

CHAPTER 1

INTRODUCTION

1.1. Background

Birth weight act as an indicator of health status of newborns as it reflects upon the maternal's capability to provide nutrients for the fetus. Low birth has continued to be a concern in the world, especially in developing countries. United Nation Children's Fund, or UNICEF, (2019) has recorded that 14.6% global babies are born with low birth weight in 2015 and this has contributed into a larger problem including higher mortality rate, stunted growth, lower IQ and obesity. In Indonesia, the prevalence of low birth weight has increased from recent years from 5.7% to 6.2% (Ministry of Health of the Republic of Indonesia, 2018). Babies with low birth weight are more susceptible towards infections, breathing problems, immature lungs and many more that will result in increase of morbidity and mortality rate of the baby. In addition, low birth weight may also lead to stunting that may has poorer prognosis into the adulthood (Numalasari et al, 2019; Predengast & Humphrey, 2014). Two of the biggest contributor of low birth weight are gestational anemia and maternal with chronic energy deficiency (Rahmati et al, 2017; Wijayanti, 2018).

Anemia is a condition where the amount of haemoglobin (Hb) level lower than the normal threshold that can be caused by increasing amount of plasma (haemodilution) or decreasing amount of red blood cells. In pregnancy, Hb threshold for anemia are exceptional, where trimester I and III anemia is diagnosed as the Hb is lower than 11g/dL, while the threshold for trimester II is 10.5g/dL. Anemia is considered as a global public health problem, where the estimated that 42% of child aged below five and 40% of pregnant woman is experiencing anemia

worldwide. Indonesia has experienced a huge increase over the year 2013 to 2018, where anemia prevalence in pregnant women has increased from 37.1% to 48.9, swaying further than the national target 28% (Ministry of Health of the Republic of Indonesia, 2018)

Anemia is a physiological process of pregnancy caused by the increase of plasma 20-30% of blood plasma (hypervolemia) and increment in nutrients demand. Hypervolemia state is important during pregnancy to lighten the heart's burden as well as filling of vascular spaces. More nutrients are vital for the development of fetus, placenta and at the same time, supporting the maternal's blood volume (Khalafallah et al, 2012). Folate and iron deficiency are often found and will cause anemia (Friel, 2020). Condition of anemia contributes towards maternal hypoxia, hence less oxygen will be supplied to the placenta and fetus and may cause premature birth and low birth weight (Allen, 2001). Many studies have been conducted on gestational anemia and low birth weight, but the result had varied and often contradicted one another (Rahmati et al, 2017; Kumar et al, 2013).

Fetal growth is largely influenced by the availability of nutrient in maternal circulation before being transported to the fetal circulation through the placenta (Brett et al, 2014). Maternal with chronic energy deficiency (CED) has reduced capability of nutrients transfer, as CED refers to lack of energy intake that occurred over a long period of time (Ariyani et al, 2012). In Indonesia, CED in pregnant women is most commonly diagnosed with maternal's middle-upper arm circumference being lower than 23.5cm. The prevalence of CED in pregnant women has dropped from 23.79% to 16.99% from year 2013 to 2018 (Ministry of Health of the Republic of Indonesia, 2018). Though it has reached the national

target of 2015-2019, which is 21.2%, now the urgency remained high as the national target of 2020-2024 has been improved to 10% (Ministry of Health of the Republic of Indonesia, 2015; Ministry of Health of the Republic of Indonesia, 2020). CED holds negative consequences for both maternal and baby, including maternal anemia, haemorrhage, maternal fail to gain weight normally, low birth weight, anemia on baby, congenital malformation and many more. A study had found that women with CED are eight times more likely to have low birth weight (Wijayanti. 2018). Low birth weight may occur as a result of inadequate nutrient supplied to the fetus from the mother.

Over the years, study on the association between anemia and low birth weight has mostly focused on anemia in the first and third trimesters. A systematic review and meta-analysis conducted by Rahmati (2017) found that anemia in the first trimester plays a significant role in causing low birth weight, while not significant in second and third trimesters. However, a local study in Yogyakarta found that anemia in the first trimester did not play a role in the incidence of low birth weight babies, unless it continued to other trimesters. Even though, anemia in the second and third trimesters has a risk for giving birth to children with low birth weight, especially in the third trimester (Dewi et al, 2020). Therefore, further research needs to be done to address the inconsistency of the data. The purpose of this study was to determine the relationship between the size of the mother's middle-upper arm circumference, haemoglobin levels in the third trimester and the child's birth weight.

1.2.Problem Formulation

Are there any association between maternal middle-upper arm circumference, haemoglobin level in trimester III and neonatal birth weight?

1.3. Research Objectives

Based on the above problem formulation, the purpose of this research is to:

1.3.1. General Objective

To investigate the association between middle-upper arm circumference, haemoglobin level and neonates birth weight.

1.3.2. Specific Objective

1.3.2.1. To measure maternal middle-upper arm circumference, haemoglobin level, and neonates birth weight.

1.3.2.2. To analyse the association between haemoglobin level in trimester III, maternal middle-upper arm circumference and neonatal birth weight.

1.4. Research Benefits

1.4.1. Theoretical Benefit

1.4.1.1. To update the knowledge regarding the association between the association between maternal middle-upper arm circumference, haemoglobin level in trimester III and neonates birth weight.

1.4.1.2. To update the knowledge the importance of maternal energy and haemoglobin level in trimester III towards neonatal birth weight

1.4.2. Practical Benefit

Public Health Centre will continue to survey maternal middle-upper arm circumference and haemoglobin level especially in the third trimester.