And the Pre-experimental Design method is to find out the condition of the subject before and after being treated and then the results can be compared or seen the changes. Data analysis was performed using the McNemar and Chi-Square tests

samples were 2 material experts and 2 media experts, the *Technology Acceptance Model* (TAM) trial sample was in a small group of 10 young women and a large group of 30 young women at SMPN 12 Kota Gorontalo. This research was carried out at SMPN 11 Gorontalo City from December 2022 – February 2023. The sample in this study was girls in grades VII and VIII. With the inclusion criteria, willingness to be a respondent, and having a smartphone and laptop, the exclusion criteria were not present during the study, and had not menstruated. The sampling technique was *purposive sampling* with a total sample of 80 young women (36 Class VII and 44 Class VIII). Has received an ethical recommendation from the ethical committee of the Faculty of Public Health, the University of Hasanuddin Makassar with number 14731/UN4.14.1/TP.01.02/2022.

Before the researchers intervened, the researchers gave informed consent to the young women and provided socialization on how to use Web-based E-WoHealth media. The pre-test used a questionnaire contained in the WEB-based E-WoHealth media and was then given an intervention to watch animated videos on the Web 2 times a week for 4 weeks after that a post-test was carried out. And to see adherence to consumption of iron tablets for 4 weeks monitored

using a control card that is on the Web. With compliance criteria if consuming 4 tablets of anemia and disobedience if less than 4 tablets by checking the control card provided on the Web.

## 3. RESULTS AND DISCUSSION

**Figure 1.** Display of Web-based E-WoHealth media content.

**Appearance 1**. Display of animated video material

1. After the respondent has filled out all *the pretests*, the educational video material icon will appear.
2. If the educational video material has been watched, the display of the educational video is checked.
3. If the animated video is not watched until it's finished, the animated video display will not be checked.

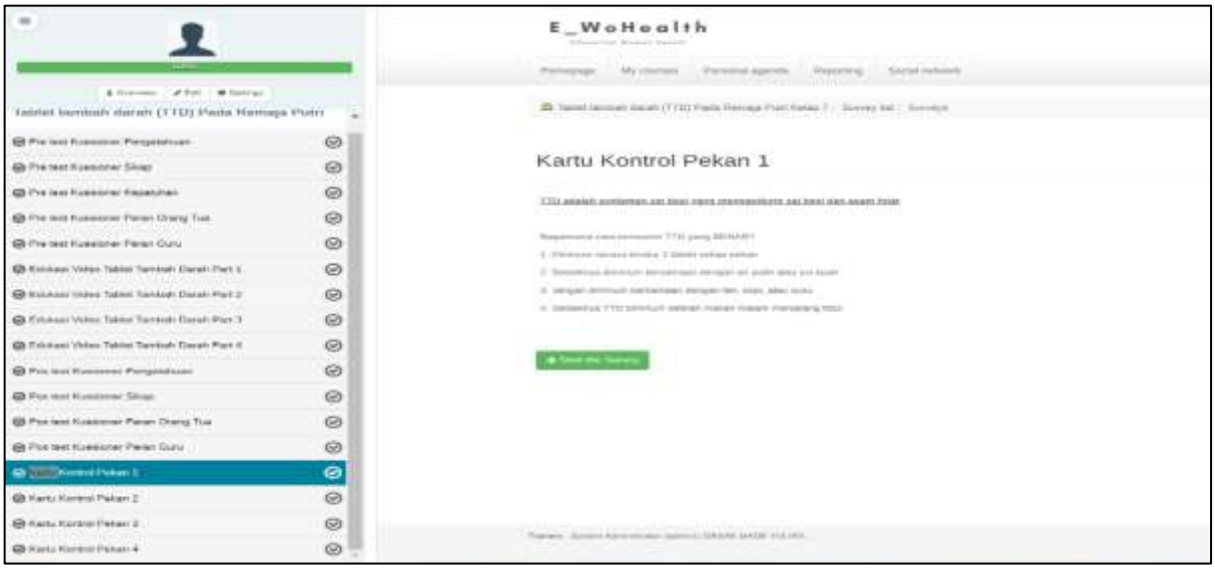
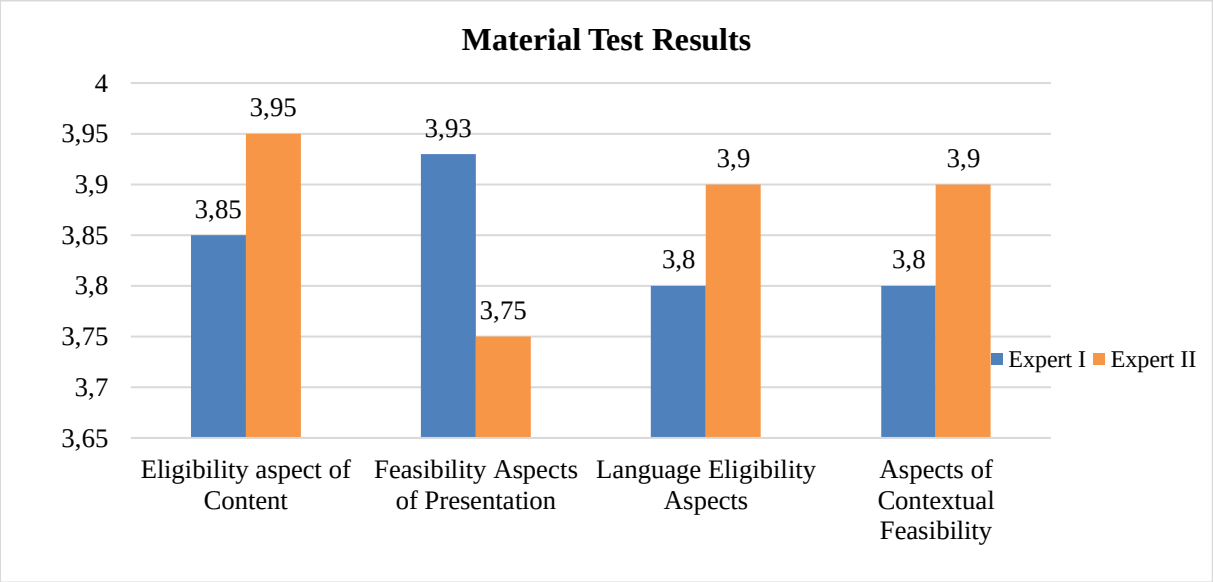


