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ABSTRACT Anemia is a burden for women of reproductive age (15 – 49 years old) which in Indonesia takes 22.3% of prevalence based on Basic Health Survey data in 2018. Women of reproductive health have different points of view according to their subjective well-being. This study aimed to examine the correlation between anemia status and hemoglobin level related to subjective well-being among women of reproductive age. This cross-sectional study used the Indonesia Family Life Survey (IFLS) wave 5 in 2014/15 with a total study sample were 12,818. Subjective well-being is self-reported data with categories satisfied, somewhat satisfied, and not satisfied.

Hemoglobin level is measured by blood test and if the Hb level is less than 12, it will be categorized as anemia. This study tested the analysis of univariate, bivariate (Chi-square and ANOVA), and multivariate (multinomial logistic regression) using STATA version 17. The findings revealed that anemia and hemoglobin levels did not have a correlation with subjective well-being.

However, some other covariates were found significantly associated with having satisfied subjective well-being including being married, pregnant, having poor SES, more than adequate of family life satisfaction, and adequate and more than adequate standard of life, with RRR 1.21, 1.21,0.63, 1.77, 1.19, and 1.74, respectively. It is concluded that subjective well-being is associated with not only health aspects but also social and economic. Intervention in the level of community is needed to improve the quality of life to achieve satisfied well-being. For example by joining the social group at the village level.

Future study can include other health-based predictors at individual level that potentially predict subjective well-being. Keywords: Anemia, Hemoglobin Level,

Indonesia Family Life Survey, Women of Reproductive Age, Subjective Well-Being

INTRODUCTION Anemia is a medical condition characterized by a deficiency of red blood cells or hemoglobin in the blood. It can have various impacts on an individual's well-being, including subjective well-being. Subjective well-being refers to an individual's self-perceived happiness, life satisfaction, and positive affect 1.

Research has shown that anemia can have a negative impact on subjective well-being. A study conducted on pregnant women found that the severity of anemia had a significant effect _on their quality of life, which encompasses physical, mental, and social well-being 2. Another study on elderly patients found that chronic anemia was highly associated with fatigue, which is a subjective sensation of weakness, lack of energy, and tiredness 3.

Furthermore, socioeconomic status (SES) has been found to be linked to subjective well-being. Lower SES is often associated with reduced access to material and social resources, as well as higher levels of stress-inducing conditions. These factors can negatively impact child well-being and overall subjective well-

being 4. _ Anemia is a medical condition _anemia and subjective well-being, there is some mediators including physical disability that

characterized by a decrease in the number of red blood cells or a decrease in the amount of hemoglobin in the blood.

It can have significant effects on an individual's health and well-being. One study conducted on pregnant women in Yogyakarta found that the severity of anemia had a significant effect on their quality of life, including their physical, mental, and social well-being 2. This suggests that anemia can have a negative impact on subjective well-being. Subjective well-being (SWB) refers to an individual's evaluation of their own well-being and life satisfaction 1.

It encompasses both hedonic well-being, which refers to how people feel emotionally in their everyday lives, and evaluative well-being, which refers to how people evaluate their overall current and future lives 5. Research on SWB has made extensive advancements in the past few decades, and it has become the most widely used index of well- being 6. In addition to anemia and SES, other factors such as health status can also influence subjective well-being. A study conducted in Russia found that characteristics such as poor health had a significant negative impact on subjective well-being 7.

Moreover, the impacts of flooding and flood preparedness were found to severely impact human subjective well-being 8. Overall, anemia can have a negative impact on subjective well-being, as evidenced by studies on pregnant women and elderly patients. Additionally, socioeconomic status, health status, and environmental factors such as flooding can also influence subjective well- being. Understanding these relationships can help healthcare professionals and policymakers develop interventions and strategies to improve subjective well-being in individuals affected by anemia and other related factors.

In the global context, anemia is still a burden for women of reproductive age. In low-middle-income countries, the prevalence of anemia is still high9-15. In the Indonesian context, anemia is a burden for women of reproductive age. In Indonesia, there are some studies that found the factors associated with anemia among women 16. Moreover, sociocultural determinants were found as the drivers of anemia based on a previous study in Indonesia 17. According to the Basic Health Survey in 2018, the prevalence of anemia was 22.3% 18. According to the correlation between _might influenced 19,20.

