



# EFFECTIVENESS OF MONOPOLY SIMULATION EDUCATION METHOD TO IMPROVING KNOWLEDGE, PROTEIN INTAKE, AND HEMOGLOBIN LEVELS OF PREGNANT WOMEN WITH ANEMIA

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## Abstract

Background and Aim: Anemia is a problem that often occurs in adults, women of childbearing age, and especially pregnant women. The results showed that the diet of the third-trimester pregnant women (65%) was unhealthy. The results of other studies in Maros Regency found that 79.4% of pregnant women suffer from nutritional anemia with a protein intake below the RDA. In general, the population of Indonesia, especially pregnant women, consumes a source of iron derived from vegetable protein which has a low absorption compared to animal protein. One of the factors that cause anemia in pregnant women is the lack of knowledge about the importance of consuming protein during pregnancy. This study examines the effectiveness of monopoly simulation-based education in increasing knowledge, protein intake, and Hb levels of pregnant women with anemia in Klasaman Health Center, Sorong City.

Methods: This research was conducted in 3 posyandu in the working area of Klasaman Health Center in November-December 2018. This type of research is a quasi-experiment with a PretestPosttest Control Group Design. The Independent variable is monopoly simulation-based education, and the dependent variable is knowledge, protein intake, and Hemoglobin level. The sample was 20 pregnant women suffering from anemia who were divided into experimental and control groups. The sampling technique is total sampling. Data collection was carried out by measuring Hemoglobin, pre-test and post-test questionnaire, and recall of protein intake—the bivariate statistical test using Mann-Whitney.

Results: The results showed that monopoly simulation-based education increased knowledge, protein intake, and Hemoglobin levels of pregnant women who suffer from anemia, although the effectiveness test was not significant.

Conclusion: It is recommended that health workers, to provide education to the community, should use various methods that vary to attract the community's interest so that the information conveyed can be well received. The researchers want to examine the effectiveness of the monopoly simulation method so that the number of samples used is more so that the results achieved can be maximized.

**Keywords:** Monopoly Simulation, Hemoglobin Levels, Anemia, Pregnant Women

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## Introduction

Pregnant women are one of the groups in society that are most prone to suffer from health problems due to malnutrition, this is indicated by the high maternal mortality rate (MMR) in 2007 in Indonesia of 228 per 100,000 live births, and 28% of them are due to bleeding due to deficiency Chronic energy and anemia (SDKI, 2007).

*Anemia* is a problem that often occurs in adult groups, namely women of childbearing age (WUS), especially pregnant women. Based on data from the *World Health Organization* (WHO) in 2008, the prevalence of anemia in pregnant women in developing countries increased from 35 % to 75%. The prevalence of anemia in pregnant women in Asia in 2008 was 48.2 %.

The data from the Klasaman Health Center showed that 67 pregnant women, there were 36 who suffered from anaemia in 2018.

The prevalence of anemia increases in pregnancies from trimester II to trimester III by 2 to 3 times. Research data in Turkey show an increased prevalence of anemia from trimester II to trimester III, from 21.2% to 37.5%.

Third-trimester pregnant women are said to be anaemic if Hb levels  $<11$  gr / dL. Third trimester pregnant women experience changes in circulation that are increasingly increasing against the placenta, so additional nutritional intake is needed.

Maternal nutritional status measured by LILA reflects mothers' nutritional reserves and nutritional status in pre-pregnancy. Malnutrition before pregnancy will affect the mother's nutritional status during pregnancy, resulting in the nutritional needs of KEK pregnant women being higher than mothers who do not KEK due to meeting the needs of the mother and fetus.

In general, the population of Indonesia, especially pregnant women, consumes energy under the RDA and consumes a source of iron derived from vegetable protein which has a low absorption compared to animal protein.

The results of the study by Eko et al. (2012) show that the diet of pregnant women in the third trimester (65%) is unhealthy.

The same results were also obtained from 6 research results by Fatimah et al. (2011) in Maros Regency found nutritional anemia was 79.4% with the amount of protein, vitamin C, vitamin B6, iron, and zinc intake also under the RDA.