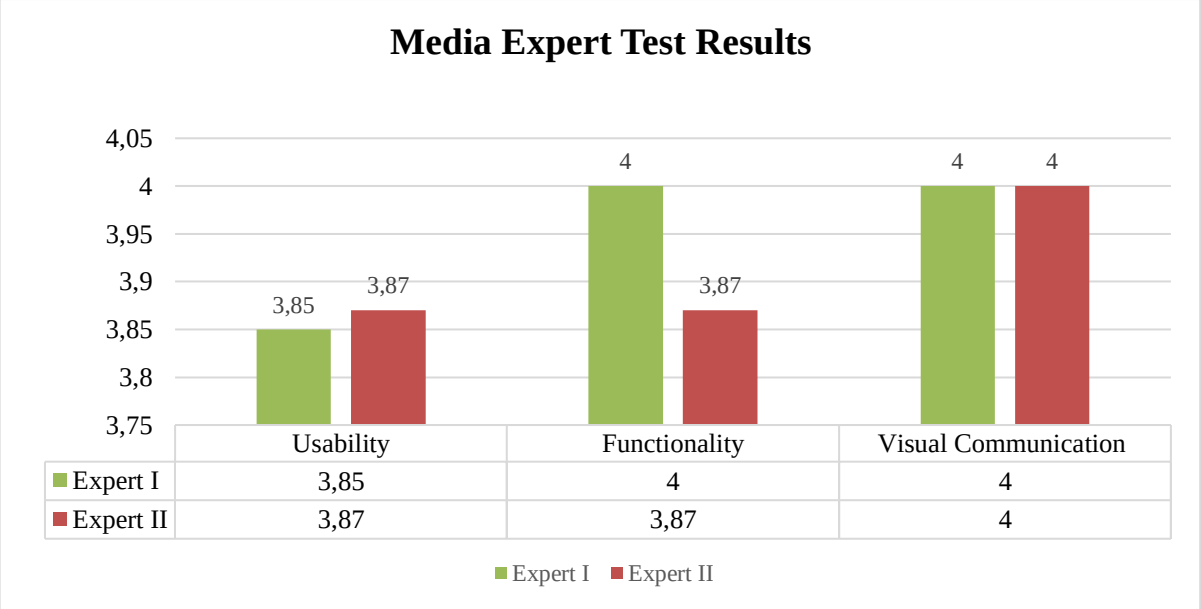

**Figure 2.** Display of Web-based blood supplement tablet control card

Appearance 2 is a display of the iron tablet control card on the Web which is used to monitor adherence to iron blood tablet consumption.




