Analysis of Indonesian Youth Reproductive Health Survey (IYRHS) 2012: Determinant Study of Anemia among Adolescent

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Abstract: *The prevalence of anemia in developing countries about 27% and 6% in developed countries. It is not certain the prevalence of anemia among adolescents in Indonesia, on the other hand, the knowledge about anemia among adolescents aged between 15-24 years were quite low. The purpose of this study to determine the relationship of socio demographic characteristics and risks behavior among adolescent with adolescent knowledge about anaemia in Indonesia using the data Indonesian Youth Reproductive Health Survey (IYRHS) 2012. Secondary data from IYRHS 2012 analyzed using logistic regression analysis. Socio demographic variables and adolescent risk behaviors such as smoking, using substances/drug, and premarital sex behavior analyzed with adolescent knowledge about anemia. A total of 19,399 male respondents and 8,419 female respondents in the survey, there were 66 % aged between 15- 19 years and about 34 % were aged between 20-24 years. The main predictor of lack of anemia knowledge among adolescent were socio demographic characteristics, especially low education level and parent socioeconomic level (OR = 8.0; 95 % CI = 7.0-9.1 and OR = 3.2; 95% CI = 2.8-3.6). Cooperation across sectors is should be increase to make early interventions for adolescents to improve reproductive health in the future, through anemia prevention program based on school, clinic, or community.*

Keywords: knowledge, anemia, adolescent, Indonesian Youth Reproductive Health Survey

1. Introduction

Anemia is a common public health problem experienced mainly in developing countries, including Indonesia (1). The WHO estimates that more than 2 billion people globally suffer from anemia (2). The main problem of adolescent health and nutritional status in Indonesia is that 35.2% of adolescents aged between 13-15 years and 31.2% aged between 16-18 years are short and very short. Most adolescents experience an energy deficit and a third experience protein and micronutrient deficit (1–3).

Indonesia is one country with the prevalence of severe anemia (> 40.0%) (4). A total of 35.0% of adolescent girls are anemic and most of them have conditions of chronic energy deficiency (2,4–6). Anemia not only affects the health status of adolescent girls today but also has the detrimental effect of pregnancy in the future, which puts women three times higher risk of having a baby with low birth weight and a nine times higher risk of perinatal mortality, which in turn significantly contribute to increasing infant and maternal mortality (4,7–9).

Based on IYRHS data (2012), found that most adolescents' knowledge about the understanding of anemia, causes of anemia, and its management were still low (1). The efforts of the government have not sought anemia prevention program in adolescents as a priority service, because it is more focused on the health of the mother from pregnancy, childbirth, to parturition and from newborn babies to the neonatal period (3–5,7,10). Strategic Plan of Ministry of Health Year 2015-2019 related school-age and adolescent health is conducted through School Health Unit. The program is required at all levels of education, especially kindergarten to high school as a forum for the promotion of health (11).

This study aimed to explore the level of knowledge of adolescents aged 15-24 years in Indonesia regarding anemia according to socio demographic characteristics, including; level of education, place of residence, age, socio-economic level of the parents, and other risky behaviors (i.e. smoking behavior, alcoholic consumption and history of premarital sexual experience). The results of this research can be a reference in planning activities to raise adolescent awareness, tackle and prevent anemia early, and prepare a healthy reproductive life. Increased knowledge is the first step to improve and change certain behaviors, including behavior to prevent anemia appropriately. Programs made for adolescent can be planned based on the needs and the results of studies with sufficient external validity.

2. Subject and Methods

The data used in this study were based on the data of IYRHS in 2012 or secondary data, obtaining 19,626 unmarried adolescents boys and girls aged between 15-24 years. A total of 10,980 unmarried adolescent boys and 8,646 unmarried girls were engaged in this survey. The survey was conducted in 33 provinces in Indonesia. The author chose some of the variables associated with adolescent knowledge level of anemia, including the definition of anemia, causes, ways to overcome or intervention. Socio demographic and adolescent risky behavior variables were also obtained from the IYRHS (2012). Analysis of the data used was the analysis of regression logistic in multivariate test.

The level of adolescent knowledge about anemia was a dependent variable obtained from respondents regarding the definition of anemia, causes, signs of anemia and anemia

management. Socio demographic characteristics as independent variables were in form of education level, place of residence, socioeconomic level of parents, and age obtained from questions in the IYRHS data (2012). For the extraneous variables, this study dealt with risk behavior among adolescents that included smoking behavior, drugs use, and premarital sexual history obtained from the data in the IYRHS (2012).