Anemia is a condition of decreased levels of hemoglobin (Hb), hematocrit, and the number of erythrocytes below normal values. Anemia that often occurs in developing countries (developing countries) and in the middle to lower socioeconomic groups is nutritional. Nutritional anemia is caused by a lack of nutrients that play a role in the formation of hemoglobin, either due to lack of consumption or absorption disorders. Nutrients concerned are protein, iron, pyridoxine (vitamin B6), vitamin B12, vitamin C, folic acid, and vitamin E.

Protein, iron, and pyridoxine (vitamin B6) are catalysts in hem synthesis. Protein plays a role in transporting iron to the bone marrow to form new hemoglobin molecules. The absorption and release of iron from transferrin into the body's tissues are influenced by vitamin C. Folic acid plays a role in the metabolism of amino acids, which are needed in the formation of red blood cells and white blood cells and their maturation. Vit B12 is needed to activate folic acid and in the normal function of metabolism of all cells, especially cells of the digestive tract, bone marrow, and nerve tissue. The stability of the red blood cell membrane is influenced by vitamin E.

The impact of anemia problems during pregnancy is to increase in the risk of fetal death during the prenatal period, infants born prematurely, an increase in the risk of postpartum hemorrhage, triggered hypertension and heart failure during pregnancy, or Low Birth Weight (LBW). Overall, 20-40% of 50,000 maternal deaths are also caused by anemia during pregnancy.

One factor that causes anemia in pregnant women is the common understanding of pregnant women about the importance of consuming protein during pregnancy. Therefore, it is necessary to provide health information, especially the importance of protein in pregnancy, to increase comprehensive knowledge of anemia prevention.

Health promotion can be done using various methods and media tailored to the target. Game media can be used in health promotion as a learning and teaching tool. The game is a health promotion media because it is a fun learning media that returns to the benefits of the game; the game can present something joy in learning and unconsciously stimulates the brain, increasing IQ and increasing self-confidence. The



atmosphere created can strengthen the relationship between researchers and pregnant women. Moreover, the important value of each game, what is needed to prepare it (tools, materials, and forms of participation of researchers) and how the game is done, which is then expected to be used as material for solving a problem, and finally participants provide an assessment of what is delivered, and he saw (Prasojo, 2010).

The use of game media is not for every learning; it needs to be designed at certain times, topics, and sub-topics. The media can adopt various types of games that are well known to the public, but the material and questions can be adjusted to the learning indicators. For example, a monopoly game (Rahmawati, 2009). Simple games can be a source of inspiration in designing learning media. We know that monopoly games are one of the world's most popular types of board games. This game is valid not only in our country but also in various other countries (Rifkisajid, 2013). Therefore the need for innovation from the monopoly game as a medium of health education, especially in the importance of protein consumption in preventing anemia in pregnant women.

The results of research conducted on teenagers of Kesatrian 1 Semarang High School who have comprehensive knowledge of HIV / AIDS before conducting health education using *monopoly simulation* methods as much as 28%, after health education, especially about HIV / AIDS using *monopoly simulation* methods students who have comprehensive knowledge

HIV / AIDS as much as 84%, which means an increase in the number of students who have comprehensive knowledge of HIV / AIDS by 56%.

This study aims to analyze the effectiveness of education-based *monopoly simulation* to increase knowledge, protein intake, and levels of Hb of pregnant women with anemia in Klasaman Health Center.

**MATERIALS AND METHODS**

This research type is a *quasi-experimental* study with a *Pretest-Posttest Control Group Design*. The independent variable is *monopoly simulation-based* education, and the dependent variable is knowledge, protein intake, and hemoglobin level. The research was conducted in 3 posyandu located in Klasaman Health Centre (PosyanduMelati, PosyanduSinipagu, and Posyandubogenvil) in November-December 2018. Observation times was 1 month. The samples were 20 pregnant women with anemia—Total Sampling method. The sample was divided into the experimental group and the control group of 10 pregnant women each. The inclusion criteria for the sample are first and first-trimester pregnant women and Hb levels 9, 9 - 10.9 mmHg (Mild Anemia). Data collected are respondents' characteristics, knowledge about pregnancy anemia, protein intake, and hemoglobin levels of pregnant women. Knowledge data was obtained through the pretest and posttest results using a knowledge questionnaire. Data analysis using *the Mann-Whitney* test by comparing *the mean* between the pretest and posttest results in both groups.