**Graph 1.** Material expert validation results in Web-based E-WoHealth media

Graph 1 shows the results of validation by 2 experts (A lecturer of nutrition at the Faculty of Public Health, University of Hasanuddin Makassar, and a Nutrition Lecturer at the Manado Ministry of Health Polytechnic) obtained an average value of 3.85, which means Web-based E-WoHealth is feasible to develop and use as an educational medium (Nurhayati, 2019).




**Graph 2.** Results of expert validation of the Web-based E-WoHealth media model

Graph 2 shows the results of validation by 2 media experts (Head of a learning technology development laboratory at Hasanuddin University and Lecturer at the Faculty of Computer Science at the Indonesian Muslim University) with an average score of 3.91, which means that Web-based E-WoHealth media is feasible to develop and use as an educational medium (Nurhayati, 2019).

**Table 1.** Small group Web trial results (n=10).

| Aspect | N | Min | Max | Means | SD |
|---|---|---|---|---|---|
| Web convenience | 10 | 3.00 | 5.00 | 4.58 | 0.549 |
| Web Benefits | 10 | 4.00 | 5.00 | 4.67 | 0.479 |
| We Trust | 10 | 4.00 | 5.00 | 4.62 | 0.490 |
| User Attitude | 10 | 4.00 | 5.00 | 4.75 | 0.444 |
| Valid N (listwise) | 10 | | | | |

Table 1 shows perceptions of convenience with an average respondent score of 4.58, an average benefit value of 4.67, an average trust value of 4.62, and an average user attitude value of 4.75. From the overall average results of small group trials, it can be concluded that Web-based E-WoHealth media about blood supplement tablets is feasible to be tested on respondents with a larger group (Arianggara et al., 2021; Divayana et al., 2016).

**Table 2**. Results of the large group Web trial (n=30).

| Aspect | N | Min | Max | Means | SD |
|---|---|---|---|---|---|
| Web convenience | 30 | 3.00 | 5.00 | 4.54 | 0.607 |
| Web Benefits | 30 | 3.00 | 5.00 | 4.53 | 0.545 |
| Web Trust | 30 | 3.00 | 5.00 | 4.38 | 0.564 |
| User Attitude | 30 | 3.00 | 5.00 | 4.57 | 0.533 |
| Valid N (listwise) | 30 | | | | |

Table 2 shows the average value of respondents' answers about convenience is 4.54, the average value of benefits is 4.53, the average value of trust is 4.38 and the average value of attitudes is 4.57 which means that E-WoHealth media is based on The web is in a very good category and is suitable for use as an educational medium about iron tablets (Januarysman & Ghufron, 2016).

**Table 3.** Characteristics of Respondents (n=80).

| Characteristics | Class | | | |
|---|---|---|---|---|
| | VII | | VIII | |
| | n (36) | Percentage (%) | n (44) | Percentage (%) |
| **Age** | | | | |
| 12 years old | 19 | 52,8 | 1 | 2,3 |
| 13 years old | 17 | 47,2 | 18 | 40,9 |
| 14 years | - | - | 25 | 56,8 |
| Parent Education | | | | |
| Father | | | | |
| Low (SD) | 9 | 25 | 20 | 45.5 |
| Intermediate (junior high school) | 25 | 69,4 | 24 | 54.5 |
| High (College) | 2 | 5,6 | 0 | 0 |
| Mother | | | | |
| Low (SD) | 10 | 27,8 | 18 | 40,9 |
| Intermediate (junior high school) | 21 | 58,3 | 25 | 56,8 |

Table 3. Characteristics of respondents according to age in class VII, most of the respondents were 12 years old, 52.8%, and in class VIII, the majority of respondents were 14

years old, 56.8% of respondents. The last education of the respondent's fathers in class VII and class VIII was the majority with secondary education, 69.4%, and only 5.6% of the respondent's fathers in class VII had higher education. In class VII respondents, most of them had secondary education, 58.3%, while the respondents in class VIII, most of them had low education, 40.9%.

