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Development of Audiovisual Media as an Informational Tool for the Prevention of Anemia in Pregnant Women at Sangkrah and Gilingan Community Health Centers

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ABSTRACT

Introduction: Anemia during pregnancy remains a priority public health problem, including in Surakarta City. Therefore, health promotion media are needed to improve anemia prevention behaviors among pregnant women in these areas. This study aims to develop and test audiovisual media as a health promotion tool for pregnant women in Sangkrah Health Center and Gilingan Health Center. **Method**: This study applied the Research and Development (R&D) method, which includes the stages of Define, Design, Develop, and Disseminate. The participants in this study consisted of four material and video experts, four practitioners, and 30 target people. **Results**: Based on the analysis of the Content Validity Ratio (CVR), it was found that the audiovisual media developed by the researcher had a content validity index (CVI) of 1, which indicates very good or excellent quality. **Conclusion**: The audiovisual media developed by the researchers have met the eligibility criteria as a health promotion tool, especially for pregnant women, to increase knowledge about anemia.

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INTRODUCTION

Anemia among pregnant women remains a significant public health concern in low- and middle-income countries. The highest prevalence of anemia in pregnant women is observed in Sub-Saharan Africa, estimated at approximately 57%, indicating that more than half of pregnant women in the region are affected. This condition is largely attributed to limited access to nutritious food, inadequate healthcare services, and low levels of education. In Southeast Asia, the prevalence is approximately 48%, suggesting that nearly half of pregnant women in the region experience anemia. Contributing factors include dietary habits, limited access to healthcare, and socioeconomic challenges. In contrast, South America reports the lowest prevalence among the regions mentioned, at around 24.1%. Although relatively lower, this prevalence remains noteworthy. Improved economic

conditions and better access to healthcare services are considered potential factors contributing to the reduced prevalence in this region **(WHO, 2023)**

Indonesian Health Surveys indicate that the national prevalence of anemia among pregnant women is approximately 27.7% (SKI, 2023). This relatively high prevalence underscores ongoing challenges in ensuring adequate maternal nutrition and access to essential healthcare services. Specifically, in Central Java, data from the 2023 Central Java Health Profile showed that the prevalence of anemia among pregnant women was approximately 10.4%, which is significantly lower than the national average. This discrepancy may reflect the effectiveness of local health interventions or comparatively better socioeconomic conditions in the region. In 2023, the prevalence of anemia among pregnant women in Surakarta City reached approximately 46%, which is significantly higher than the average prevalence in both Central Java and Indonesia as a whole. This indicates that Surakarta faces a specific challenge that needs to be addressed to reduce the rate of anemia among pregnant women. It suggests the presence of localized issues, potentially related to limited access to nutritious food or inadequate healthcare services. Furthermore, the Sangkrah Public Health Center (Puskesmas Sangkrah) recorded the highest number of anemia cases among pregnant women in Surakarta, accounting for 12.4% or approximately 90 cases. The Gilingan Public Health Center (Puskesmas Gilingan) reported 5.1% or around 37 cases of anemia among pregnant women (Profil Kesehatan Kota Surakarta 2023 Dinas Kesehatan Kota Surakarta, 2023). These figures indicate a concentration of health issues in this area that requires special attention. The high prevalence in certain regions reflects disparities in access to adequate nutrition and healthcare services. Compared to the national average, some areas in Indonesia, such as Central Java, have demonstrated better outcomes. In contrast, Surakarta City shows a significantly higher prevalence, highlighting the urgent need for more intensive interventions in this region.

Anemia occurs when the total number of red blood cells or the level of hemoglobin (a protein that carries oxygen) falls below normal. Hemoglobin in red blood cells functions to transport oxygen from the lungs to the rest of the body (Malaka et al., 2023). Anemia during pregnancy is defined as a maternal hemoglobin concentration of less than 11 g/dL in the first and third trimesters, and less than 10.5 g/dL in the second trimester (Dufera et al., 2024). According to WHO (2023), Anemia in pregnant women is classified into several categories: severe anemia with hemoglobin levels below 7 g/dL, moderate anemia with levels between 7 and 9.9 g/dL, and mild anemia with levels between 10 and 10.9 g/dL.

