

## Original Research Article

# The prevalence of anemia in pregnant women in the 10 priority villages for stunting control in Sumedang district, West Java: a community-based survey

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### ABSTRACT

**Background:** Anemia in pregnant women possessed potential harm to mother and child. There were 48.9% of pregnant women suffering from anemia and 40% of women of childbearing age also suffer from anemia. Incidence of anemia among pregnant women is prominent health problems especially in developing countries such as Indonesia. The aim of the present study is to determine the prevalence of anemia among pregnant women in relation to infection of Soil-Transmitted Helminthes (STH) and Serum Iron deficiency in 10 priority villages for stunting control set by the government in Sumedang district, West Java.

**Methods:** This is a community-based survey. Hemoglobin concentration was obtained from finger prick blood test. Containers for stool specimens and anal swabs were given to each woman at the time of hemoglobin fingerpick blood test showed positive results for anemia. Data were analyzed using SPSS software.

**Results:** Out of 209 pregnant women examined we found 39 pregnant women (18.7%) suffering from anemia. Followed by serum iron analysis we found 23.3% of the total number of pregnant women with iron deficiency. On microscopic examination of fecal specimens and anal swabs we found no worm eggs or larvae in the specimens examined.

**Conclusions:** Hemoglobin examination found that there were 18.7% pregnant women with anemia and 23.3% suffering iron deficiency. Microscopic examination of fecal samples and anal swabs in pregnant women with anemia showed neither STH eggs nor larvae.

**Keywords:** Pregnant women, Anemia status, Soil-transmitted helminthes, Serum iron, Stunting, Rural areas Sumedang

### INTRODUCTION

The direct cause of maternal mortality in Indonesia is due to hemorrhage, infection and eclampsia, while indirect causes are anemia. Anemia in pregnant women possessed potential harm to mother and child.<sup>1</sup> The maternal mortality ratio in Indonesia is 305/100,000 live births.<sup>2</sup> In addition, according to Indonesia "basic health research-riskesdas" there were 48.9% pregnant women suffer from

anemia and 40% of women of childbearing age suffered as well.<sup>3</sup> Infectious and parasitic diseases are prominent health problems, especially in developing countries such as Indonesia. Helminthes infections are disease that is typical found in the tropics, sub-tropics and usually increases during the rainy season. Indonesia is one of the countries that meet these criteria, so we could say that helminthes distribution in Indonesia is partly contributed by our country geographical states. Soil transmitted

helminthes in Indonesia have high prevalence, especially in rural areas where the environmental conditions are very supportive for the development of helminthes and their life cycle within the soil.<sup>4,5</sup> Chronic STH infection would lead to anemia due to iron chelation and insidious bleeding.<sup>6</sup> In Indonesia, Asia Development Bank (ADB) stated that on 2012 as many as 22 million Indonesian children suffered from anemia which in turn caused decrease in IQ.<sup>7</sup> STH infection and anemia were closely related. In this research, therefore, we ought to study on distribution of both anemia and soil transmitted helminthes infection among pregnant women.<sup>8</sup>

### **Aim**

The aim of the present study was to assess the prevalence of anemia of pregnant women in relation to infection of soil-transmitted helminthes (STH) and serum iron deficiency in 10 priority villages for stunting control set by the government in Sumedang district, West Java.

## **METHODS**

### **Study type**

A community-based, cross-sectional study.

### **Study population**

Pregnant women.

### **Study area**

In 10 priority villages of stunting of Sumedang district, namely the villages of Mekarsari, Mekarbakti, Margamukti, Cilembu, Cijeruk, Cimarga, Ungkal, Sukahayu, Kebon Kalapa, and Malaka. The inclusion criteria were pregnant women within these villages; any trimester of pregnancy; samples were collected on specific dates for every villages. Recruitment also included canvassing (door-to-door approached) in neighborhoods in the more rural catchment areas because it was known that some of the pregnant women worked on day time.

### **Study duration**

This study was undertaken in the period of November 2018 and January 2019.

### **Sample size**

All pregnant women in the population (n=209) are included in the study.

### **Exclusion criteria**

Not readily to sign informed consent form; unwilling to provide sample (hemoglobin, fecal specimen, anal swab);

women who underwent abortion and labor also excluded from the study.