This study aimed to examine the correlation between anemia and hemoglobin status to subjective well-being among women of reproductive age in Indonesia using IFLS wave 5 data. METHOD This study was an analytical observation study with a cross-sectional design using Indonesia Family Life Survey (IFLS) wave 5 data (2014-2015), to analyze the

relationship between anemia and subjective well-being. The study population was all women in Indonesia who were selected as respondents to the IFLS 5 study, namely women aged 15-49 years. The study sample was an IFLS 5 study respondent, who met the inclusion and exclusion criteria.

Inclusion criteria: women of reproductive aged 15-49 years and completed the Hemoglobin test. Exclusion criteria: Women whose data were not completed. The IFLS 5 survey was held from the end of 2014 until the beginning of 2015 using the same respondents as IFLS 4, namely 16,204 households, 50,148 individuals, and 2,662 individuals who died since IFLS 4 21. The only extensive longitudinal survey that is currently available for Indonesia is IFLS.

IFLS provides a means to comprehend behavior dynamics at the individual, household, family, and community levels since data are available for the same persons at different times. From the IFLS 5 data, there were 18,825 female respondents who answered questionnaires. Then, from this data, it was re-selected based on inclusion and exclusion criteria. There were 12,818 study samples that were obtained according to inclusion and exclusion criteria. The dependent variable in this study is subjective well-being (satisfied/somewhat satisfied/not satisfied).

The main independent variable is anemia and hemoglobin level. Hb level in this study was measured by blood test. Those who are categorized as having anemia if Hb level is less than 12 mg/dL. There are some other independent variables including age, marital status, pregnancy, menstruation, breastfeeding, SES, family life satisfaction, standard of life, and food consumption. The analysis is divided into 3 parts, namely, univariate, bivariate, and multivariate analysis.

Univariate analysis can be presented

in the form of frequency distribution, which in this study describes the characteristics of anemia and subjective well-being among women of reproductive age. Bivariate analysis in this study was performed on two tests including Chi-Square for categorical independent variables and ANOVA for continuous independent variables. A 95% Confidence interval was used as cut off for significant levels. Multivariate analysis was done using multinomial logistic regression. Subjective well-being in this study was categorized into satisfied/somewhat/not satisfied, so in the multivariate analysis, the baseline or reference group is somewhat.

It is because the authors want to explore the factors associated with satisfied and not-satisfied well- being. All the tests have been done using STATA version 17. The procedures in the IFLS were previously tested and approved by Institutional Review Boards (IRBs) in the United States (RAND Corporation) since IFLS 1. All data processed in this study came from IFLS 5 data which was conducted by Survey Meter and RAND Corporation.

The original survey IFLS 5 has been approved by IRBs (Institutional Review Boards) in the United States (at RAND) and in Indonesia at the University of Gadjah Mada (UGM) 22. This current study using secondary data has been approved by the Universitas Muhammadiyah Pontianak Ethical Committee with number 013/KEPK-FIKES/UMPONTIANAK/2023. RESULTS Table 1 below describes the general characteristics of the samples. Hb level in this study has a minimum 4 g/dL, maximum 18.8 g/dL and mean 14.5 g/dL. About the age, minimum age is 15, maximum is 49, and mean 31 years old.

Among all respondents in this study, around half of them reported satisfied according to their subjective well-being (47%). About the anemia level, more than one-fourth of them were anemia (32%). More than three fourth of them were married (77%), not pregnant (95%), not in menstruation (86%), not in breastfeeding (86%), poor SES (67%), adequate family life satisfaction (59%), adequate standard of life (54%), and adequate food consumption (55%). _Table 1. General characteristics of respondents Variables (n = 12,818) _Frequency _Percentage (%) _ _Subjective _ _ _ _wellbeing _6,023 _46.99 _ _Satisfied _5,369 _41.89 _ _Somewhat _1,426 _11.12 _ _satisfied _ _ _ _Not satisfied _ _ _ _Anemia _ _ _ _No _8,754 _68.29 _ _Yes _4,064 _31.71 _ _Age _Mean (Min-Max) = 31 (15 – 49) _ _Hb level Mean (Min–Max) = 14.5 (4 – 18.8) _ _Marital status _ _ _ _Married _9,803 _76.48 _ _Not married _3,015 _23.52 _ _Pregnant status _ _ _ _No _12,188 _95.09 _ _Yes _630 _4.91 _ _Menstruation _ _ _ _status _10,976 _85.63 _ _No _1,842 _14.37 _ _Yes _ _ _ _Breastfeeding _ _ _ _status _11,014 _85.93 _ _No _1,804 _14.07 _ _Yes _ _ _ _Socioeconomic _ _ _ _status _4,205 _32.81 _ _Rich _8,613 _67.19 _ _Poor _ _ _ _Family life _ _ _ _satisfaction _2,033 _15.86 _ _Less adequate _7,597 _59.27 _ _Adequate _3,188