Previous studies have identified several factors influencing anemia in pregnant women. One important factor is the frequency of childbirth; with more frequent deliveries, greater amounts of iron are lost, increasing the risk of anemia. Regular antenatal care (ANC) visits have been shown to reduce this risk by enabling early detection and management. Nutritional factors also play a critical role, including insufficient dietary iron intake, impaired iron absorption, and excessive iron loss (such as through bleeding). Additionally, a lack of knowledge regarding anemia and maternal nutrition contributes to its prevalence among pregnant women (Kurniasih & Farida, 2024). Factors such as maternal age, economic status, household size (four to six members), number of young children (two toddlers), and age at first sexual intercourse (13–17 years) have been shown to influence the occurrence of anemia in pregnant women (Woldegebriel et al., 2020). Additionally, (Jagadeeswari J & Soniya, 2020) also stated that economic factors, nutritional knowledge, and internal physiological conditions are key determinants of anemia.

LITERATURE REVIEW

According to the 2023 Surakarta City Health Profile, the prevalence of anemia among pregnant women at the Sangkrah and Gilingan Community Health Centers remains relatively high. One contributing factor is the lack of effective health promotion media to enhance pregnant women's knowledge. To address this gap, it is essential to develop educational materials that are simple, accessible, and aligned with the preferences of pregnant women.A survey conducted by the researchers among pregnant women at these health centers revealed a preference for audio-visual media over print materials. This finding is consistent with previous studies carried out at the Sangkrah and Gilingan Community Health Centers, which demonstrated that pregnant women are more engaged by audio-visual media. This preference is attributed to the variety and innovativeness of audio-visual content, which helps maintain their interest and reduces boredom compared to traditional booklets (Arifah et al., 2024).

Audiovisual media can be categorized into two main types: auditive, which involves the sense of hearing, and visual, which involves the sense of sight (Ilmiah & Imelda, 2020). Learning media offer several benefits, including the facilitation of memory retention. Visual media, in particular, link images with cognitive processes, helping to reinforce memory. The use of images can also improve focus by directing attention and engaging the viewer's emotions and motivation. Moreover, incorporating images stimulates creativity. Consequently, audiovisual media play a significant role in enhancing knowledge acquisition. (Nurti et al., 2025).

Based on research findings on health promotion using audiovisual media to improve knowledge and attitudes of adolescent girls regarding anemia, it can be concluded that health promotion through audiovisual media is effective in increasing adolescent girls' knowledge in preventing anemia (Dwi Astuti et al., 2025).Research conducted in Brebes indicates that the development of audiovisual media is highly effective as a health promotion tool (Maratun et al., 2024). Research in Magetan shows that the media developed is very suitable for use as a health information medium (Widiyawati et al., 2023). Therefore, the researchers are interested in developing audiovisual media and conducting trials to evaluate its effectiveness as a health promotion tool for pregnant women at the Gilingan and Sangkrah Community Health Centers.

METHOD

This study received ethical approval from the Ethics Committee of the Faculty of Medicine, Muhammadiyah University of Surakarta (Approval Number: 4997/B.2/KEPK-FKUMS/VIII/2023). The research was conducted in August 2024 at the Sangkrah and Gilingan Community Health Centers in Surakarta City. The study involved several participants, including four material and media experts, four practitioners, and 30 target individuals.

