"KRUE SEUMANGAT; KEHAMILAN SEHAT TANPA ANEMIA" BOOKLET EFFECT TO ANEMIA AMONG PREGNANT WOMEN AT KOTA LANGSA INDONESIA: A QUASI EXPERIMENTAL STUDY

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จุฬาลงกรณ์มหาวิทยาลัย
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ผลของการใช้หนังสือ "ห่างไกลโรคโลหิตจาง" ในกลุ่มสตรีตั้งครรภ์ ในเขตเทศบาลเมือง โกตาลางซา
สาธารณรัฐอินโดนีเซีย: การวิจัยกึ่งทดลอง

นางพูทรี นาริซา

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต
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                                       KOTA LANGSA INDONESIA: A QUASI EXPERIMENTAL STUDY

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พูทธิ นาริซา : ผลของการใช้หนังสือ "ห่างไกลโรคโลหิตจาง" ในกลุ่มสตรีตั้งครรภ์ ในเขตเทศบาลเมือง โกตาลางซา สาธารณรัฐอินโดนีเซีย: การวิจัยกึ่งทดลอง . (*"KRUE SEUMANGAT; KEHAMILAN SEHAT TANPA ANEMIA"* BOOKLET EFFECT TO ANEMIA AMONG PREGNANT WOMEN AT KOTA LANGSA INDONESIA: A QUASI EXPERIMENTAL STUDY) อ.ที่ปรึกษาหลัก : นพ.สำลี เปลี่ยนบางช้าง

วัตถุประสงค์ : เพื่อประเมินผลของโปรแกรมการแทรกแซงทางการศึกษาของสื่อทางการศึกษาที่พัฒนาขึ้น

(หนังสือเล่มเล็กเรื่องโลหิตจางและบันทึกเตือนการเสริมอาหาร) เพื่อยกระดับการบริโภคธาตุเหล็ก-โฟเลทของหญิงตั้งครรภ์ที่มีภาวะโลหิตจางในจังหวัดอาเจะฮ์

ผู้ป่วยและวิธีการ: เป็นการศึกษากึ่งทดลองแบบเปรียบเทียบก่อน – หลังการทดลอง ณ เขตเทศบาล 2 แห่งซึ่งเลือกอย่างเจาะจงที่มีจำนวนหญิงตั้งครรภ์ที่มีภาวะโลหิตจางมากกว่าร้อยละ 40 กลุ่มทดลอง (จำนวน 70 คน) ได้รับการเยี่ยมบ้านสองครั้งเพื่อให้คำปรึกษาเป็นรายบุคคลและได้รับหนังสือเตือนความจำ กลุ่มควบคุม (จำนวน 70 คน) ได้รับการติดตามการฝากครรภ์ตามปกติ วัดคะแนนความรู้เกี่ยวกับภาวะโลหิตจาง และภาวะโลหิตจางทางโภชนาการ ปริมาณเฉลี่ยการบริโภคธาตุเหล็กเฉลี่ยต่อวันตามบันทึกการกินอาหารใน 24 ชั่วโมง จำนวน 3 วัน คะแนนแบบสอบถามความถี่ของอาหารประเภทเนื้อสัตว์และพืชที่อุดมด้วยธาตุเหล็ก จำนวนการบริโภคธาตุเหล็ก-โฟเลท ความเข้มข้นของฮีโมโกลบินและฮีมาโตคริต น้ำหนักแรกเกิดทากรของทั้งสองกลุ่ม ใช้การทดสอบไคว์สแควร์ การทดสอบค่าที การทดสอบวิลคอกสัน และการทดสอบแมนวิทนีย์ยู เพื่อเปรียบเทียบความแตกต่างทั้งภายในและระหว่างกลุ่มในระหว่างช่วงเวลาการวัด

ผลลัพธ์: ภายหลังโปรแกรมการแทรกแซง คะแนนความรู้ ค่าเฉลี่ยการบริโภคธาตุเหล็กต่อวัน (มล.ก./วัน) คะแนนแบบสอบถามความถี่ของอาหาร จำนวนการบริโภคธาตุเหล็ก-โฟเลท ความเข้มข้นของฮีโมโกลบินและฮีมาโตคริตในกลุ่มทดลองดีขึ้นอย่างมีนัยสำคัญเมื่อเปรียบเทียบกับกลุ่มควบคุม ($P < 0.005$) ภาวะโลหิตจางในหญิงตั้งครรภ์ทั้งหมดในกลุ่มทดลองได้รับการฟื้นฟูในช่วงไตรมาสที่สามของการตั้งครรภ์ แตกต่างจากกลุ่มควบคุมที่ร้อยละ 92.8 ยังมีภาวะโลหิตจางระหว่างตั้งครรภ์และทารก 3 คนมีน้ำหนักแรกเกิดต่ำ

สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อนิสิต	....
ปีการศึกษา	2561	ลายมือชื่อ อ.ที่ปรึกษาหลัก	....

5779164453 : MAJOR PUBLIC HEALTH

Putri Nahrisah : *"KRUE SEUMANGAT; KEHAMILAN SEHAT TANPA ANEMIA"* BOOKLET EFFECT TO ANEMIA AMONG PREGNANT WOMEN AT KOTA LANGSA INDONESIA: A QUASI EXPERIMENTAL STUDY. Advisor: Distinguish Scholar Samlee Plianbangchang, M.D., Dr P.H.

Purpose : To assess the effect of education interventional program by previously developing ane education material (booklet of anemia and supplement reminder) upgrade dietary and iron-folic acid te intake of anemic pregnant women in province Aceh.

Patients and methods: It was quasi experimental study using a pre- and posttest design, purposively applied at two municipalities having more than 40% anemic pregnancy. The intervention group (n=70) received two home visits for individual counseling session and was given the paper-based reminder, the control group (n=70) followed the usual antenatal care. The knowledge regard anemia and nutritional anemia score, average daily iron intake according to three days of 24-hours food recall, food frequency questionnaire score of animal and plant iron-rich food, number of iron-folic acid intake, hemoglobin and hematocrit concentration, baby's birth weight of both groups were measured. A Chi-square, Student's t-test, Wilcoxon ranked test, Man Whitney U test, Ancova test were used to compare the differences of within and between groups across the time measurements.

Results: After the intervention program, there was significant improvement of knowledge score, average daily iron intake (mg/day), food frequency questionnaire score, number of iron-folate intake, hemoglobin and hematocrit concentration in intervention group compared with control group (P<0.005). All anemic pregnancies in intervention group recovered during their third trimester of gestation, differently in the control group where 92.8% anemic pregnancies remained and three babies were delivered with low birth weight.

Field of Study:	Public Health	Student's Signature	
Academic Year:	2018	Advisor's Signature	

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Putri Nahrisah

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CHULALONGKORN UNIVERSITY

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CHAPTER 1

INTRODUCTION

1.1.Background and Rationale

Anemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs (World Health Organization, 2016a). Anemia is caused not only by nutritional, but also non nutritional factors. Nutritional causes include deficiencies of iron, folic acid, vitamin B12, vitamin B2, copper and vitamin A, whereas non-nutritional causes include chronic infectious diseases due to intestinal parasites, malaria, Human Immunodeficiency Virus (HIV) and also hemoglobinopathies, such as sickle cell disease and thalassemia (Gross, Romaña, & Tomaro, 2000; World Health Organization, 2016b).

Iron deficiency anemia (IDA) is thought to be the most common cause of anemia globally (World Health Organization, 2016a). It typically results when the intake of dietary iron is inadequate for hemoglobin synthesis (Naigamwalla, Webb, & Giger, 2012). Anemia mentioned in this study is about nutritional IDA during pregnancy. Anemic pregnancy refers to hemoglobin concentration is below 11 g/dl (Ministry of Health Indonesia, 2006; World Health Organization, 2011) or a hematocrit level is below 33% (World Health Organization, 2011).

Anemia is found in 30% of the world's population. It is a widespread public health problem with major consequences for human health as well as social and economic development of the country. It is the most common micronutrient deficiency in more than 40% of women of reproductive age in the developing world particularly pregnant women and

contributes to 20% of all maternal deaths (World Health Organization, 2016b). Anemia in pregnancy related to physiological changes that occur during pregnancy, fetal age, and condition of women before pregnant. When pregnant, the amount of blood in the body increased by about 20-30% and require an increasing in the supply of iron and vitamin needs to make hemoglobin (K. K. Sahu et al., 2013).