_24.87 _ _More than _ _ _ _adequate _ _ _ _Standard of life _ _ _ _Less adequate _2,228 _17.38 _ _Adequate _6,876 _53.64 _ _More than _3,714 _28.97 _ _adequate _ _ _ _Food _ _ _ _consumption _1,392 _10.86 _ _Less adequate _7,003 _54.63 _ _Adequate _4,423 _34.51 _ _More than _ _ _ _adequate _ _ _ _The results of bivariate using Chi- Square are reported in Table 2 below.

In this table, there are some variables that have a correlation with subjective well-being, including age, pregnancy, SES, family life satisfaction, standard of life, and food consumption. However, the variables of anemia, Hb level, marital status, menstruation, and breastfeeding.

Table 2. Bivariate result between each independent variable and subjective wellbeing Variables Subjective wellbeing Total p- value Satisfied Some- No what _1.21 times more likely to have satisfied well- being compared to non-pregnant women. Compared to rich ones, poor ones had a 37% probability of having satisfied well-being.

According to those who have more than adequate family life satisfaction, an adequate standard of life, and more than adequate standard of life, they were 1.77 times, 1.19 times, and 1.74 times more likely to have satisfied well-being compared to those who have less adequate.

Married Not married Pregnant* No _4,631 1,392 5,695 _1,267 4,102 5,132 _356 1,070 1,361 _3,015 9,803 12,188 _ 0.032 _According to those reported not satisfied subjective well-being, it was revealed that some variables have correlation including married, poor, adequate family life satisfaction, _ _Yes _328 _237 _65 _630 _ _more than adequate family life satisfaction, _ _Menstruation _ _ _ _ _ _adequate and more than the adequate standard _ _No Yes _5,160 863 _4,589 780 _1,227 199 _10,976 1,842 _0.854 _of life, adequate and more than adequate food consumption.

In detail, married ones have a _ _Breastfeeding _ _ _ _ _ _26% probability to report not satisfied well- _ _

Family life satisfaction*** _ 0.000 _being compared to those not married. Poor women are 1.29 times more likely to have not- satisfied well-being compared to rich ones. Those who have adequate and more than adequate family life satisfaction, adequate and more than adequate standard of life, and

Less _560 _795 _678 _2,033 _adequate and more than adequate food

Adequate _3,323 _3,642 _632 _7,597 _ _consumption have the probability to have not- _ _More _2,140 _932 _116 _3,188 _ _satisfied well-being 61%, 66%, 54%, 64%, _ _Standard of _life*** _ _ _ _0.000 _34%, and 25%, respectively. _ _

*p-value <0.05, **p-value <0.01, and ***p-value <0.001 Table 3 below describes the multivariate analysis using multinomial logistic regression. This variable included two: satisfied subjective well-being and not satisfied subjective well-being.

There are some variables found to have a correlation with those reported satisfied subjective well-being including those who are married, pregnant, poor, more than adequate family life satisfaction, more than adequate standard of life. However, the variables of anemia, Hb level, age, menstruation, breastfeeding, and food consumption did not have any correlation with satisfied subjective well-being. In detail, married women were 1.21 times more likely to be satisfied according to their well-being compared to single ones. Pregnant women were _Table 3.