Tabel 1. Sample Criteria (Inclusion and Exclusion)

Subject	Criteria
Subject and Media Experts	•Minimum of a Master's degreeDosen
	•Lecturers at Muhammadiyah University of Surakarta
	•4 Experts
Practitioners	•Health promotion coordinators at Sangkrah and Gilingan Community Health Centers
	•4 Practitioners
Target	•Pregnant women
	•30 Participants

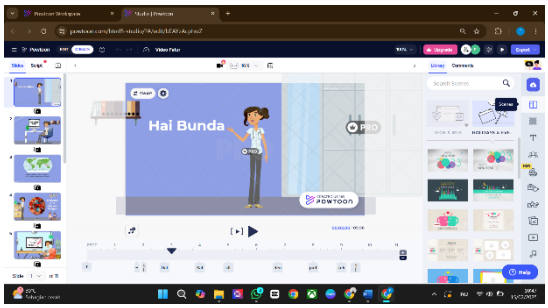
The role of the material and media experts is to evaluate whether the content and media developed by the researchers are appropriate and aligned with the chosen theme. These experts are also responsible for providing constructive feedback to improve the media if any shortcomings are identified. Similarly, practitioners assess the relevance and suitability of the material and media for the intended theme. After validation by the material and media experts, practitioners also provide recommendations for improvement if necessary. The target group's role is to evaluate whether the media is appropriate for distribution and to offer suggestions if they find the media unsuitable. This study employs a Research and Development (R&D) methodology, which involves systematic stages of creating or enhancing existing products in a responsible manner. The objective of this research is to develop audiovisual video media about anemia in pregnant women and to assess its effectiveness. The research follows the stages of Define, Design, Develop, and Disseminate (Saski & Sudarwanto, 2021).

1. Define
   According to a survey conducted by the researchers, pregnant women at the Sangkrah and Gilingan Community Health Centers showed a stronger preference for audiovisual media as an educational tool compared to printed materials such as booklets or articles. Participants reported that videos were more engaging and easier to understand than reading printed content.
2. Design
   The video material is divided into the following sub-chapters:
   a. Understanding Anemia
      Selecting a sub-chapter on the definition of anemia is essential as it offers a comprehensive overview of the health condition. This section serves as a foundational basis for understanding other aspects of anemia and highlights the importance of public health interventionsn (Helmyati et al., 2023).
   b. Diagnosis of Anemia
      The selection of sub-chapters related to the diagnosis of anemia is highly crucial, as an accurate diagnosis serves as an essential initial step in the management of anemia (Wahyuni, 2024).
   c. Criteria for anemia in pregnant women
      Selecting a subsection that discusses the criteria for anemia is crucial, as these criteria serve as the primary basis for accurate diagnosis and effective management of anemia (Hastuti et al., 2022).
   d. Symptoms of Anemia
      Selecting material on the symptoms of anemia in pregnant women is important, as anemia during pregnancy increases the risk of low birth weight (LBW), which can contribute to delivery complications and adverse health outcomes for the baby (Litaqia & Mulat, 2025).
   e. Causes and Risk Factors
      Selecting a sub-chapter on the causes and risk factors of anemia in pregnant women is very important because anemia is a significant health problem among pregnant women which can have a negative impact on the health of the mother and fetus (Murniati et al., 2024).
   f. Impact of Anemia
      Selecting a subsection on the impact of anemia in pregnant women is essential, as anemia is closely associated with an increased risk of miscarriage, low birth weight (LBW), preterm birth, and maternal and neonatal mortality (Wang et al., 2025).
   g. Suggestions from the perspective of the Quran

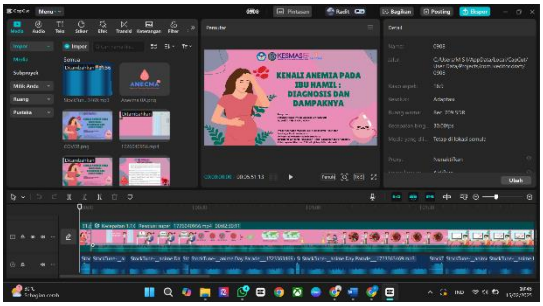
Incorporating guidance from the Quran can empower and motivate pregnant women with anemia to adhere to health recommendations, as they perceive these actions as aligned with their religious beliefs.