Pregnancy with anemia correlated with negative pregnancy outcomes including premature labor, intrauterine growth retardation, low birth weight, birth asphyxia, and neonatal anemia (Rahman et al., 2016). Affected women experiencing breathing difficulties, fainting, tiredness, palpitations, and sleep difficulties (Abbaspour, Hurrell, & Kelishadi, 2014; Shill et al., 2014). Increased risk of developing perinatal infection, pre-eclampsia, postpartum hemorrhage, postnatal depression, and maternal perinatal deaths (Brabin, Brabin, & Gies, 2013; Rahman et al., 2016).

Women who are older than 30 years, had more than three children, with body mass index less than 20, shorter birth spacing less than 2 years, lack of antenatal care visits, low intake of foods of animal source, vegetables and fruits and having intestinal parasites were positively associated with anemia (Rezk, Marawan, Dawood, Masood, & Abo-Elnasr, 2015). Moreover, women's age, literacy, social economic, ethnic background, religion and culture do have a significant influence on the outcome of pregnancy (Akella & Jordan, 2014; Dako-Gyeke, Aikins, Aryeetey, Mccough, & Adongo, 2013).

Global prevalence of anemic pregnancy has decreased only slightly from 41.6% in 2000 to 40.1% in 2016, it has affected pregnant women aged 15–49 years as many 46.2% in Africa Region, 25.5% in Region of Americas, 48.1% in South-East Asian Region, 26.5% European Region, 40.9% in Eastern Mediterranean Region and 33.3% Western Pacific Region (World Health Organization, 2017). Further actions are required to reach the World Health Assembly target of a 50% reduction of anemia in women of reproductive age by 2025 (World Health Organization, 2014)

The household health survey Indonesia in 1992, noted that 63.5% of pregnant women suffer from anemia. Decreasing to 50.5% in 1995, to 40.1% in 2001, 24.7% in 2007 and 24.5% in 2010 (Ministry of Health Indonesia, 2010b). It was increased to 37.1% in 2013, almost the same prevalence among pregnant women in urban areas (36.4%) and in rural area (37.8%) (Ministry of Health Indonesia, 2013b), indeed nowadays the prevalence is 42%, (World Health Organization, 2017); severe public health problem according to World Health Organization (World Health Organization, 2011).

The maternal mortality rate (MMR) in Indonesia related to pregnancy, childbirth, and postpartum is 359 per 100,000 live births. The lead causes of maternal mortality are postpartum hemorrhage (30.3%), hypertension (27.1%) and infection (7.3%) which the risk is become higher with the state of anemia (Ministry of Health Indonesia, 2015; World Health Organization, 2011).

The government's contribution to improve both iron intakes and reducing iron losses are include fortification, supplementation, dietary diversification and public health measures (Development Initiatives, 2018; WHO, 2001). In Indonesia, it is government recommendation for pregnant women to access antenatal care (ANC) to receive nutrition education and iron-folate

supplement for at least 90 days (Ministry of Health Indonesia, 2018). One tablet contains 200 mg of ferrous sulfate and 0.25 mg folic acid (equivalent to 60 mg of iron and 0.25 mg of folic acid). The iron supplement is free of charge which can be obtained during ANC services at any government health services (Ministry of Health Indonesia, 2010a).

The high prevalence of anemic pregnancy in Indonesia is related with lack of nutrition intake and less consuming of iron-folate supplement than the recommendation (Ministry of Health Indonesia & Millenium Challenge Account Indonesia, 2015). Pregnant women in Indonesia were low intake of recommendation for energy, protein, calcium and iron as well (Hartriyanti, Suyoto, Muhammad, & Palupi, 2012). Among women of childbearing age, it was 26% pre-pregnant women insufficiency of protein and up to 70% for iron, as 49% pregnant women insufficiency of for energy and up to 85% for iron (Madanijah et al., 2016). This condition is often associated with mistakes found in nutritional habits and deficiencies in nutritional knowledge, especially among middle and lower socio-economic group (Berti, Faber, & Smuts, 2014; Kavle & Landry, 2018). A lack of compliance to the 90 days iron-folate intake was pointed out by ministry of health survey; as many 33.3% consumed at least 90 days, 34.4% consumed less than 90 days, and 21.4% forget to take iron (Ministry of Health Indonesia, 2013a).

Total Diet Survey in 2014 showed that more than 50% of pregnant women were having energy intake less than 70% of energy adequacy score (*Angka Kecukupan Energy*), 49.6% of pregnant women in urban areas and 55.6% in rural areas were having protein intake less than 80% of protein adequacy score (*Angka Kecukupan Protein*) (Ministry of Health Indonesia, 2015). The fact that hemoglobin is protein in nature led to early belief that an adequate amount of dietary protein is essential to its formation (Orten & Orten, 1943).

Province Aceh consists of 23 districts and municipalities; the population is 4.906.800 people, consisting of 2.449.400 of male and 2.457.400 of female. The agricultural sector is still a sector that provides the greatest share of employment in which 44.09%, followed by services sector (21.19%) and trade (17.30%), and others (17.41%). Percentage of literate people aged 15 years and above is 98.25%. Percentage of population 10 years and above by educational attainment for not complete elementary school either never go to school is 18.52%, completed elementary school is 26.50%, completed junior high school is 20.43%, completed senior high school is 26.15% and completed higher education is 8.4%. Poverty percentage is 16.98% compared to 11.22% at national level (Central Bureau of Statistic of Province Aceh, 2015).

The anemic pregnancy prevalence in province Aceh is 45.9%, the number of pregnant women who did at least 4 times antenatal care and received 90 iron-folate tablets is 95% (Health Office of Province Aceh, 2017). Unfortunately, there is no recording data available regarding the amount of iron-folate intake by pregnant women.

To prioritize the group of study, researcher consider the percentage of women under the age of first marriage in province Aceh; aged of ≤ 15 years old as many 7.33%, aged of 16-18 years old as many 29.78%, aged of 19-24 years old as many 48.42%, and aged of ≥ 25 years old as many 14.47% (Central Bureau of Statistic of Province Aceh, 2015). From these figures, it can be indicated that mostly pregnancies are experienced by mother at age ≥20 years old is the rational population of study.

Previous studies, particularly in low-income and middle-income countries, have shown that individual education and counseling during first antenatal care visit help mothers to improve their food consumption and the use of dietary supplement (Girard & Olude, 2012). Health education is a very crucial factor in preventing illness, provision of information regarding the women's health and risk factors will help them in taking care of themselves and their family (Garg & Kashyap, 2006). The Maternal Child Health (MCH) handbook is a tool for monitoring the maternal and child health, it contains health information that can be studied independently by mother or used by health workers and health volunteers as media to educate the mother (Ministry of Health Indonesia, 2015).

However, mothers with MCH handbook were not associated with greater knowledge, but have a great tendency to see the benefit of antenatal care and the purpose of immunization (Osaki, Hattori, Kosen, & Singgih, 2009). Other study suggested that the utilization of the MCH Handbook by health professionals need to be modified, particularly in combining information/messages to make it more attractive, easily understood as a way to convey the message. Providers also need to consider the educational level of the target group (Kusumayati & Nakamura, 2007). To improve understanding of information in the MCH handbook, Ministry of health Indonesia has advised to use and develop other educational media if needed (Ministry of Health Indonesia & Millenium Challenge Account Indonesia, 2015).

According to preliminary survey (researcher assessed the list goods and material during 2016 that provice or cental government distributed to maternal and child health section at one of municipality office involved in present study), there was no specific education material about anemia and nutrition other than maternal and child health (MCH) handbook that can be used by

midwife /health worker to educate pregnant women in province Aceh. Hence, this study is willing to develop an anemia educational material in the form of booklet with participatory development by pregnant women. The participatory approach used in the development of educational materials enables identifying the needs of pregnant women which indicate the inclusion of contents in the booklet that correspond to their own demands (Reberte, Hoga, & Gomes, 2012). The booklet title is *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* (Keeping spirit; Healthy Pregnancy without Anemia).

Including in the booklet development also a supplement reminder as the government's survey stated that forgetfulness is one of the causes of non-compliance (Ministry of Health Indonesia, 2013b). Study about home-based reminder observed that people of middle aged (31-60 years) were preferred to visual reminder of paper based, mobile phone and desktop screen (M. R. McGee-Lennon, M. K. Wolters, & S. Brewster, 2011). The low-tech (paper based) used in present study was due to the information and communication technology not yet fully support in province Aceh; percentage of household owning and literate to cellular phone was 86.78% , however sharing communication devices among the household member was indicated as individual owning cellular phone was 65.29%, household owning and literate of computer was 18.5 % and internet was accessed only by 46.76% female (Central Bureau Statistic Indonesia, 2018)

This study aims to assess the effect of education interventional program with previously developing the education material (booklet of anemia and paper-based supplement reminder to place at home environment) to the anemia status of anemic pregnant women in province Aceh.