### **Data collection**

Aside the physical and laboratories examination, the questionnaires is used to obtained demographic data. Hemoglobin concentration was obtained from fingerpick blood test using Easy-Touch® assessment. Anemia was diagnosed when the Hb result were <11.0 mg/dl at first and third trimester, <10.5 mg/dl at second trimester as categorized by the WHO, Api et al and Astriana.<sup>9-12</sup> As many as 48 trained young doctors were deployed to check anemia status. Pregnant women who have low Hb then proceed with an iron serum examination. For the measurement of STH infection, containers for stool specimens and anal swabs were given to each woman at the time of hemoglobin fingerpick blood test showed positive results for anemia.<sup>13</sup> Women were asked to return the next day with the fecal sample. The fecal samples were examined on the same day they were returned by researchers under supervision of well-trained laboratory analyst. Fecal samples used 2% of eosin as reagent; anal swab samples used toluene as reagent.<sup>13</sup> Both samples were examined under light microscope under 10x and 40x magnification. Quality control measures (e.g., daily supervision, re-reading of negative slides and external evaluator) were strictly enforced. Diagnosis of STH infection was confirmed when either helminthes' larva or eggs were found.<sup>14-16</sup>

### **Ethical approval**

Ethical clearance for the study was obtained from Committee of Ethics, Christian University of Indonesia, Faculty of Medicine. Permission was also obtained from the District Health Office of Sumedang-West Java and informed consents.

### **Statistical analysis**

Data processing includes editing, coding, data tabulation of the prevalence measured in percentage using SPSS software.

## **RESULTS**

As it showed in Table 1 below, based on the demographic data obtained of 209 pregnant women we found that in 10 villages of priority control of stunting in Sumedang district most pregnant women are in the age range of 16-25 years (50.7%) and 26-35 (40.2%). The age range of marriage in pregnant women is most commonly found at the age of 17-20 years.

The level of education, the majority had junior high school education (44.5%) whereas almost all (96.7%) as housewives (96.7%).

**Table 1: Demographic data of pregnant women in the 10 priority villages for stunting prevention in Sumedang district.**

Variable	Frequency	%
<b>Age (in years)</b>		
<15	1	0.5
16-25	106	50.7
26-35	84	40.2
36-45	18	8.6
<b>Marital age (in years)</b>		
<13	2	1.0
13-16	46	22.0
17-20	111	53.1
21-24	30	14.4
25-28	11	5.3
29-32	5	2.4
33-35	3	1.4
>35	1	5.0
<b>Level of education</b>		
Elementary	54	25.8
Junior high school	93	44.5
High school	54	25.8
University	8	3.8
<b>Occupation</b>		
Housewife	202	96.7
Entrepreneur	3	1.4
Employee	4	1.9
<b>No. of family member</b>		
2 person	67	32.1
3-5 person	127	60.8
>5 person	15	7.2
<b>Family income (in Rs.)</b>		
<1,000,000	40	19.1
1,000,000-2,000,000	122	58.4
2,000,000-3,000,000	35	16.7
>3,000,000	12	5.7

**Table 2: Pregnancy status and specific physical examination.**

	Frequency	%
<b>Pregnancy age</b>		
Trimester 1	43	20.6
Trimester 2	99	47.4
Trimester 3	67	32.1
<b>Gravid</b>		
1	76	36.4
2	90	43.1
3	27	12.9
4	12	5.7
5	1	0.5
>5	3	1.4
<b>Parity</b>		
0	85	40.7
1	89	42.6
2	22	10.5
3	12	5.7
4	0	0.0
≥5	1	0.5

Continued.

	Frequency	%
<b>Abortion</b>		
0	188	90.0
1	15	7.2
2	5	2.4
3	1	0.5
4	0	0
≥5	0	1
<b>Conjunctival anemia</b>		
Yes	7	18
No	22	152
<b>Pale lips mucosal</b>		
Yes	10	4
No	29	166
<b>Koilonychias</b>		
Yes	7	1
No	32	169

**Table 3: Anemia status and microscopic fecal and anal swab on STH infection and serum iron examination.**

	Frequency	%
<b>Anemia status</b>		
Anemia (+)	39	18.7
Anemia (-)	170	81.3
<b>Microscopic fecal examination and anal swab on STH Infection</b>		
Negative	39	18.7
Not examined	0	81.3
<b>Severity assesment of anemia ( WHO, 2011)</b>		
Mild	39	-
Moderate	0	-
Severe	0	-
<b>Anemia status and deficiency of Fe</b>		
Low serum iron	7	23.3
Normal serum Iron	23	76.7

**Table 4: Cross-tabulation data of anemia status according to variables.**

	Anemia (+)	Anemia (-)
<b>Age (in years)</b>		
<15	0	1
16-25	25	81
26-35	11	73
36-45	3	15
<b>Marital age (in years)</b>		
<13	0	2
13-16	16	30
17-20	17	94
21-24	4	26
25-28	1	10
29-32	1	4
33-35	0	3
>35	0	1
<b>Level of education</b>		
Elementary	9	45
Junior high	26	67
High school	4	50
University	0	8

Continued.