h. Prevention and management of anemia
The selection of the subchapter on the prevention and management of anemia in pregnant women is highly relevant, considering the high prevalence of anemia and its association with increased risks of preterm birth, maternal and infant mortality, as well as susceptibility to infectious diseases. Iron deficiency anemia in pregnant women can significantly impact fetal and infant growth and development, both during pregnancy and postnatally (Erryca et al., 2022)

3. Develop

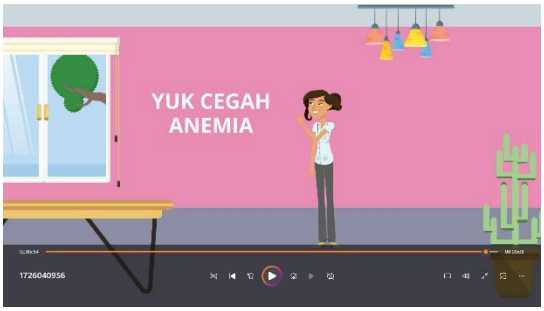


(Figure 1. Animation design)



(Figure 2. Animation merging)

To create the audiovisual media in the form of animated videos, the researchers utilized Powtoon and CapCut software. Prior to distribution to pregnant women, the media was piloted and evaluated by public health experts, health promotion specialists, and media experts—all of whom are lecturers at Muhammadiyah University of Surakarta. Following this pilot phase, the researchers revised the audiovisual media based on the feedback provided by the experts.



(Figure 3. Final Video Result)

4. Dessiminate
During the distribution phase, the researchers provided the audiovisual media to both practitioners and end-users. Convenience sampling was employed to select four health promotion officers from the Sangkrah and Gilingan Community Health Centers as practitioner respondents. For the end-users, incidental sampling was used to select 30 pregnant women who visited the same health centers. The evaluation instruments included validation sheets for the practitioners, while both validation sheets and interviews were used to assess the media's effectiveness among the pregnant women.

For validation using assessment sheets by experts, practitioners, and users, the content validity ratio (CVR) approach introduced by Lawshe (1975) is used. The formula for calculating CVR is as follows:

$$CVR = \frac{(\mathrm{ne} - \frac{\mathrm{n}}{2})}{(\frac{n}{2})}$$

Description:
1. CVR: Content validity ratio
2. N: Number of experts
3. ne: Number of experts providing relevant scores

The decision-making criteria based on the CVR test results are:
1. If ne < ½ N, then CVR < 0 (invalid)
2. If ne = ½ N, then CVR = 0 (invalid)
3. If ne > ½ N, then CVR > 0 (valid)

The overall validity value is determined using the CVI (content validity index). According to (Lawshe, 1975), the CVI is determined using the following formula:

$$CVI = \frac{(\sum \mathrm{CVR})}{k}$$

Description:
1. CVI: Content validity index
2. ΔCVR: Total content validity ratio
3. k: Number of items

Lawshe (1975) suggests that a good CVI index is one with a score above 0.50, while CVI values > 0.90 to 1 are considered excellent.

RESULTS AND DISCUSSION

The design of the animated video began with the development of a guiding scenario. The video opens with an introductory segment, followed by content covering the definition of anemia, its diagnosis, anemia criteria in pregnant women, symptoms, causes and risk factors, impacts, recommendations from a Quranic perspective, and prevention and treatment strategies. The video concludes with a references section. After production, the animated video underwent a trial phase involving experts, practitioners, and users. The following section presents the results of the media assessment.

This study developed a questionnaire to measure students' perceptions of online learning in the Computational Mathematics course. Content validity was assessed using the Content Validity Index (CVI), with results showing a mean item-level CVI (i-CVI) of 1.00 for the instruction aspect, 0.83 for content, and 1.00 for language. The overall scale-level CVI (s-CVI) was 0.92, indicating that the questionnaire has excellent content validity (Dwi Puspitasari & Febrinita, 2021).

This study developed an interactive learning media based on the Creative Problem-Solving model. The media's content validity was evaluated using the Content Validity Index (CVI). The results showed an average item-level CVI of 0.95 for the educational aspect, 0.91 for program appearance, and 0.87 for technical quality. These values indicate

that the media is highly relevant and meets the expected standards for information delivery (Sugiharni, 2018).