1.2. Research Question

Does education using *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet and implementation of supplement reminder affect to knowledge and attitude regarding anemia, iron-rich eating practice, and number of iron-folate supplement intake subsequently to affect the hemoglobin and hematocrit concentration along with pregnancy outcomes among anemic pregnant women in province Aceh Indonesia.

1.3. Research Objectives

1.3.1 General Objective

To assess the effect of education using *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet and implementation of supplement reminder on knowledge and attitude regarding anemia, iron-rich eating practice, number of iron supplement intake to hemoglobin concentration and hematocrit concentration along with pregnancy outcomes among anemic pregnant women in province Aceh Indonesia.

1.3.2 Specific Objectives

a. To assess knowledge and attitude regarding anemia, iron-rich eating practice of pregnant women in experimental and control group before and after intervention

b. To assess number of iron supplement intake in experimental and control group before and after intervention

c. To assess hemoglobin and hematocrit concentration in experimental and control group before and after intervention

d. To assess pregnancy outcomes (premature birth, low birth weigh and intrauterine death) in experimental and control group after intervention

1.4 Hypotheses

1.4.1 Research Hypothesis

Education using *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet and implementation of supplement reminder affect to knowledge and attitude regarding anemia, iron-rich eating practice, number of iron supplement intake concomitantly with hemoglobin and hematocrit concentration and pregnancy outcomes among anemic pregnant women in Province Aceh Indonesia.

1.4.2. Statistical Hypotheses

H0: There is no difference of pregnant women's knowledge regarding anemia within and between experimental and control group before and after intervention

H1: There is difference of pregnant women's knowledge regarding anemia within and between experimental and control group before and after intervention

H0: There is no difference of pregnant women's attitude regarding anemia within and between experimental and control group before and after intervention

H1: There is difference of pregnant women's attitude regarding anemia within and between experimental and control group before and after intervention

H0: There is no difference of pregnant women's iron-rich eating practice within and between experimental and control group before and after intervention

H1: There is difference of pregnant women's iron-rich eating practice within and between experimental and control group before and after intervention

H0: There is no difference in number of iron supplement intake between experimental and control group before and after intervention

H1: There is difference in number of iron supplement intake between experimental and control group before and after intervention

H0: There is no difference of pregnant women's hemoglobin and hematocrit concentration within and between experimental and control group before and after intervention

H1: There is difference of pregnant women's hemoglobin and hematocrit concentration within and between experimental and control group before and after intervention

H0: There is no difference of pregnant women's pregnancy outcomes (number of premature birth, low birth weigh and intrauterine death case) between experimental and control group after intervention

H1: There is difference of pregnant women's pregnancy outcomes (number of premature birth, low birth weigh and intrauterine death case) between experimental and control group after intervention

1.5 Conceptual Framework
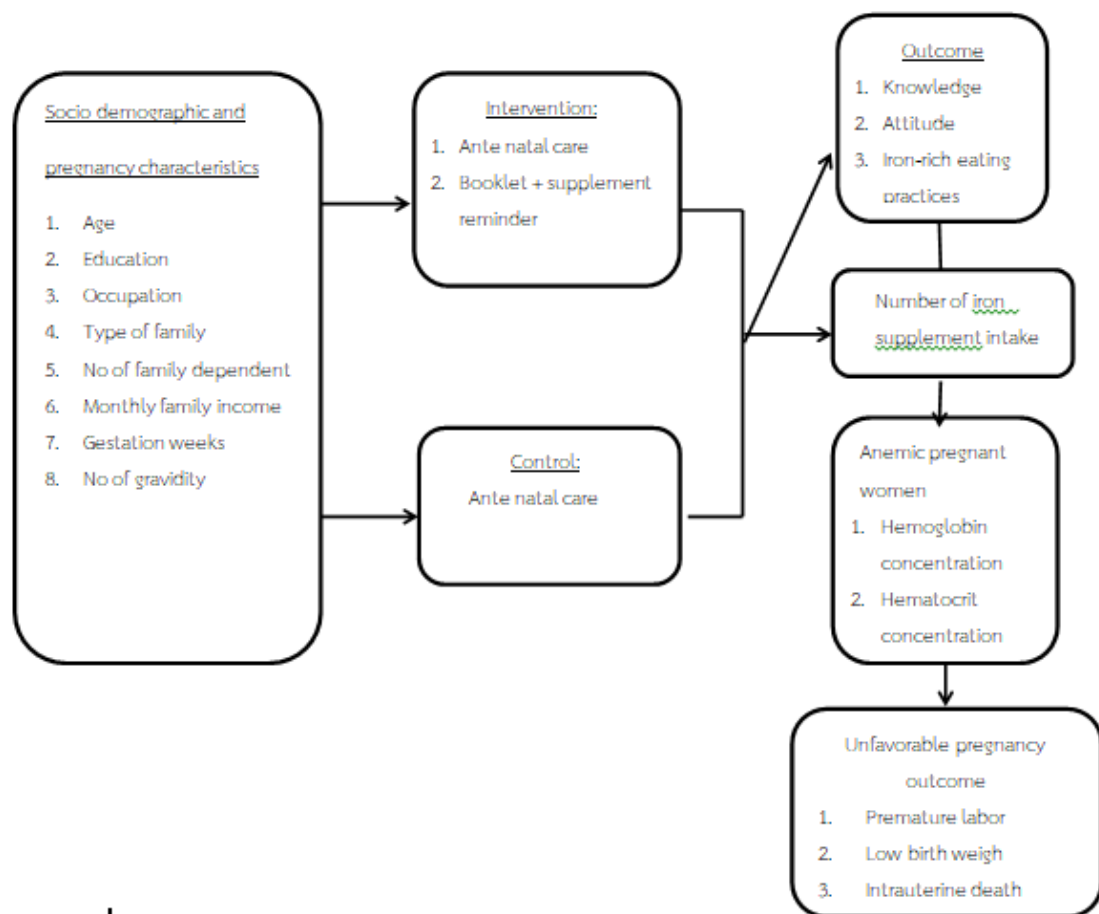
Figure 1. Conceptual Framework

1.6 Expected Outcome

a. The *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet and implementation of supplement reminder are expected to improve the knowledge, attitude, iron-rich eating practice and enhance number of iron-folate supplement intake of anemic pregnant women

b. The "*Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet and implementation of supplement reminder are expected to be a reference alternative to other districts/municipalities in Indonesia particularly in province Aceh to develop the same book and reminder system according to their regional characteristics.

1.7 Operational Definitions

a.   Anemic pregnant women refers to pregnant women with hemoglobin concentration is <11 g/dl or hematocrit concentration is < 33% (World Health Organization, 2011).

b.   Age refers to a period of human life measured by years from birth. The participants in this study are anemic pregnant women aged ≥ 20 years old.

c.   Education refers to the latest of formal education completed by anemic pregnant women.

d.   Occupation refers to activities of the anemic pregnant women to generate income

e.   Type of family: (1). nuclear family consists of a mother, father, and their biological or adoptive descendants. (2). Joint family consists of more than parents and children; it may be a family that includes parents, children, cousins, aunts, uncles, grandparents, foster children (Sharma, 2013).

f.   Number of family dependents: (1) small family is ≤ 4 person , (2) medium family is 5-6 person, (3) extended is ≥ 7 person (Purwanto & Taftazani, 2018)

g.   Monthly family income refers to the amount of accumulated earnings husband and wife in Rupiah (Indonesia currency). It was categorized to under and above poverty line. Above poverty line when monthly family income is equal and more than the result when number of family dependents multiple by average expenditure per capita per month in Aceh which was 808.094 Indonesia rupiah and vice versa for under poverty line (Central Bureau of Statistik Province Aceh, 2017).

h.   Gestation age measured in weeks, from the first day of the woman's last menstrual cycle (Manuaba, 2009) to the time of enrollment in study.

i. Number of gravidity refers to number of pregnancies that have been experienced by the mother regardless of the outcome of pregnancy. Primigravida is a woman who has been pregnant once. Multigravida is a woman who has been pregnant several times (two to three times). Grande multigravida is women been pregnant four times or more (Manuaba, 2009).

j. Antenatal care refers to pregnancy check-up by health personnel, provision of iron-folic acid supplements, tetanus toxoid vaccination, health education and counseling.

k. The *"Krue Seumangat; Kehamilan Sehat Tanpa Anemia"* booklet refers to pictorial and colorful book sized 12cm x 17 cm. *"Krue seumangat"* is Acehnese words means keeping/calling spirit, it is well known to say when opening speech either as opening words at writings/articles in Acehnese language and/or written by Acehnese people. *"Kehamilan Sehat Tanpa Anemia"* is Indonesia language for healthy pregnancy without anemia.