**Table 4 .** Frequency Distribution of Respondents Based on Compliance.

| Class | Variable | Web-Based E-WoHealth Media | | | |
|---|---|---|---|---|---|
| | | Pre Test | | Posttest | |
| | | n | % | n | % |
| | Obedience | | | | |
| VII | Not obey | 36 | 100 | 15 | 41.7 |
| | obey | 0 | 0 | 21 | 58,3 |
| Total | | 36 | 100 | 36 | 100 |
| VIII | Not obey | 44 | 100 | 17 | 38,6 |
| | obey | 0 | 0 | 27 | 61,4 |
| Total | | 44 | 100 | 44 | 100 |

Table 4 shows that there was a change in compliance in classes VII and VIII in the Pre-Test assessment, the results obtained were that all respondents were 100% disobedient in consuming iron supplement tablets and after being given Web-based E-WoHealth media intervention and monitored from the control card, there was a change in class VII category. obedient 58.3% (n=21) and class VIII obedient category 61.4% (n=27).

**Table 5**. Effect of Web-Based E-WoHealth Media Against Compliance with Consumption of iron supplement tablets for female adolescents.

| Class | | n | % | Negative Rank | Positive Rating | Ties | p-value |
|---|---|---|---|---|---|---|---|
| VII | Pretest<br>Posttest | 36 | 100 | 0 | 21 | 15 | 0.000 |
| VIII | Pretest<br>Posttest | 44 | 100 | 0 | 27 | 17 | 0.000 |

**McNemar*

Table 5 shows the influence of Web-based E-WoHealth media on adherence to the consumption of iron supplement tablets in class VII young women with an increase in 21 obedient respondents and class VIII respondents with an increase in 27 obedient respondents with a p-value of 0.000 <0.05.

**Table 6.** Differences in adherence to taking blood supplement tablets for class VII and VIII girls after being given the Web-Based E-WoHealth intervention.

| Class | Obedience | | | | Total | p-value |
|---|---|---|---|---|---|---|
| | Obey | | Not obey | | | |
| | n | % | n | % | | |
| VII | 21 | 58,3 | 15 | 41.7 | 36 | 0.822 |
| VIII | 27 | 61,4 | 17 | 38,6 | 44 | |

Table 6 shows that in class VII respondents who had adherence to taking iron tablets as much as 58.3% (n=21) while in class VIII respondents there were 61.4% (n=27) of respondents who were obedient in consuming iron tablets. The results of the comparative analysis between class VII and class VIII obtained a p-value of 0.822 > 0.05

The graphs and tables show that the results of the validation tests of the two material experts and media experts obtained an average value of 3.85 and 3.93. This means that the

material presented and the media used are included in the very good category so that the material and media can be used with or without revision. The overall results obtained are in line with research conducted by Nurhayati, (2019) which found that the development of print modules for the first 1000 days of life is very good/feasible and can be used without revision. The test results used the *Technology Acceptance Model* (TAM) questionnaire in Tables 1 and 2 which consisted of the components of ease of use, benefits, trust, and user attitudes in the very good/proper category (Rahayu, Budiyanto, & Palyama, 2017). Several studies state that the application of the TAM model aims to measure the level of user understanding and acceptance of information technology innovations and whether a system will be useful and easy to use (Arianggara et al., 2021; Divayana et al., 2016) the results of the feasibility test of small groups and large groups with a value of $x > 4.21$, it means that E-WoHealth media is suitable for use as an educational medium (Januarysman & Ghufron, 2016).

*Women's health* education media (E-WoHealth) about blood supplement tablets equipped with tablet supplement consumption control cards is an interactive multimedia technology-based educational media that can display material in the form of text, video, animation, and sound, equipped with discussion forums and control cards blood supplement tablets which are presented in digital form, can be accessed through a browser that can be used on various smartphone and desktop devices.