Table 1. Summary of Media CVR Assessment Results by media experts, materials and practitioners

Instrument Question	Relevant	Not Relevant	CVR	Conclusion
Content Delivery	8	0	1	Accepted
Content Relevance	8	0	1	Accepted
Content Clarity	8	0	1	Accepted
Media Quality	8	0	1	Accepted
Language Usage	8	0	1	Accepted
Media Presentation	8	0	1	Accepted
		∑	6	

Table 2. Summary of Content Validity Index (CVI) Results for Media by Media Experts, Content Experts, and Practitioners

CVI	=(∑CVR)/k = (6/6) = 1

Table 3. Summary of Media Evaluation Results by Pregnant Women

Instrument Questions	Relevant	Not Relevant	CVR	Conclusion
The material in the video media is easy to understand	30	0	1	Accepted
The presentation of material on video media is very interesting	30	0	1	Accepted
The illustrations shown in the video are in accordance with the explanation of the material.	30	0	1	Accepted
The material in the media is very important for pregnant women to know.	30	0	1	Accepted
The text displayed on the video is easy to read.	30	0	1	Accepted
The color combination shown in the video is appropriate and attracts the attention of pregnant women.	30	0	1	Accepted
The text placement is perfect	30	0	1	

Table 4. Summary of CVI Media results by media experts, materials and practitioners

CVI	=(∑CVR)/k = (7/7) = 1

This study developed an animated video media for the prevention of anemia in pregnant women. Content validation was conducted by material and media experts, with results showing that all media aspects—such as ease of understanding the material, visual appeal, appropriateness of illustrations, text readability, color combination, and text placement—received a Content Validity Ratio (CVR) of 1. This indicates that the media is highly effective and relevant for the target audience (Widiyawati et al., 2023).

This study compared the effectiveness of audiovisual media and booklets in increasing pregnant women's knowledge about nutrition for the prevention of chronic energy deficiency. Although the study did not explicitly report CVR or CVI values, the results demonstrated that audiovisual media was more effective in enhancing pregnant women's knowledge (Wahyuni, 2024). This study employed a one-group pretest-posttest pre-experimental design to evaluate the effectiveness of an educational video about anemia on the knowledge of pregnant women. The results demonstrated a significant increase in pregnant women's knowledge after viewing the educational video (Abdillah et al., 2020). This study developed an animated video as an educational tool to prevent anemia in pregnant women. The development process followed the ADDIE model (Analyze, Design, Develop, Implement, Evaluate) and included validation by material and media experts. The findings indicated that the developed media was of excellent quality and suitable for use in health education(Widiyawati et al., 2023).

This study created educational media in the form of an animated video titled "DEDIMIA" for the early detection of anemia in pregnant women. Evaluation results showed that this media effectively increased pregnant women's knowledge about anemia prevention (Rohmatika & Apriani, 2023). Based on the assessments from both experts and the target audience, the developed media meets excellent criteria for construct validity and content validity. All evaluated aspects yielded highly satisfactory results, indicating that the media is effective, relevant, and of high quality. Therefore, this media is expected to serve as an effective tool for enhancing pregnant women's knowledge about anemia and providing valuable information for their health.

Recommendations for future research include utilizing more professional video editing applications, such as Adobe After Effects, to facilitate the creation of animated videos. The content delivered in the videos should be analyzed and tailored according to the specific needs of the target partners. Additionally, it is advisable to separate media experts and content experts during the evaluation process to enable more focused and effective assessments of the developed media.

CONCLUSION

Based on the analysis using Lawshe's Content Validity Ratio (CVR) formula, the audiovisual media developed by the researchers achieved a Content Validity Index (CVI) of 1, indicating excellent quality. Therefore, this media meets the eligibility criteria as an effective instrument for health promotion. It is specifically designed for pregnant women to enhance their knowledge about anemia, demonstrating strong potential to increase awareness and understanding of anemia within this population.

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