l. Supplement reminder is refers to one page of legal size paper with content of message of reminding and spaces checklist for monitoring the number of iron-folate supplement have been taken.

m. Knowledge regarding anemia refers to the correct responses of anemic pregnant women to the items in the questionnaire about anemia which is measured and expressed in terms of knowledge scores and categorized as poor and good knowledge.

n. Attitude regarding anemia refers to anemic pregnant women's opinion of agreement and disagreement to the statement concerning anemia, which is measured and expressed in terms of attitude scores and categorized as favorable and unfavorable attitude.

o.   Iron rich- eating practice refers to anemic pregnant women's average daily iron food intake which is measured by 24-hours food recall questionnaire result in mg/day and frequency of iron-rich food intake which is measured by food frequency questionnaire result in score.

p.   Number of iron-folate supplement intake refers to total amount of supplement that was taken by anemic pregnant women at the end line of measurement (Subarda, Muhammad Hakimi, & Siti Helmyati, 2011).

q.   Hemoglobin concentration is below 11 g/dL for pregnant women is generally considered as anemic (World Health Organization, 2011).

r.   Hematocrit concentration is below 33% for pregnant women is generally considered as anemic (World Health Organization, 2011).

s.   Premature labor refers of having delivery the baby before 37 weeks during the term of pregnancy (American College Obstetricians and Ginecologist, 2016).

t.   Low birth weight refers to a birth weight of a live born infant of less than 2.500 g (World Health Organization, 2004).

u.   Intrauterine death defined by the World Health Organization as death prior to birth (ie, expulsion or extraction of the baby from the mother) at any gestational age (Evelyn P, 2006).

CHAPTER 2

LITERATURE REVIEW

2.1. Definition of Anemia in Pregnancy

Based on the origin of the word, anemia in ancient Greek means lack of blood, no blood (Johnson-Wimbley & Graham, 2011). Blood has two major components; (1) plasma is a clear yellow liquid contains protein, nutrient, hormones, electrolytes, and other substances. It constitutes about 55% of blood, (2) white and red blood cells and platelets make up the balance of blood. The white cells are the infection fighter for the body. Platelets are necessary for blood clotting. The important factor in anemia however is red blood cells (RBCs). Anemia is a deficiency of functioning red blood cells that leads to a decrease of oxygen carrying ability, it is more common in pregnancy because a pregnant women needs to have enough RBCs to carry oxygen around her body as well as to her baby (Chowdhury, Rahman, & Moniruddin, 2014) .
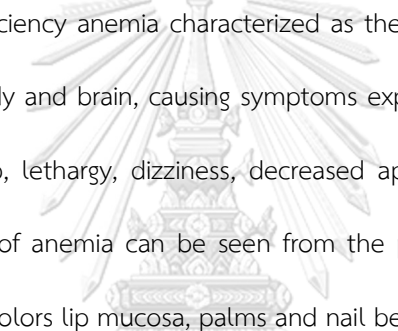
Increasing blood volume in pregnancy is commonly called hydremic or hypervolemia, the increasing of red blood cells less than the increasing blood plasma can cause blood dilution. Dilution leads to lower hemoglobin and hematocrit level, these changes by themselves can be considered a normal alteration of pregnancy as volume of circulating blood increased (K. Sahu et al., 2013). Anemic pregnancy is expressed with hemoglobin level of below 11 g/dl or a hematocrit level of below 33% (WHO, 2001).

Dilution ease the burden of the heart has to work harder in pregnancy, because of as result of hydremic, the cardiac output increased. The heart work easier with low blood viscosity reduced peripheral resistance as well so that the blood pressure does not rise (Manuaba, 2010). The dilution of blood in pregnancy is a natural process and starts at approximately at the eighth week of pregnancy and progresses until the 32nd to 34th week of pregnancy (Breymann et al., 2011) .

The body iron requirement for an average pregnancy is approximately 1.000 mg. It is calculated that 350 mg of iron is lost to the *fetus* and the *placenta*, 250 mg is lost in *blood at delivery*. In addition, about 450 mg of iron is required for the large increase in maternal *red blood cell mass*. Lastly, *basal losses* of iron from the body continue during pregnancy and amount to about 240 mg. Thus, the total iron requirements of a pregnancy (excluding blood loss at delivery) average about 1,040 mg. Permanent iron losses during pregnancy include loss to the fetus and placenta, blood loss at delivery, and basal losses, which together total 840 mg (Hallberg, 1988).

Nutritional anemia is a state of hemoglobin concentration in the blood lower than normal due to deficiency of one or more substances nutrients necessary for the formation of blood (iron, folic acid, vitamin B12, protein) (World Health Organization, 2016a). Pregnant women are one of the groups vulnerable to malnutrition, due to the increased nutritional requirements to meet the needs of mothers and fetus, the physiologically changes caused various dynamics in food intake, including iron intake, absorption and utilization (Waryana, 2010). Most of the cause of anemia in Indonesia is a shortage of iron from foods eaten each day that is required for the formation of hemoglobin (Waryana, 2010).

Indeed, the etiology of iron deficiency anemia in pregnancy are; (i). Hypervolaemia leads to blood dilution, (ii). The increasing of blood volume is not proportional to the increasing of blood plasma, (iii). Lack of iron and protein intake of food, several food sources that comprise a source of protein, glucose, fat, vitamin B12, B6, folic acid, vitamin C and the basic elements consisting of ferrum, copper and zinc ion, (iv). The need for iron increases, (v). Indigestion and absorption due to chronic diseases such as tuberculosis, Human Immunodeficiency Virus (HIV), intestinal worms, malaria and others (Haidar, 2010; Manuaba, 2010).

Symptoms of deficiency anemia characterized as the effect of lacking of oxygen that is transferred to the cell body and brain, causing symptoms experienced by pregnant women that are tiredness, looked limp, lethargy, dizziness, decreased appetite, headache, dizzy eyes, lost concentration, symptoms of anemia can be seen from the physical examination of pale color conjunctiva mother, pale colors lip mucosa, palms and nail beds (Baby et al., 2014).

Iron deficiency during pregnancy is associated with a variety of adverse outcomes for both mother and infant, including increased risk of sepsis, maternal mortality, perinatal mortality, and low birth weight. Iron deficiency and anemia also reduce learning ability and are associated with increased rates of morbidity. The babies of anemic mother during their first trimester in utero experience higher rates of cardiovascular disease in their adult lives compares to those mothers who did not have anemia during pregnancy. The increases the tendency of infants to develop iron deficiency anemia causes adverse consequences in the infant condition and development (Allen, 2000; Baby et al., 2014).

2.2. Diagnosis of Anemia

For reasons of cost and quick results, examination of the iron component in red blood cells by hemoglobin and hematocrit concentration are often used to screened anemia in community. This examination is a reflection of the number of functional iron in body (Yip, 2000). Hemoglobin and hematocrit levels change only happens on the stage of iron deficiency (Bothwell, 2000; Suominen, Punnonen, Rajamäki, & Irjala, 1998). One common practice in assessing whether anemia due to iron deficiency is monitoring the response in hemoglobin or hematocrit levels after 1 or 2 months of oral supplementation with iron (Riswanto, 2013).

2.2.1. Hemoglobin concentration

Hemoglobin is the part of the erythrocytes (red blood cells) that formed in the bone marrow. Hemoglobin serves as a means of transportation to carry oxygen from the lungs to the heart and back again to the lungs through the venous blood vessels to bring carbon monoxide. Within the tissue, oxygen used for the combustion process nutrients into energy, thus when hemoglobin formation is inhibited, there will be consequences that can harm the body. Hemoglobin can be measured chemically and total hemoglobin / 100 ml of blood is used as an index of oxygen-carrying capacity of the blood. Low hemoglobin level describes the advanced of iron deficiency (Murray RK, Granner DK, Mayes PA, & Rodwell VW, 2003). According to the WHO classification Hb levels for pregnant women set into three categories: Normal (> 11 g /dl), mild anemia (8-11 g /dl) and severe anemia (<8 g /dl). (Almatsier S, 2001).

Hemoglobin level is measured two times during pregnancy; at the first trimester of pregnancy (before 12 weeks gestation) and the third trimester (gestational age 28 to 36 weeks). The benefits of examination hemoglobin in pregnant women are to prevent anemia in pregnancy, prevent the occurrence of low birth weight (LBW) and to fulfill the iron requirement (Waryana,

2010). During antenatal care, pregnant women in Indonesia will receive hemoglobin test by midwife village using the **Sahli's** haemoglobinometer method. The materials are; Hemometer, Single mark pipette, Distilled water, Needle, Spirit, Cotton, HCl. The procedure is: (1). Take 1/10 HCl in the Hb tube upto the lowest mark '2'. (2). Prick the finger with needle and collect 20μl of blood sample with single mark pipette. (3). Place the Hb tube on working table for five minutes for the formation of hemin crystals. (4). Place the Hb tube in the compater/hemometer and add drop by drop of distilled water into it until the colour of the solution in the Hb tube coincides with the glass plates of the compater. (5). If the colour coincides with the glass plates of the compater, observe the reading in the Hb tube (Department of Biotechnology, 2016).