**RESULTS**

**1. Characteristicsof Respondents**

Distribution of respondents according to characteristics of age, education level, can be seen in table 1.

**Table 1**

**Respondents Characteristics**

Variable	Experiment		Control	
	n	%	n	%
<b>Age Group (year)</b>				
19-24	4	40	2	20
25-30	3	30	4	40
31-36	2	20	3	30
37-42	1	10	1	10
<b>Level of education</b>				
Bachelor	1	10	3	30
High school	6	60	6	60
Middle School	3	30	1	10



<b>Occupation</b>				
Housewife	5	50	5	50
Civil Servants	1	10	1	10
Entrepreneur	2	20	1	10
State-Owned Enterprises	0	0	1	10
Honorary	1	10	0	0
Traders	1	10	2	20
<b>Age of Pregnancy</b>				
Trimester I	3	30	3	30
Trimester II	5	50	4	40
Trimester III	2	20	3	30
<b>Gravida status</b>				
Primipara	3	30	0	0
Multipara	7	70	9	90
Grandemultipara	0	0	1	10

Table 1 shows that the incidence of anemia is most common in pregnant women aged 25-30 years, as many as 7 people (35, 0 %). At the same time, the least anemia occurred in pregnant women in the age group of 37 -42 years old, as many as 2 people (10%). Anemia is most common in pregnant women with a high school education level of 12 (60.0%). In terms of work, anemia is most common in pregnant women who work like homemakers, as many as 10 people (50.0%), while the least occurs in pregnant women who work as State-owned enterprises or Honorary Employees, each with 1 person (5, 0%). In terms of gestational age, the most suffering from anemia in pregnant women at the Trimester II gestational age (14-27 weeks)

as many as 9 people (45.0%). In terms of gravid status, anemia most often occurs in pregnant women with multipara status as many as 16 people (45.0%), while the least occurs in pregnant women with grandmultipara status as many as 1 person (5.0%).

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**2. Statistical analysis**

**Test for normality and homogeneity of data**

To determine whether there is a difference in the average change in hemoglobin levels in the two groups conducted independent testing of samples on the condition that the normal distribution of data and the data variants are homogeneous. However, if these requirements are not met, they will be replaced with the *Mann-Whitney* test. Therefore, to determine the type of test used, the normality and homogeneity of the data must be tested first. The test results can be seen in Table 2.

**Table 2 . Normality Test By Shapiro-Wilk**

	<b>Knowledge</b>	<b>Protein intake</b>	<b>Hb level</b>
<b>Statistics</b>	0,846	0.912	0.920
<b>Df</b>	10	10	10
<b>Sig.</b>	0.041	0.292	0,355

The normality test is known from the Sig. (P-value) of the Shapiro-Wilk test. If the value of  $p > 0.05$ , it can be concluded that the data is normally distributed. Table 2 shows that the knowledge variable value of  $p < 0.05$  (significant value 0.041 less than 0.05) concluded that the data tested did not meet the normality requirements.

**Table 3 . Homogeneity Variance Test Results**

	<b>Knowledge</b>	<b>Protein intake</b>	<b>Hb level</b>
<b>Levene Statistics</b>	0.450	0.174	1955
<b>df1</b>	1	1	1
<b>df2</b>	18	18	18
<b>Sig.</b>	0.511	0.681	.179



Based on the homogeneity test results, the significance values obtained were 0, 179, 0.511, and 0.681 > 0.05, which means that the data obtained had the same or homogeneous variants.

**Difference Test Results Between Pre And Post Test**

The normality test showed that the data were not normally distributed (terms paired sample t-test is not met) because the research continued right to the statistical method of non-parametric with the Wilcoxon test. Wilcoxon test results can be seen in table 4.