The level of adolescent knowledge about anemia could be divided into low and high- level knowledge, obtained from the total number of correct answers which was averaged. If the value obtained was higher than the average value, it was grouped into high-level knowledge (score = 1). In contrast, if the value obtained was lower than the average value, it was grouped into low level (score = 0).

The adolescents' socio demographic characteristics were grouped into four categories. The first was the level of education divided into some levels, ie, basic education (until junior high school), secondary level (until high school), and higher education level. The second was the place of living divided into urban and rural areas. The third was socio-economic level of the parents obtained from the amount of revenue and expenditure of parents recorded in the IYRHS data (2012), divided into quintiles 1 to 5 or from the lowest to the highest levels of income. The fourth was adolescent age, divided into groups of adolescents aged 15-19 years and 20-14 years. For the extraneous variables, they were regarding adolescent risky behavior, such as smoking behavior, drug use, and a history of premarital sexual.

3. Statistical Analysis

Analysis of data used univariate, bivariate and multivariate. Univariate analysis to determine the frequency and percentage of each of the characteristics of adolescents, including : adolescent knowledge about anemia , education level , socioeconomic level of parents, residence , smoking behavior, using illicit substances , and premarital sexual history.

Bivariate analysis was to analyze the relationship between the independent and dependent variables as well as between the extraneous variables and the dependent variable using χ^2 test or chi-square. The multivariate analysis was performed by logistic regression analysis with stepwise modeling, which included the variables that were statistically and significantly associated starting by analyzing all the extraneous variables with the dependent variable together, and continued by analyzing the independent variables and the extraneous variables and the dependent variable simultaneously.

4. Results

The characteristics of the respondents were illustrated as follows, nearly 40% of adolescent knowledge about anemia was low, educational level of the respondents almost a half

was secondary education (49.1%), the socioeconomic level of the respondents' parents was middle and richest (20.4% and 20.8%), most respondents were aged 15-19 years old (65.5%), nearly 50% of the respondents were smokers or with a history of smoking, nearly 60.0% lived in urban areas, around 2.5% used drugs, and 7.8% had premarital sex. Table 1 describes the level of adolescent knowledge about anemia and adolescent characteristics according to the IYRHS (2012).

Table 1: The level of knowledge and characteristics of adolescents (N = 19,626) according to the IYRHS data (2012)

Variables	Frequency (f)	Percent (%)
Adolescent knowledge about anemia:		
a) Low	7,267	37.0
b) High	12,359	63.0
Adolescent education:		
a) Elementary	6,673	34.0
b) Middle	9,642	49.1
c) High	3,311	16.9
Parent socio economic levels:		
a) Quintile1	3,853	19.6
b) Quintile2	3,986	20.3
c) Quintile3	4,009	20.4
d) Quintile4	3,699	18.8
e) Quintile5	4,079	20.8
Adolescent age (years):		
a) 15-19	12,853	65.5
b) 20-14	6,773	34.5
Smoking behavior:		
a) Yes	9,625	49.0
b) No	10,001	51.0
Residence:		
a) Rural	8,499	43.3
b) Urban	11,127	56.7
Drug/substance use:		
a) Yes	488	2.5
b) No	19,138	97.5
Premarital sexual behavior history:		
a) Yes	1,506	7.7
b) No	18,035	91.9
c) Not know	85	0.4

Source: Secondary data analysis (SKRRI 2012)

The results of bivariate analysis between socio demographic characteristics and knowledge about anemia were presented in Table 2. The results showed that adolescents with high and secondary levels of education had high level of knowledge about anemia (90.0% and 69.8%, respectively), and there was a significant relationship between the level of education (secondary and high) and knowledge about anemia (p <0.000). The variables of residence, socio-economic level of parents, adolescent age, smoking behavior and history of premarital sex showed a highly significant association with adolescent knowledge about anemia (p <0.005). Those who had high knowledge about anemia tended to not have sex before marriage, to not smoke, to be more than 19 years old, have middle and high/rich parental socioeconomic level, and live in rural areas.