2.2.2. Hematocrit

Hematocrit is the percentage of blood composed of red blood cells. The word comes from the Greek hematocrit, ie hema (meaning blood) and krite (which means assessing or measuring). Hematocrit has units using percent, for example 42% (meaning that there are 42 ml of red blood cells in 100 ml of blood). It is considered an integral part of a person's complete blood count results, along with hemoglobin concentration, white blood cell count, and platelet count. The purpose of red blood cells is to transfer oxygen from the lungs to body tissues, a blood sample's hematocrit can become a point of reference of its capability of delivering oxygen, and roughly used to guide the measurement accuracy hemoglobin, hematocrit value is equal to three times the levels hemoglobin. The principle is the hematocrit examination of erythrocytes separated from the plasma by way centrifuged and expressed in percent (%). Anemia is when hematocrit falls below 33% for adult pregnant women (Riswanto, 2013).

2.3. Source of Iron in Diet

Dietary iron occurs in two forms: heme and non heme. The primary sources of heme iron are from consumption of meat, poultry, and fish, whereas non heme iron is obtained from cereals, pulses, legumes, fruits, and vegetables. Heme iron is highly bioavailable (15%-35%) and dietary factors have little effect on its absorption, whereas nonheme iron absorption is much lower (2%-20%) and strongly influenced by the presence of other food components. On the contrary, the quantity of non heme iron in the diet is many fold greater than that of heme-iron in most meals. Thus despite its lower bioavailability, non heme iron generally contributes more to iron nutrition than heme-iron (Hurrell & Egli, 2010).

A number of dietary factors influence iron absorption. Ascorbic acid will overcome the negative effect on iron absorption of all inhibitors, which include phytate, polyphenols, the calcium, proteins in milk products, and will increase the absorption of both native and fortification iron. Ascorbic acid is the only absorption enhancer in vegetarian diets, iron absorption from vegan meals can be best optimized by the inclusion of ascorbic acid-containing vegetables. The addition of chicken, beef, or fish to non heme meals can boost the availability of non heme absorption (Gao et al., 2013) (Hurrell & Egli, 2010) .

In plant-based diets, phytate (example of plain cereal and legumes) is the main inhibitor of iron absorption. Polyphenols occur in various amounts in plant foods and beverages, such as vegetables, fruit, some cereals and legumes, tea, coffee, and wine. In cereals and legumes, polyphenols add to the inhibitory effect of phytate (Hurrell & Egli, 2010). Calcium has been shown to have negative effects on non heme and heme iron absorption, which makes it different

from other inhibitors that affect non heme iron absorption only. The absorption of iron greatly depends on the balance between inhibitors and enhancers (Gao et al., 2013).

When both heme and non heme forms of iron in the diet are considered, the average total dietary iron absorption by men is about 6% and by women in their childbearing years is 13%. The higher absorption in women is related to their lower iron stores and helps to compensate for the losses of iron associated with menstruation (Charlton & Bothwell, 1983). Foods that are part of the usual, everyday meals have low iron contents and low bioavailability. So only 10% to 20% of total iron intake is absorbed, but the absorption percentage is higher at iron deficiency anemia (WHO, 2001).

The absorption of iron supplements is influenced by the solubility of the iron compound, the dose, timing of the dose example with or between meals, delivery of the dose example alone or as part of a vitamin-mineral supplement and the abundance of iron stores in the individual (Status, Pregnancy, Intake, & Pregnancy, 1990).

It is recommended to women aged 19-49 years to fulfill the iron intake of 26 mg / day, an additional of 9 mg / day is needed when the women is pregnant during the second trimester and 13 mg /day additional iron intake during the third trimester. Our study participants were all in the second trimester at baseline time that need daily iron adequacy for 35 mg / day, and countinue to third trimester at end line of study that need daily iron adequacy for 39 mg / day. With additional of one tablet per day of iron-folate from government contains of 200 mg of ferrous sulfate which equal to 60 mg iron and 0.25 mg folic acid, It is expected that iron needs during pregnancy and childbirth period can be fulfilled (Ministry of Health Indonesia, 2014b). The

singleton pregnancy is suggested to eat protein animal-food such as meat (three times of serving, of 35 grams/serving) or fish (three times of serving, of 45 grams/serving) and protein plant-food such as tofu and *tempeh* (four times of serving, of 50 grams/serving), vegetables of four times of serving, of 100 grams/serving, and four times of serving, of 50 grams/serving for fruits (Ministry of Health Indonesia, 2014b). *Tempeh* is traditional food originating from Indonesia made through fermentation process of soybeans (National Standardization Agency, 2012)

2.4. Prevention of Anemia of Pregnant Women

Efforts made to prevent and treat anemia in pregnant women (Ministry of Health Indonesia, 1999) are:

a. Increase iron consumption of natural resources, especially food from animal sources (hem iron) that is easily absorbed as the liver, meat, fish. Improve intake food containing Vitamin C and Vitamin A (fruits and vegetables) as well to help iron absorption and assist in the formation of hemoglobin.

b. Fortification of food that is adding iron, folic acid, vitamin A and essential amino acids in foods that are eaten widely by the target group. Iron fortification is generally performed on foodstuff production of food industry.

c. Iron-folate supplementation on a regular basis for a certain period, aims to increase hemoglobin levels immediately. Since 1970 the Ministry of Health continues to implement programs to overcome the anemia in pregnant women with iron tablets as much as one tablet per day for 90 consecutive days during pregnancy and 40 tablets for childbirth period.

2.5. Relevant Researches about Individual Factors Affecting Healthy Eating during Pregnancy

Physiological, cognitive-perceptual and psychological factors controlling what a pregnant women consumes (Fowles & Fowles, 2008). Physiological factors are pre-pregnancy body mass index (BMI), nausea and vomiting in pregnancy. Pre-pregnancy weight status has been reported as an independent determinant for gestational diabetes mellitus, gestational hypertension, preterm birth, and small and large for gestational age births in U.S. pregnant women (Shin & Song, 2015). Diet during pregnancy may partially mediate the relationship between pre-pregnancy overweight and obesity and pregnancy complications and birth outcomes (Tomedi et al., 2013).

In a cross-sectional study of Greek women, it is reported that pregnant women who were underweight or normal weight before pregnancy demonstrated a better diet quality as assessed by the Healthy Eating Index (HEI)-2005 compared to women with obese pre-pregnancy BMI (Tsigga, Filis, Hatzopoulou, Kotzamanidis, & Grammatikopoulou, 2011). Nausea and vomiting are among the most common symptoms experienced by women in pregnancy, affecting their ability to eat and the individual food choices they make. Seventy to 85% of pregnant women report nausea and 50% report vomiting, and 13% of pregnant women report nausea and vomiting beyond 20 weeks of gestation (Jewell & Young, 2003; Lacroix, Eason, & Melzack, 2000).

Cognitive-perceptual factors are knowledge of nutrition requirement of pregnancy, perceptions of healthy eating in pregnancy and attitudes towards weight gain in pregnancy. Studies show that nutritional knowledge affects the quality of food intake and also healthy choices of purchased food (O'Brien & Davies, 2007; Verbeke, 2008). Advancement of individual nutrition knowledge provides new information which may stimulate changing of attitude and

subsequently result in enhancement of dietary practices (De Vriendt, Matthys, Verbeke, Pynaert, & De Henauw, 2009).

Research suggests that nutritional knowledge in the first trimester of pregnancy may be related to infant birth weight and dietary intake. Women's perceptions of what constitutes eating healthy during pregnancy may influence their food choices. Some women change their diets in pregnancy to eat foods they consider "better to eat," such as fruits and vegetables, and to limit salty snacks (Fowles & Gabrielson, 2005). Underweight women were noted to have positive attitudes toward weight gain, whereas obese women had negative attitude (Hickey CA, 2000).

Psychological factors are depression, stress and emotional eating. Researchers have identified a relationship between depression in pregnancy and low gestational weight gain (Bodnar, Wisner, Moses-Kolko, Sit, & Hanusa, 2009). In a British study, depression and anxiety had a negative influence on eating behaviors in the third trimester of pregnancy (Tuffery & Scriven, 2005). Pregnant women who are stressed are more likely to consume energy dense, nutrient poor foods (Fowles et al., 2011).