**Table 4 Difference Test Results Between Pre And Post Test**

	Knowledge	Protein intake	Hb level
<b>Negative Ranks</b>	3.00	0.00	0.00
<b>Positive Ranks</b>	4.17	5.50	5.50
<b>Z</b>	-1,933	-2,803	-2.803
<b>Asymp. Sig (2-tailed)</b>	0.003	0.005	0.005

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Different test between groups is known from the value of Sig. (2-tailed) Wilcoxon test. If the Sig. (2-tailed) ≤ 0.05, it can be concluded that there are significant differences in the average before and after treatment. The results of the Wilcoxon test show that the Sig. (2-tailed) ≤ 0.05, so it can be concluded that there is an effect of the application of *Monopoly Simulation*-based education on increasing knowledge, protein intake and hemoglobin levels. Based on the mean values between pretest and posttest can be seen an increase before and after

being given treatment. This means that the application of education based on *Monopoly Simulation* can increase knowledge, protein intake and hemoglobin levels of pregnant women suffering from anemia.

**Difference Test Results Between the Two Groups**

Normality and homogeneity test showed that the data was homogeneous but not normally distributed (terms independent sample t-test is not met) because the research continued right to the statistical method of non-parametric with the Mann-Whitney test. The Mann-Whitney test results can be seen in Table 5

**Table 5 Difference Test Results Between the Two Groups Using the Mann-Whitney Test**

	Knowledge	Protein intake	Hb level
<b>Mann-Whitney U</b>	37,500	42,000	39,000
<b>Wilcoxon W</b>	92,500	97,000	94,000
<b>Z</b>	-0,983	-0,605	-0,836
<b>Asymp. Sig (2-tailed)</b>	0.326	0.545	.403

Different test between groups is known from the value of Sig. (2-tailed) Mann-Whitney test. If the Sig. (2-tailed) < 0.05, it can be concluded that there is an average difference between the experimental and control groups. The results of the Mann-Whitney test show the Sig. (2-tailed) > 0,05, so that it can be concluded not there are differences in the average increase in hemoglobin concentration, increased knowledge, and protein intake between the experimental group and control group

The results of the research conducted will be discussed following the variables studied as follows:

**1. Knowledge**

A person's level of knowledge affects individual behavior. The higher the nutritional knowledge of pregnant women, the higher the awareness to participate in providing food so that their nutritional needs for themselves are met. The higher the knowledge about anemia, the hemoglobin levels will increase where there is a tendency for each additional 1% of knowledge, the hemoglobin levels will increase by 0.006 g / dl (Argana, 2004; Agustarika & Mustamu, 2022).

**DISCUSSION**



Sig obtained the results of the statistical tests conducted in this study. ( 2-tailed )  $\leq 0.05$ , so it can be concluded that the application of *monopoly simulation-based* education has an effect on increasing knowledge about pregnancy anemia. Based on the *mean* values between *pretest* and *posttest*, can be seen an increase in the average knowledge before and after treatment. Exploiting *simulation-based* education can increase knowledge in pregnant women suffering from anemia.

The results of this statistical test are in line with research conducted by Saputri and Azam (2015 ), who tested the effectiveness of the game simulation method " Monopolizing HIV" on the level of comprehensive knowledge of HIV / AIDS and found that the game simulation method was effective in increasing comprehensive knowledge of HIV / AIDS by 56% of teens

## 2. Protein intake

One nutrient that is known to increase its needs during pregnancy is protein and iron. Iron during pregnancy is used for fetal development, placenta, red blood cell expansion, and the body's basal needs. Required iron can be obtained from food and iron tablets. However, like general nutrient consumption, iron consumption often does not meet the body's needs. If the levels of iron in a pregnant woman's body are lacking, there will be a condition called anemia. That is because iron is an essential microelement for the body. This substance is especially needed in hemopoiesis (blood formation) in the synthesis of hemoglobin (Darlina, 2003).

The results of statistical tests conducted in the study obtained the value of Sig. ( 2-tailed )  $\leq 0.05$ , so it can be concluded that there is an effect of the application of *monopoly simulation-based* education on increasing protein intake. Based on the *mean* values between *pretest* and *posttest* can be seen an increase in the average protein intake before and after being treated. The application of *monopoly simulation-based* education can increase protein intake in pregnant women who suffer from anemia.