Table 2: Bivariate analysis between the adolescent knowledge about anemia and socio demographic characteristics based on the IYRHS data (2012)

Variables	Adolescent knowledge about anemia				Total (N=19.626)	Odds Ratio (OR)	95%CI
	Low		High				
	f	%	f	%			
Education level:							
a. Elementary	4,011	60.1	2,662	39.9	6,673		
b. Middle	2,915	30.2	6,727	69.8	9,642	13.1	11.6 - 14.9***
c. High	341	10.3	2,970	90.0	3,311	3.8	3.3 - 4.3***
Residence:							
a. Rural	4,257	50.1	4,242	49.9	8,499	2.7	2.5 – 2.9***
b. Urban	3,010	27.0	8,117	72.9	11,127		
Parent socio economic level:							
a. Quintile 1	2,394	62.1	1,459	37.9	3,853		
b. Quintile 2	1,691	42.4	2,295	57.6	3,986	6.9	6.2 – 7.6***
c. Quintile 3	1,414	35.3	2,595	64.7	4,009	3.1	2.8 – 3.4***
d. Quintile 4	985	26.6	2,714	73.4	3,699	2.3	2.1 – 2.5***
e. Quintile 5	783	19.2	3,296	80.8	4,079	1.5	1.4 – 1.7***
Adolescent age (years):							
a. 15 – 19	5,205	40.5	7,648	59.5	12,853		
b. 20 - 24	2,062	30.4	4,711	69.6	6,773	1.5	1.5 – 1.7***
Smoking behavior:							
a. Yes	4,152	43.1	5,473	56.9	9,625		
b. No	3,115	31.1	6,886	68.8	10,001	1.7	1.6 – 1.8***
Substance/drug use:							
a. Yes	195	40.0	293	60.0	488		
b. No	7,072	36.9	12,066	63.0	19,138	1.1	0.9 – 1.4
Premarital sexual behavior history:							
a. Yes	714	47.4	792	52.6	1,506		
b. No	6,499	36.0	11,536	64.0	18,035	0.5	0.3 – 0.8**
c. Not know	54	63.0	31	36.5	85	0.3	0.2 – 0.7***

Source: Secondary data analysis (SKRRI 2012) Note: $P<0.05*$, $P<0.005**$, $P<0.001***$
OR=Odds Ratio, 95%CI=95% Confidence Interval

Table 3 shows the relationship between the independent variables, the extraneous variables and the dependent variable, as well as the strongest predictor of knowledge about anemia. The strongest predictor of the level of adolescent knowledge about anemia was the level of primary and secondary education (OR = 8.0; 95% CI = 7.0 to 9.1). The main predictor of the level of education seen from the results of the analysis on Model 1 to 4 indicated that the level of education was the strongest predictor of the level of adolescent knowledge about anemia.

Table 3: Multivariate analysis about risk factors of anemia based on the IYRHS data (2012)

Variable		Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Education level:	8.5	7.5-9.7***	7.9	6.9-9.0***	8.6	7.5-9.8***	8.0	7.0-9.1***
a. Elementary b. Middle	3.1	2.7-3.5***	2.9	2.5-3.2***	3.0	2.7-4.5***	2.9	2.5-3.3***
Residence:Urban	1.5	1.4-1.6***	1.5	1.4-1.6***	1.5	1.4-1.6***	1.5	1.4-1.6***
Parent socio economic level:								
a. Quintile 1	3.3	3.0-3.7***	3.3	2.91-3.7***	3.2	2.9-3.6***	3.20	2.8-3.6***
b. Quintile 2	1.9	1.7-2.1***	1.9	1.7-2.1***	1.9	1.7-2.1***	1.8	1.6-2.0***
c. Quintile 3	1.7	1.5-1.9***	1.69	1.5-1.9***	1.7	1.5-1.9***	1.7	1.5-1.9***
d. Quintile 4	1.3	1.2-1.5***	1.30	1.2-1.5***	1.3	1.2-1.5***	1.3	1.2-1.4***
Adolescent age (years): 15-19	1.0	0.9-1.1	1.1	1.1-1.2**	1.1	1.0-1.2	1.2	1.1-1.3***
Smoking behavior: Yes			1.6	1.5-1.7***			1.5	1.4-1.7***
Premarital sexual behavior history:								
a. Yes					1.8	1.6-2.1***	1.6	1.4-1.8***
b. Not know					2.0	1.2-3.2**	1.9	1.1-3.0*
N		**19,626**		**19,626**		**19,626**		**19,626**
Log Likelihood		**-11026.4**		**-10922.2**		**-10974.6**		**-10893.4**
Pseudo R²		**0.1**		**0.2**		**0.1**		**0.2**

Source: Secondary data analysis (IYRHS, 2012) Note: $P<0.05*$, $P<0.005**$, $P<0.001***$
OR= Odds Ratio, 95% CI = 95% Confidence Interval

Analysis of Model 1 showed the relationship between socio demographic variables and the level of knowledge about anemia. Adolescent age was the only variable which was not associated with the level of knowledge about anemia (OR=1.0; 95% CI = 0.9-1.1). Model 2 shows the relationship between the independent variables and risky behavior and knowledge about anemia. Smoking behavior and socio demographic variables showed a highly

significant association with the level of knowledge about anemia (p<0.005). Model 3 showed the results that premarital sexual behavior and characteristics socio demographic showed a highly significant relationship (p<0.005), except age which was not associated significantly (p> 0.05). Model 4 included all significant variables associated with knowledge about anemia. This obtained that all variables were significantly associated (*p*<0.005), and the highest predictor that improved adolescent knowledge about anemia was the level of education, in addition to parental socioeconomic level, smoking behavior and a history of premarital sex.