2.6. Relevant Researches about Factors Affecting Iron Supplement Intake during Pregnancy

Low intake of iron tablet consumption in Southern Nigeria has been associated with a number of factors, including gastrointestinal side effects that can occur with taking iron, inadequate supply of tablets (including limited resources to purchase tablets), inadequate counseling of patients by healthcare providers concerning the utility of tablets and possible transient side-effects, poor utilization of prenatal health-care services, lack of knowledge and/or

patient fears about the tablets and community beliefs, attitudes and practices that affect women's perception regarding tablet use (Ejidokun, 2000).

A study conducted in Senegal on two hundred and twenty- one pregnant women reveals that (58%) were motivated by the perception of improved health upon taking the tablets, the midwives insisted them to take the tablets and mention that the tablets would improve health. Women with low compliance (42%) reported the experience of side-effects that they associated with the tablets, and forgetfulness (Seck & Jackson, 2008).

In Mecca District; age of the mother, educational status, knowledge of anemia and iron folate tablets, and history of anemia during pregnancy were found to be significantly associated with compliance of prenatal iron foliate supplementation. In addition, fear that too many tables would harm the mother and/or the baby, fear that the baby will become bigger and side effects were the most commonly mentioned reasons for failure to comply with iron folate supplementation. Therefore, pregnant woman should receive adequate information from health providers about iron-folate supplementation to be aware of the benefits and importance of taking the supplementation (Taye, Abeje, & Mekonen, 2015).

Systematic review study in Indonesia about various kinds of factors affecting adherence mother in consuming the iron tablets are number of antenatal care visit, the supply of iron tablet, side effects and benefits that experienced by mother after consuming iron tablets, counseling of officers health, family support, traditional beliefs, forgetfulness and knowledge of pregnant women about iron tablets (Wiradnyani LAA, Khusun H, & Achadi EL, 2013).

2.7. Role of Midwives Villages in Prevention and Treatment Pregnant Women with Anemia

Midwife village is a midwife who is assigned by the government to stay at the village health care unit named *Poskesdes.* Midwife in the village is one of the supporting facilities and service networks of sub district health center to provide health services at the village level. It aims to improve the quality and equity of health service; to reduce maternal mortality, children under five mortality, the birth rate (family planning) and increase public awareness for healthy serve the community in their working area (Leimena, 1994).

Midwife village is assisted by volunteers in creating a map of the village consist of roads, houses, and update the map with new data on the presence of pregnant women, neonates and infants. Midwife village record all details of maternal and child health services in the cohort mother, baby cohort, cohort toddlers, birth cohort, maternal and child health book. The records are to monitor intensively and continuously conditions and problems found in the mothers, babies and children in the villages (Ministry of Health Indonesia, 1998).

Mother who visit Midwife village for antenatal services will obtain appropriate antenatal care standards include anamneses, physical examination (general and obstetrics), routine and special laboratory tests, as well as general and special intervention (corresponding risks were found in the examination). In application consists of: (1) weight and height measurement. (2) Blood pressure measurement. (3) Nutritional status (measure the circumference of the upper arm) measurement. (4) the height fundus measurement. (5) Determine the presentation of the fetus and the fetal heart rate. (6) Screening Tetanus immunization status and provide immunization Tetanus Toxoid (TT) when necessary. (7) Provision of at least 90 tablets of iron tablets during pregnancy and 40 tablets during childbirth period. (8) Laboratory test (regular and

special). (9) Cases procedure. (10) Counseling, including planning and prevention childbirth complications and family planning of postpartum. Antenatal contacts for four times as follows: at least one time in the first trimester (0-12 weeks), at least one time in the second trimester (> 12-24 weeks), and at least 2 times in the third trimester (> 24 weeks up to birth). Antenatal visits could be more than 4 times as needed (Ministry of Health Indonesia, 2014c).

Iron tablet distribution to pregnant mothers is done through the following mechanisms (Ministry of Health Indonesia & Millenium Challenge Account Indonesia, 2015);

a. Iron tablets are given to pregnant women by midwives in during antenatal services.

b. Iron tablet given by midwives to pregnant women during home visit. Pregnant women who do not perform antenatal services need to be visited by health workers for confirmation and motivation.

c. Iron tablet can be given at the time of the Pregnancy Classes. Pregnancy Class is education activities provided by the government for pregnant women in process of learning together about health during pregnancy, in the form of face to face in a group that aims to improve the knowledge and skills of mothers about pregnancy, prenatal care, childbirth, postnatal care, newborn care, myth, infectious diseases and birth certificate. Pregnancy class is learning groups of pregnant mothers with gestational age between 4 weeks until 36 weeks (of pregnancy) with the number of participant maximum of 10 people. The classes are facilitated by midwife / health workers, media used are MCH book, Flip chart, Guidelines of the Pregnancy Classes, Pregnancy Handbook for Facilitator and gymnastics Pregnancy Books. Pregnancy class have 3 sessions and Midwife village organize it at every months thus pregnant women have change to attend at any convenience/available time (Ministry of Health Indonesia, 2010a). Unfortunately in province Aceh, percentage of villages that have the

pregnancy class is only 12.45% (range in 0-100% villages) , with average attendance is 4.18%

(range in 0-13.08% across the districts and municipalities) (Health Office of Province Aceh,

2017)

d. Iron tablet can be obtained at the time of *Posyandu (Pos Pelayanan Terpadu). Posyandu* is

one form of community based health activity carried out by the community, to empower and

provide convenience to the community to obtain medical care for mothers, infants and

toddler. Administrator *Posyandu* activities are cadres starts from preparation, implementation

and evaluation of *Posyandu* day. Midwife village and health worker will attend the *Posyandu*

day. Implementation of *Posyandu* is at least once in a month. If necessary, the *Posyandu* can

open more than one time in a month. The day, time and place in accordance with the

community agreement. The main activities of *Posyandu* consist of mother and child health,

family planning, immunization, nutrition, prevention and control of diarrhea (Ministry of Health

Indonesia, 2012).

2.8 Maternal and Child Health Book

        Maternal and child health book is mainly used as guidance for midwife/health workers

either health volunteers to implement the health service including health education/promotion.

The following information cite in MCH book (2015) about nutrition and iron tablets during

pregnancy (Ministry of Health Indonesia, 2016):

a. Sub tittle : Ensuring the pregnant women receive antenatal care including the iron tablet

    (page 2)

    "Pregnant women since early in pregnancy to drink one iron tablet every day for at least 90

    days. Iron tablet taken at night to reduce nausea".

b. Sub tittle: Daily care (page 4 and page 7)

"Eat variety of foods in proportion to the pattern of balanced nutrition and a lot more than

before pregnancy"

"No dietary restrictions during pregnancy"

"Adequate drinking water needs during pregnancy. Drinking water needs of pregnant women

10 glasses per day"

"If nausea, vomiting and loss appetite, choose foods that does not contain of fat in small

portions but frequently. Examples: fruit, bread, potatoes and biscuits"

"Do not drink alcohol and smoke"

"If taking medication consult health workers"

"Ask your health care workers on nutritious food"

"My dining plate: the portion of a meal"

Figure 2 My dining plate: the portion of a meal in Indonesia

There is no information to aware pregnant women about anemia as either limited

information about anemia related to nutrition and iron tablets supplementation. Even though

every woman will receive the iron supplement from midwife villages, there is no information

about iron supplement consumption by the pregnant women, there is no monitoring record available for this practice in MCH book. The booklet in this study aims to provide midwife village an additional education material to assist the MCH book in educating the pregnant women about preventing and treating anemia during pregnancy. The booklet will emphasize on iron-rich food consumption and promoting iron supplement compliance. Pregnant women will be encouraged to contribute in providing technical and applicable inputs regarding daily eating (the amount, types, schedule of food intake) and iron supplement practices.

2.9. Theory of Behavioral Changes Using Health Believe Model

The Health Believe Model (HBM) in this study was involved in development of education materials and questionnaires. The HBM developed in the early 1950s by a group of social psychologists at the U.S. Public Health Service in an attempt to understand the widespread failure of people to accept disease preventives or screening tests for the early detection of asymptomatic disease (Maiman & Becker, 1974). The HBM was originally developed as a systematic method to explain and predict preventive health behavior. It focused on the relationship of health behaviors, practices and utilization of health services. The HBM states that the perception of a personal health behavior threat is itself influenced by at least three factors: general health values, which include interest and concern about health; specific health beliefs about vulnerability to a particular health threat; and beliefs about the consequences of the health problem. Once an individual perceives a threat to his/her health and is simultaneously cued to action, and his/her perceived benefits outweighs his/her perceived benefits, then that individual is most likely to undertake the recommended preventive health action. There may be some variables (demographic, socio psychological, and structural) that can influence an individual's decision (Rosenstock, 1974).