The number of respondents in this study was 80 young women consisting of 36 young women in class VII and 44 young women in class VIII. in class VII and class VIII, the average age range is 12-14 years. This age is the early and middle stages of adolescence which is a transitional period between childhood and adulthood that is characterized by rapid growth and development. During this period cognitive development occurs in adolescents, including changes in mental abilities such as learning, memory, reasoning, thinking, and language. Teenagers begin to have the capacity to acquire and use knowledge efficiently. They reach their peak because the growth of the brain reaches perfection. The nervous system that functions to process information develops rapidly. During this period, it is important to provide adequate information about reproductive health, one of which is to prevent anemia in adolescence by consuming iron tablets.

The highest education of parents of class VII and class VIII respondents is the majority of secondary education. only 5.6% of respondents' fathers in class VII have tertiary education. And of class VII respondents' mothers, most of them had secondary education, 58.3%, while the mothers of class VIII respondents had almost a low level of education, 40.9%. Parents' educational level is one of the factors that influence knowledge. A high level of education will make it easier for someone to gain knowledge and information, one of which is health information which can be used as a reference for providing information to their children (Perdana et al., 2017).

Compliance is a condition that arises and is formed through a process of behavior that shows the values of obedience, loyalty, and order. Attitudes or actions taken are no longer or are not felt as a burden at all, on the contrary, it will burden him if he cannot act as usual (Iqbal et al., 2016). Compliance in this study is defined as the obedient attitude of female adolescents in consuming blood-supplementing tablets regularly (1 tablet a week) by the 2018 circular of the Ministry of Health of the Republic of Indonesia concerning the administration of blood-supplementing tablets to female adolescents and women of childbearing age (Kementerian Kesehatan Republik Indonesia, 2018). Compliance assessment by looking at the control cards in the Web-Based E-WoHealth media is carried out for 1 month (4 weeks).

In this study, it was found that there were differences in the compliance results of female adolescents before and after being given Web-based E-WoHealth media. Those who were monitored for 1 month (4 weeks) by consuming 4 iron tablets were then monitored using a control card that had been provided on the Web media.

This finding is in line with the results of Perdana et al., (2017) which stated that Android-based nutritional education media and websites were effective in increasing knowledge, attitudes, and practices of balanced nutrition in elementary school students. The results of the study Kementerian Kesehatan Republik Indonesia, (2021) stated that there was an effect of using oral birth control medication applications with a p-value = 0.000. This application is an Android application that can always be carried out. However, previous respondents had to download and install it first on their respective *smartphones which needed storage space.* (Princess & Hasanah, 2021) . Meanwhile, E-WoHealth media can be accessed via a browser on various devices and does not require storage space, making it easier for young women to access the material.

Table 6 shows the differences in the obedience results of class VII and class VIII adolescent girls after being given the Web-Based E-WoHealth media intervention using the Chi-Square test showed a P-value of 0.822 > 0.05 meaning that there was no significant difference between class VII and class VIII girls. Compliance with the consumption of blood-boosting tablets apart from being given interesting and interactive educational media, individual factors (intentions and behavior), and external factors such as the role of teachers, parents, peers, and the community is very influential (Shah et al., 2016). Adolescents are an age group that in their psychological development requires support from the surrounding environment to grow and achieve the best performance (Silitonga et al., 2023).

Based on the results of the analysis, the researchers concluded that the application of Web-based blood tablets (E-WoHealth) educational media that can be accessed via a browser on various devices makes it easier for young women to access material, study, and fill out control cards anywhere and anytime. And it is proven to be able to increase the adherence of young women in consuming blood-adding tablets as recommended even though there are still young women who are not obedient in consuming blood-adding tablets.

Compliance with the consumption of blood-boosting tablets apart from being provided with interesting and interactive educational media also requires cooperation from various parties (teachers, parents, peers, and health workers) as well as interpersonal trust between young women in the social environment so that the program can run optimally (Silitonga et al., 2023). The limitation of this study is that there is no control group as compared to the educational media that was developed and requires internet access.

## 4. CONCLUSION

Media-based E-WoHealth The web is suitable and valid for educating young women about iron tablets and is effective in increasing adherence to blood supplement consumption in young women at SMP Negeri 11 Kota Gorontalo. The results of this study can be used as material for consideration in implementing health education, especially the prevention of anemia by giving iron tablets to young women in a wider scope, namely the community and schools. This Web-based E-WoHealth media should be utilized as well as possible by related officers (teachers and health workers) as one of the educational media, especially about blood-boosting tablets, and can be used as an example for the development of educational media in other forms and different materials.

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