5. Discussion

Based on the results obtained, the strongest predictor of adolescent knowledge about anemia was the level of education, in addition to socio-economic level of parents, residence in urban areas, and adolescent risky behaviors. As stated earlier, anemia is caused by various factors, such as direct and indirect causes. The direct causes of anemia include lack or insufficiency or abnormal production of red blood cells, very quick destruction of red blood cells, and the loss of red blood cells in very short time. The indirect causes of anemia are related to inadequate nutrient intake, diet quality, sanitation, health behavior, harmful environmental conditions, limitations in reaching health facilities, and poverty (2, 6, 10, 12, 13).

According to Kaplan et al (2000), there are several levels at which health translates into ecological model, namely from level one to level three (14). The first level is known as intrapersonal level refers to the knowledge, attitudes and beliefs of individual behavior. Theories of cognition, perception, and motivation are also relevant to the intrapersonal level. The second level is the level of interpersonal refers to how much the significance of family members, friends, and coworkers affects individual behavior, which eventually became a social norm. The third level is called the community level, including workplaces, schools, workplaces, social and health policies (such as health care reform) and the effects of poverty. This level considering setting organization and its influence on the health and well-being (2, 4, 10, 14–16).

According to IYRHS (2012), the perception of adolescent boys and girls regarding anemia was mostly good. Most adolescents also did not know how to cope with anemia, particularly adolescent boys. Adolescents need to be equipped with a correct understanding of the prevention and management of anemia, because anemia contributes greatly to the survival of young people in the future. The contribution of many factors in which affecting anemia including individual factors (biological immunity), family factors (caregiver knowledge) and institutional factors (adequacy of health services)(4–7,13,17).

The fundamental cause of anemia is the socio-economic factor, which affect the pattern of child care, food safety, and a healthy environment. These conditions cause the closest of anemia , namely under nutrition and morbidity (2,10). It should be understood that malaria and hookworm is the cause of anemia, in addition deworming and water,

sanitation and hygiene promotion activities. Strategic effort must be taken to overcome anemia through health promotion especially effective care-seeking behavior (2,9–11) .

Programs on adolescent reproductive health services by the Ministry of Health in Indonesia also target the improvement of adolescent health and nutrition, among others, 1) adolescent reproductive health services, i.e., promotive and preventive services focused on IEC/counseling, 2) adolescent reproductive health that pays attention to physical aspect services, including nutrition healthcare, to prepare adolescents to be healthy mothers in the future, and 3) adolescent reproductive health services specifically for troubled teens including premarital pregnancy, teenage pregnancy, drug abuse, and others (1,11).

Various studies found association between anemia and socioeconomic factor which is support this result. The level of education is a major predictor of adolescent knowledge about anemia, because higher levels of education will provide an opportunity for a person to get more knowledge. There is a relationship between level of education and health. Someone with a longer and higher education will have better understanding regarding efforts to gain healthy behavior, health problems and health care, and knowledge about the prevention and management of anemia.[14,15] Level of education and socioeconomic level alone may not have any significant effect to treat an anemia (3–5, 7, 8, 15–17). An education and program about anemia as a proper approach to combat iron deficiency (2, 5, 6, 9, 11–13).

6. Limitations of the Study

Limitations of our study in the form of the limited number of variables analyzed related to the factors that affect adolescent knowledge about anemia. Only a history of drug uses were not significantly associated with adolescent knowledge about anemia. This result requires further explanation based on the evidence based. We did not find the results of a study about evaluation of prevention and management program of anemia among adolescents in Indonesia on a wide scale. Analysis of the data in this study did not compare the level of knowledge about anemia by sex. It is unknown what the program can be done between adolescence male and female.

7. Conclusion

To prevent and treat anemia among adolescents should involve a wide range of related sectors, mainly the fields of nutrition, infectious and parasitic diseases, pregnancy care program as well as safe motherhood, family planning and reproductive health, child health, school, prevention and management of HIV/AIDS, food and processing safety, environmental health, the commercial sector particularly distributor employers of food and medicine, and specific sectors.

8. Conflict of Interest

We have no conflict of interest in this study.

9. Acknowledgement

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