	Anemia (+)	Anemia (-)
<b>Occupation</b>		
Housewife	38	164
Entrepreneur	0	3
Employee	1	3
<b>Family income</b>		
Rs. <1,000,000	4	36
Rs. 1,000,001-2,000,000	27	95
Rs. 2,000,001-3,000,000	4	31
Rs. >3,000,000	4	8
<b>Pregnancy age</b>		
Trimester 1	7	37
Trimester 2	16	82
Trimester 3	16	51
<b>Gravid</b>		
1	17	59
2	14	76
3	4	23
4	2	10
5	1	0
>5	1	2
<b>Parity</b>		
0	18	67
1	15	74
2	2	20
3	4	8

The highest number of family members is found in the range of 3-5 people (60.8%). The average family income is found in the range of Rs. 1,000,000 to Rs. 2,000,000 (58.4%).

Clinically, as shown in the tables 2 and 3 we found that the most gestational age of mothers based on the trimester of pregnancy in the second trimester (15-28 weeks) which was 47.4%. Based on GPA status, most were found in gravida 2 (43.1%), parity 1 (42.6%), no abortion was 90.0%. On specific physical examination of anemia we found anemic conjunctiva (16.7%), pale lip mucosa (6.7%), koilonychia nails (3.8%). On hemoglobin examination with a quick test found 18.7% of pregnant women had anemia. From serum iron (SI) tested we found the majority had normal SI levels with a total of 76.5%), and only 23.3% had low SI levels. The results of microscopic examination of faeces and anal swabs on STH infection in pregnant women showed negative results in all pregnant women with anemia.

From the cross-tabulation in Table 4 we found 25 mothers with an age range of 16-25 years suffering from anemia, 16 and 17 mothers were found suffered anemia in the marriage age group 13-16 years and 17-20 years respectively. As many as 27 pregnant women in the family income group of Rs. 1,000,000 - Rs. 2,000,000 suffered from anemia, and anemia rates are higher in mothers with primigravida status (G1P0A0).

## DISCUSSION

The results of the study on the pregnancy status of pregnant women in 10 stunting locus villages in Sumedang district found that the most gestational age of mothers based on the trimester of pregnancy was found in the second trimester (15-28 weeks), which was 47.4%. Based on GPA status, most were found in gravida 2 (43.1%), parity 1 (42.6%), abortion 0 (90.0%). On specific physical examination of anemia in pregnant women in 10 stunting locus villages in Sumedang district found anemic conjunctiva (16.7%), pale lip mucosa (6.7%), koilonychias nails (3.8%). On hemoglobin examination with a quick test found 18.7% of pregnant women had anemia. The results of microscopic examination of faeces and anal swabs on STH infection in pregnant women showed negative results in all pregnant women with anemia.

The cross-tabulation found 25 mothers with an age range of 16-25 years suffering from anemia. Anemia in pregnancy is still a chronic problem in Indonesia as evidenced in the prevalence in pregnant women as much as 63.5%. In the last four years the prevalence of anemia did not show a significant decline. In the current era of development in Indonesia where the quality of human resources is a highly prioritized condition, the problem of anemia needs to be taken seriously.<sup>2</sup>

According to the results of the 2018 Basic Health Research (Riskesdas), the prevalence of anemia in pregnant women in Indonesia is 48.9%.<sup>3</sup> In pregnant women, the need for red blood cells is higher so that it triggers an increase in erythropoietin production.<sup>17</sup> As a result, plasma volume increases and red blood cells (erythrocytes) increase.<sup>12,18,19</sup> However, an increase in plasma volume occurs in a greater proportion compared to an increase in erythrocytes resulting in a decrease in hemoglobin (Hb) concentration due to hemodilution.<sup>20</sup> According to WHO data, globally the prevalence of anemia in pregnant women throughout the world is 41.8%. The prevalence of anemia in pregnant women is estimated in Asia by 48.2%, Africa 57.1%, America 24.1%, and Europe 25.1%.<sup>21</sup> In this study found that the incidence of anemia was higher at the age of marriage 13-16 years and 17-20 years, namely 16 people and 17 people each. It is known that several factors that can cause anemia of pregnancy include gravid, age, parity, education level, economic status, and compliance with consumption of Fe tablets.<sup>22</sup> General factors are risk factors for anemia in pregnant women. A mother's age is related to female reproductive organs. A healthy and safe reproductive age is 20-35 years old. Pregnancy at age of <20 years is biologically not yet having optimal emotions and tends to be unstable so it is easy to experience shock which results in a lack of attention to meeting nutritional requirements during pregnancy. While at the age of >35 years is related with setbacks and decreased endurance and various diseases that often affect this age. So that in some health research states that the age of the mother can influence the emergence of anemia, namely the lower the age of the pregnant woman, the lower the hemoglobin level.<sup>23,24</sup>