The multivariate results of the correlation between anemia and other covariates with subjective wellbeing Variable _RRR _p-value (95% CI lower – upper) _ _Subjective well-being: satisfied _ _Anemia (ref: No) Yes _ 0.99 _ 0.972 (0.88 – 1.14) _ _Age _0.99 _0.085 (0.99 – 1.00) _ _Hb level _1.02 _0.369 (0.98 – 1.06) _ _Marital status (ref: No) Married _ 1.21** _ 0.001 (1.08 – 1.35) _ _Pregnant (ref: No) Yes _1.21* _0.042 (1.00 – 1.46) _ _Menstruation (ref: No) Yes _0.96 _0.501 (0.86 – 1.07) _ _Breastfeeding (ref: No) Yes _ 1.04 _ 0.502 (0.93 – 1.17) _ _SES (ref: Rich) Poor _0.63*** _0.000 (0.58 – 0.69) _ _Family life satisfaction (Ref: Less adequate) Adequate More than adequate _ 1.08 1.77*** _ 0.490 (0.93 – 1.24) 0.000 (1.50 – 2.09) _ _Standard of life (ref: Less adequate) Adequate More than adequate _ 1.19* 1.74*** _ 0.032 (1.03 – 1.36) 0.000 (1.48 – 2.04) _ _

*p-value <0.05, **p-value <0.01, and ***p-value <0.00 DISCUSSION According to the findings in this study, there is no correlation between anemia and subjective well-being. However, other covariates have a significant correlation to either satisfied well-being or not satisfied well- being.

Apart from anemia as the main predictor, there are other studies that found covariates have more tendency to be correlated with subjective well-being. The opposite result found there is a significant positive relationship between subjective well-being and marital satisfaction 23. Studies have shown that higher levels of subjective well-being are associated with higher levels of marital satisfaction among married women. This suggests that subjective well- being can have a positive impact on the quality of marital relationships.

Furthermore, subjective well-being is influenced by various factors, including economic status 24. A meta- analysis found that individuals in developing countries with higher economic status tend to have higher levels of subjective well-being. This suggests that economic factors play a role in shaping an individual's subjective well-being. _In summary, anemia can have a negative impact on subjective well-being, as evidenced by the study on pregnant women 2. Subjective well- being is a multidimensional construct that encompasses both hedonic and evaluative well- being 5. It is influenced by various factors, including economic status 24.

Additionally, subjective well-being is positively related to marital satisfaction among married women 23. Understanding the relationship between anemia and subjective well-being can help inform interventions and support for individuals with anemia to improve their overall well-being. The study in Indonesia found sociocultural variables had more influence on anemia 16. Several studies about subjective well- being have been done before.

The result of this study is supported by the study about food insecurity and subjective well-being in more- developed and less-developed countries 25. One study found that job uncertainty on fertility intentions was channeled by subjective well- being 26,27. In terms of the child, another study found that infertility was correlated with women's well-being 28. Parenthood on subjective well-being was also discussed in the study in Hungary 29. Another study about subjective well-being found that disaster is highly correlated with satisfied well-being 7,8.

Among the students, there is a role and interaction of social support, resilience, and subjective well-being 30. Even though anemia was not significantly associated with subjective well- being, other core variables were found associated with subjective

well-being. Health behavior was found to correlate with subjective well-being by a longitudinal study 31. Among the elderly, iron deficiency, fatigue, and muscle strength have correlated with daily life activity that also impacts satisfied well-being 32.

This study has limitations in that anemia and Hb level are not predictors of subjective well-being, but there are other strong variables that predict, there any some potential biases, and data management challenges. CONCLUSION Regarding to results of this study, there is no correlation between anemia and hemoglobin level with subjective well-being. However, there are some other covariates that have a correlation to satisfied and not-satisfied well-being including marital status, pregnancy, SES, family life satisfaction, the standard of

life, and food consumption.

It is concluded that subjective well-being is associated with not only health aspects but also social and economic. Intervention in the level of community is needed to improve the quality of life to achieve satisfied well-being. Joining the community and social group at the village level may increase subjective well-being. Government and stakeholders might establish community and social groups at the smallest level.
ACKNOWLEDGMENTS We appreciate RAND Corporation and the team who provided the data IFLS available online on the website https://www.rand.org/well-being/social-and-behavioral- policy/data/FLS/IFLS/download.html after registering and receiving approval.

CONFLICTS OF INTEREST All authors declared there is no conflict of interest in this study.