The Health Believe Model consists of (i). Perceived susceptibility refers to the subjective perception of risk or vulnerability to health threat; (ii). Perceived severity refers to one's perception of the seriousness of the health threat; (iii). Perceived benefits refer to the efficacy of an action designed to prevent or reduce the threat of illness; and (iv). Perceived barriers refer to the assessment of the negative consequences that might be associated with the preventive or ameliorative behavior (side effects inconvenience, etc). These components explain the individual's "readiness to act" cues to action: Which stimulate behavior, and self-efficacy, which is one's confidence in the ability to success-fully perform an action and change behavior (Janz & Becker, 1984).

The model assumes that a person's beliefs about health are determinants of the possibility of an individual to make changes in the lifestyle behaviors. Aspects of essential nutritional consultation about anemia, include: definition, symptoms, causes, consequences, the benefits of iron tablets, compliance to drink iron tablets, iron tablets side effects, and iron-rich food consumption (Sandjaja, Hapsari, & Sudikno, 2005).

2.10. The strengths, weaknesses, opportunities, threats (SWOT) analysis

The SWOT analysis in this study was used to plan strategies to enhance iron-rich eating practices and iron-folate intake based on baseline data result of anemic pregnant women. The strategies result will be used during booklet education. The analysis is useful technique for understanding strengths and weaknesses and for identifying both opportunities opened and the threats faced. It was originally intended for use in business and industry, as part of an environmental scan for strategic planning processes (Balamuralikrishna & Dugger, 1995). The SWOT analyses have been used in other disciplines as strategic planning and evaluation tools

(Boone & Kurtz, 2013) and to set priorities for action (Tanjasiri & Tran, 2008). Recently, SWOT analyses have been used to examine various aspects of health and health promotion, including community organizational capacity (Caruana et al., 2012), health care curricula and teaching (Caruana et al., 2012; Henzi, Davis, Jasinevicius, & Hendricson, 2007) and health services (Goel et al., 2011; Ibargoyen-Roteta et al., 2010).A study in Canada used SWOT analyses to plan community-driven health promotion strategies of the healthy eating and physical activity patterns for the youth, it was proved to provide a more structured interpretation of results for deciding upon a plan of action for quality improvement (Skinner, Hanning, Sutherland, Edwards-Wheesk, & Tsuji, 2012).

The purpose of a SWOT analysis is to ''gather, analyze, and evaluate information and identify strategic options facing a community, organization or individual at a given time.'' The SWOT analysis can be the initial step towards participatory needs assessment and assist in focusing activities towards existing strengths of and capitalizing on the most significant opportunities for an organization or community (van Marwijk, 2004).

The SWOT analysis itself is a two-step process, as shown in Figure 3 The first step is to identify the core themes that fall into each SWOT category (shaded boxes). Strengths and weaknesses are usually seen connected with the internal environment of an organization/community, and opportunities and threats are generally associated with the external environment (Burkhart & Reuss, 1993).The second step involves the actual analysis (strengths-opportunities [S-O], weaknesses-opportunities [WO], strengths-threats [S-T], and weaknesses-threats [W-T]), where the themes identified in step 1 are fit together and transformed into strategies. For example, an item or theme can be matched from the strengths quadrant to one

from the opportunities quadrant and combined to determine a strategy (resulting in an S-O

strategy) (Balamuralikrishna & Dugger, 1995).

	STRENGTHS Positive characteristic and advantages the issue, situation or technique	WEAKNESSES Negative characteristic and disadvantages the issue, situation or technique
OPPORTUNITIES Factors situation that can benefit. Enhance or improve the issue, situation or technique	S-O Strategy/Analysis *Using strengths to take advantage of opportunities*	W-O Strategy/Analysis *Overcoming weaknesses by taking advantage of opportunities*
THREATS Factors, situations that can hinder the issue, situation or technique	S-T Strategy/Analysis *Using strengths to avoid threats*	W-T Strategy/Analysis *Minimize weaknesses and avoid threats*

Figure 3. **The SWOT analysis structure**

2.11. Media Education of Booklet

Booklet is a mass communication media that aims to convey promotional messages,

suggestions, prohibitions to a mass audience, in the form of books contain both literary and

pictures in order to gain reader understanding and obey the messages contained in the booklet.

Booklet is small-sized books (half-letter), no more than 30 pages back and forth. History of

booklet development is the need to provide references (literature) for community that has

limited access to books. Through the booklet, they can acquire the knowledge like reading a

book with a short reading time (Mahfoedz Ircham & Suryani Eko, 2007).

Media booklet has the following advantages: (1). Clients can study independently, (2). Users can view the contents at the leisure time, (3). Information can be shared with family and friends, (4). Easy to create, duplicated and corrected and adjusted, (5). Reducing the need for notes, (6). Simplify with relatively low cost, (7). Durable, (8). Wide enough of capacity, (9). Can be directed at specific segments (Ewles L & Simnett I, 1994).

In designing a message, the following points should be kept in mind; (1). Keep them short and simple; include only a few key ideas, (2). Give reliable, complete information, (3). Repeat the idea many times, (4). Recommend precise behavior change, (5). Show the relation between the nutritional problem and the recommended behavior, (6). Make use of a slogan or theme, (7). Ensure that the message is presented by a credible source (as perceived by the target group), (8). Present the facts in a direct manner, (9). Make use of positive expressions, not negative ones, (10). Use humor without being offensive to anyone (Andrien, 1994).
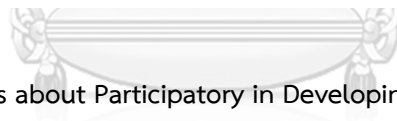
2.12. Relevant Researches about Participatory in Developing Educational Material

Generating educational materials involves gathering preliminary information about the educational message that will be presented to ascertain what the target audience already knows, what they think, imagine or have ignored regarding the subject and what needs the material could address (Kaplún, 2008). Two Brazilian studies (Fonseca, Scochi, Rocha, & Leite, 2004; Panobianco et al., 2009) included information reported by patients in educational booklets. Panobianco et al. developed educational material for post mastectomy lymphedema prevention based on discussions with professionals about language, content, concerns, difficulties regarding treatment adherence and coping strategies reported by the patients. However, they did not validate the educational material. Another Brazilian study (Fonseca et al.) applied the discussion

group technique to professionals and patients in the survey of problems and validated the content with both groups. Another method of creating a booklet was presented in a study of pregnant women, in which the researcher developed the content and then submitted it to content validation with patients and professionals through discussion groups (Reberte et al., 2012)

Participatory develop child health learning materials for health promotion through focus-group discussions with the community showed that it is worthwhile using participatory health education approaches. The target groups retain many of the messages portrayed in the materials. The quality of the participation can be increased by the production of learning materials which are well-designed and pre-tested. However, it should not be taken for granted that well-designed materials will be automatically utilized and the messages absorbed by the target groups (Laverack, Sakyi, & Hubley, 1997). Educational material effectively produced can change the reality of a population, so must consider which information is intended and what is expected (Demir, Ozsaker, & Ilce, 2008). Creating a booklet involves more than simply writing summarized ideas on a paper and handing it to the patient. One must understand the population, involve the relevant professionals, and obtain high-quality graphic aids for this type of educational material (Sousa & Turrini, 2012).

2.13. Role of Reminder

Knowledge of the home and the structure of daily life are required to ensure that reminder systems can be integrated into daily life. The main message for designing reminders at home is the need for personalization. There are three central aspects of personalization;

spatiotemporal context, shared interaction spaces, and free choice of device and modality (M. McGee-Lennon, M. Wolters, & S. Brewster, 2011).

2.13.1. Spatiotemporal Context

Many of the reminder strategies that people reported or suggested were influenced by place and/or time. Often, reminders were in visually prominent places, such as a fridge door or a blackboard or a front door. Like (Leonardi et al., 2009), we found that the kitchen was a central place in the home, and many reminder strategies focused on kitchen devices. The living room emerged as an additional central place that would need to be accommodated. Indeed, localized reminders are needed. Another successful reminder strategy also relies on temporal context. A common strategy was to integrate tasks that would otherwise be forgotten into routines, for example, putting the night-time medication beside toothbrush, assist with habit of never forget to brush their teeth last thing at night (M. McGee-Lennon et al., 2011).

2.13.2. Shared Interaction Spaces

Personalized reminder system need not only for users, but also to other people who live in the home. A reminder system should also encourage the user defined input on this decision so that users can specify the reminder as privacy or opened for family member or if they have guest at any time. Reminders that cannot be easily interpreted by visitors provide privacy, especially if users do not want to be seen as needing care (M. McGee-Lennon et al., 2011).