Through the results of cross-tabulation, 16 and 17 mothers were found suffered anemia in the marriage age group 13-16 years and 17-20 years respectively. Most pregnant women in the two age groups suffer from anemia, where marriages for women under 21 are classified as early marriages. This shows that there is a correlation between early marriage in women with anemia.<sup>21,25</sup>

Married at young age is risked because lack of readiness from aspects of health, mental, economic, socio-economic, and reproductive. Adolescent pregnancy has negative impacts for the health of adolescents and their babies because of youth pregnancy can risk premature birth, low birth weight (LBW), labor bleeding, which can increase maternal and infant mortality.<sup>23,24,26</sup>

Nutritional anemia is more common in pregnancy because at this time the need for food substances for physiological improvement during pregnancy. The cause of anemia during pregnancy in youth is caused by the lack of knowledge of nutrition during pregnancy in young people.<sup>21,27</sup> The level of education has an exponential relationship to nutritional and health status. The higher education, the higher awareness for pregnant

women to get the better nutritional so anemia in pregnancy will not happened.<sup>8</sup> The results of cross tabulation showed that 26 pregnant women had junior high school education in 10 stunting locus villages in Sumedang district. The prevalence of anemic pregnant women with low education is greater with highly educated mothers.<sup>28</sup>

Information from cross-tabulation shows that as many as 27 pregnant women in the family income group of Rs.1,000,000 - Rs.2,000,000 suffer from anemia. Factors that influence the nutrition of pregnant women, especially with anemia, are economic status, because one's economy influences the selection of foods to be consumed daily.<sup>29</sup> A person with a high economy then becomes pregnant so chances are that a large amount of needed nutrition is fulfilled plus the examination makes the mother's nutrition more monitored. Lack of family income causes location and for daily food purchases, thereby reducing the number and quality of maternal food per day which results in a decrease in nutritional status that is common in women is anemia, because physiologically menstruate every month. Food sources to prevent anemia generally come from protein sources that are more expensive and difficult to reach for those on low incomes. This deficiency increases the risk of anemia in adolescents and pregnant women and aggravates pain in the mother and in newborns. Anemia contributes to the high maternal mortality rate and increases with the increase in pregnancy rate. In this study conducted by Mariza it was found that from 19 respondents the level of socio-economic was low, there were 14 people who had anemia (73.7%) while those who did not have anemia were 5 people (26.3%).<sup>28</sup> Of the 11 respondents, the socioeconomic level was high, those who had anemia were 2 people (18.2%), while those who were not anemic were 9 people (81.8%). In the study conducted by Oktaviani (2018), in the family income variable showed no difference between the level of family income <UMR (Upah Minimum Regional, Regional Minimum Wage) and >UMR with the incidence of anemia.<sup>30</sup>

The results of cross-tabulation show that anemia rates are higher in mothers with primigravida status, G1P0A0. This is in contrast to several studies. According Singh et al, found that the incidence of anemia in pregnancy would increase with the height of the gravida.<sup>31</sup> Multigravida can cause anemia due to reduced iron reserves due to use for previous pregnancies is not enough to meet the needs of current pregnancy.<sup>32</sup> Another retrospective cohort study result by Ruramayi et al, found parity affects the incidence of anemia in pregnancy, the more often a woman is pregnant and giving birth, the higher the risk of anemia because it depletes iron reserves in the body.<sup>33</sup> Puwandari et al, stated based on their study that the higher the parity, the shorter the distance of birth.<sup>34</sup> This can make a mother not have enough time to restore her body condition. High parity can cause maternal health conditions to decline and often experience less blood so that it adversely affects subsequent pregnancies.<sup>35</sup>



## CONCLUSION

As one of the rural areas for Sumedang district that was ranked 4th in the prevalence of stunting in West Java province, and it is included in one of the 100 regencies the government's priority for stunting actually found the study rather surprising where the prevalence of anemia which is one of the causes of stunting below the national average. However, various theories suggest that anemia in pregnant women increases the risk of bleeding, preeclampsia and infection. Pregnant women who suffer from anemia also run the risk of giving birth to babies with low birth weight; babies will be iron deficient, even death in infants. This study can be concluded that one way to prevent stunting in Sumedang district is to fulfill nutrition and health services for pregnant women. This effort is very necessary, considering that stunting will affect the level of intelligence of children and health status as adults due to malnutrition in the first 1000 days of life is permanent and so difficult to repair. Other sensitive nutritional efforts should also receive serious attention for the regional government so that the target of Sumedang district stunting rate below 20% can be achieved by 2023.

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