The results of this statistical test are in line with research conducted by Marini et al. (2015 ), who tested the influence of monopoly games in increasing knowledge, attitudes, and actions of fruit and vegetable consumption patterns in SDN 021 Sungai KokongSamarinda students and found

that there was an influence of monopoly games in increasing consumption patterns of fruits and vegetables in students S DN 021 Sungai KukungSamarinda with p-value (0.027)  $< \alpha$  (0.05).

An increase in knowledge of pregnant women in the experimental and control groups also affects the intake of protein, which has a significant (difference) increase. Increase in knowledge of pregnant women because pregnant women, after an intervention, begin to know and understand about anemia in pregnancy and good food for pregnant women.

## 3. Hemoglobin level

Anemia is a state of decreased levels of hemoglobin, hematocrit, and the number of erythrocytes below normal values. *Hemoglobin* is a substance that functions to transport oxygen to all body tissues, including the body of the fetus contained by the mother, so that if anemia occurs in pregnant women, then the process of transporting oxygen throughout the body will be disrupted. Common symptoms of anemia such as lethargy, fatigue, paleness, fatigue, dizziness, and drowsiness are easily recognized clinical symptoms. According to WHO, the incidence of pregnant anemia ranges from 20% to 89%; by setting Hb 11 gr% as the basis, the pregnancy anemia rate in Indonesia shows a high enough value. Anemia due to iron deficiency is a major cause of anemia in pregnant women compared to other nutritional deficiencies. Studies in Singapore confirm that iron deficiency anemia is a major cause of anemia in pregnant women and is a health problem in developing and developed countries. In Indonesia, most anemia causes are also due to iron deficiency needed for forming hemoglobin.

Incidence of Anemia is still high because, in general, the awareness and knowledge of pregnant women are still low in paying attention to the importance of preventing anemia and the danger of lack of iron intake. Iron deficiency in the body is caused by a lack of consumption of iron from food or low absorption of iron in food. Various studies show that pregnant women in Indonesia consume inadequate staples, animal foods, vegetables, and fruits, even though all of these foods are sources of iron. The main factor that plays a role in iron deficiency is the intake of foods containing low iron from pregnant women; this is due to pregnant women consuming low energy and iron intake in their daily diet.



Sig obtained the results of the statistical tests conducted in this study. ( 2-tailed )  $\leq 0.05$ , so it can be concluded that there is an effect of the application of *monopoly simulation-based* education on increasing hemoglobin levels. Based on the *mean* values between *pretest* and *posttest*, an increase in the average hemoglobin levels can be seen before and after treatment. Applying education based on *Monopoly Simulation* can increase hemoglobin levels in pregnant women suffering from anemia.

Statistical test results align with research by Pratama and Maya (2017), which says a da average increase in hemoglobin levels in the group of pregnant mothers with education about anemia was  $0.122 \pm 0.20$ . Research other by Adawiyani (2013), which examined the effect of education in the form of *booklets* to increase hemoglobin levels, showed that providing education by using *booklets* anemia affects the rise in hemoglobin levels in the test group (given *booklets* anemia) compared with the control group (not given *booklet* anemia).

Providing education to pregnant women is one of the important pillars to optimizing the increase in hemoglobin levels of pregnant women with anemia. If education can be carried out effectively, it can increase knowledge and self-awareness among sufferers of their illness.

## CONCLUSION

Based on the research conducted, it can be concluded that *monopoly simulation-based* education affects increasing knowledge, protein intake, and hemoglobin levels of pregnant women who suffer from anemia. However, the effectiveness test results show that education based on *monopoly simulation* is ineffective in increasing knowledge, protein intake, and hemoglobin levels of pregnant women with anemia compared to conventional methods (counseling). In efforts to educate the public, health workers should use various methods that are varied to attract the community's interest so that the information conveyed can be well received if further research wants to examine the effectiveness of the methods of *monopoly simulation* so that the number of samples being used more so that the results achieved can be maximized.

## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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