2.13.3. Device and Modality Choice

The highly varied strategies of reminders that people claim to use can be grouped into five categories: paper-based (e.g., calendars, diaries), technological and specialized (e.g., mobile phone reminders and pill boxes), temporal (e.g., integration into routines), people-based (e.g. phone calls from friends, remind by family members) and physical (e.g., placing books to be returned near front door) (Wolters & McGee-Lennon, 2010).

Similar to Indonesia situation (Ministry of Health Indonesia, 2013b), many other studies shows forgetting to take supplements daily was the most common barrier to antenatal iron – folate acid supplementation (Kulkarni, Christian, LeClerq, & Khatry, 2010) (Bilimale, Anjum, Sangolli, & Mallapur, 2010) (Nguyen et al., 2018; Nisar, Alam, Aurangzeb, & Dibley, 2014). Women have reduced short-term memory during pregnancy, pregnant women performed more poorly than non-pregnant women on memory and other cognitive tests (Henry & Rendell, 2007). At the same time, many pregnant women have to perform several tasks at home throughout the day and they often forget to take the supplements on a daily basis (Nguyen et al., 2018).

Study among pregnant women at Palangkaraya city in Indonesia of implementing education with Short Message Service (SMS) reminder (Kusfriyadi K, 2012), and appling education with short audio messages in India (Pai et al., 2013) had positively impacted hemoglobin levels compared with the control group.

Another reminder method studies about involving the family member to assist mother's compliance to iron supplement intake. Studies in Bogor city Indonesia invited the husband/mother/in-laws/other close relatives/health volunteers (Aditianti, 2015) and Bangladesh (Nguyen et al., 2018) engaged the husband resulted that the anemic pregnant women improved their compliance of iron tablet

Howerver, there are some limitation noted for those reminder intervention. The several barriers related to the SMS reminder, it is possible that mobile phone numbers were entered incorrectly on patient records, or patients changed their phone numbers during the study (McLean et al., 2014). Patients may not receive the SMS reminders due to incorrect data entry

(Perry, 2011). People may not be willing to disclose their mobile phone numbers and record them in patient notes (Koshy, Car, & Majeed, 2008). Use of this emerging technology disadvantages those who do not have a mobile telephone (Geraghty, Glynn, Amin, & Kinsella, 2008) such as current study population that have limited owning cellular phone in house hold as well as individual (Central Bureau Statistic Indonesia, 2018).

The the intervention involved husband /family member was rate as low to moderate participation (30%-60%) in India (Sinha, 2008), Uganda (Tweheyo, Konde-Lule, Tumwesigye, & Sekandi, 2010), Indonesia (Aditianti, 2015), and Bangladesh (Nguyen et al., 2018). Barriers to male involvement in maternal health included low levels of knowledge, embarrassment, and social stigma related to the perceived notion that pregnancy, maternity care–related discussions are relevant only to women and men are typically working away from home during the day(Nguyen et al., 2018). Thus the concept of current study reminder is paper-based (low-tech) that also applies the home-based shared interaction spaces reminder with the family member.

2.14. Underlying Mechanism/Theoretical Frame work of implementing the Intervention
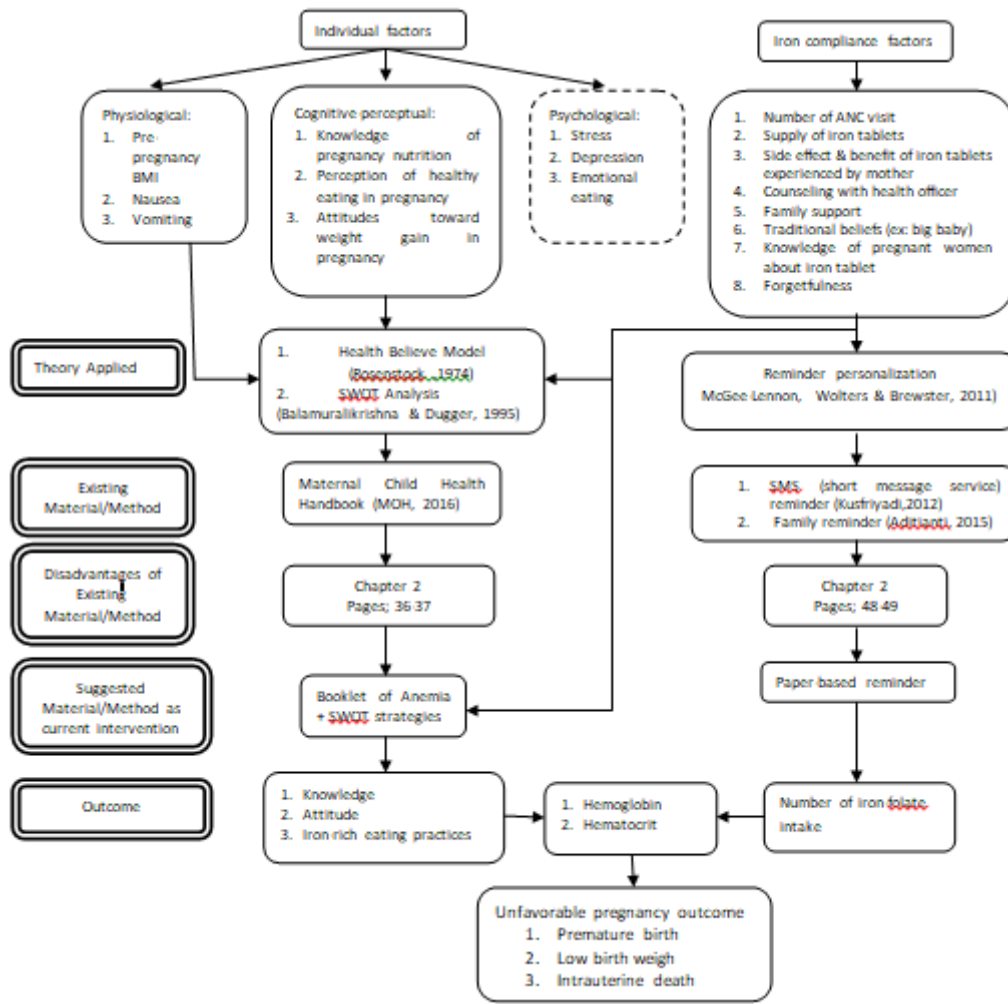
Figure 4 **Mechanism of Intervention Framework**

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Study Design

The study design is quasi experimental of pretest and posttest between intervention and control group of two municipalities in province Aceh that have severe anemic pregnancy problem (prevalence of anemic pregnancy is more than 40%). The two municipalities involved in this study are comparable according to municipality characteristics, health care resources and profile regarding anemia among pregnant women. The intervention area is Kota Langsa municipality which is researcher's living area and working area (as health officer) and the control area is Kota Lhokseumawe municipality. This study was unable to apply randomized control trial at the intervention area due to some risks of contamination:

a. Kota Langsa municipality consist of 5 sub districts with travel time in minutes or at least one hour from one sub district to another sub district (between villages), thus community are very connecting each other.

b. This study involves the midwife villages; the contamination of sharing information may occur among them due to every Monday morning they are intended to meet each other in morning ceremony and monthly meeting at municipality health office.

3.2. Study Area

The municipalities the comparable characteristics are showed in table below.

Table 1 **The Characteristics of Intervention and Control Area**

No	Characteristics	Intervention area Kota Langsa	Control area Kota Lhokseumawe
1	Number of sub district	5	4
2	Number of villages	66	68
3	Number of population	162.814	187.455
4	Number of pregnant women	4067	4540
5	Number of pregnant women were examined the Hemoglobin	889	2502
6	Number pregnant women with Anemia among examined the Hemoglobin	411	898
7	Proportion pregnant women with Anemia	411/889 x 100= 46.23%	898/2502 x 100= 43.76%
8	Percent of low income family	12.62%	12.47%
9	Percent of population literacy	99.91%	99.84%
10	Number of Poskesdes (Midwife Health Care Unit)	52 units (78%) of total village	46 units (68%) of total village
11	Antenatal care coverage (at least 4 times of ANC visit)	95%	90%
12	Iron tablet distribution (90 tablets)	95%	90%

Source: (Central Bureau of Statistic of Province Aceh, 2015)

Figure 5 **Map of Province Aceh**

The distance between the municipalities can be reached within 3-4 hours (169.8 km) using a motor vehicle (motorbike, private car or bus); the road connecting is concrete road.

3.3. Study Phases

This study consist of five phases; (1) development of booklet and supplement reminder (2) validation of booklet, (3) baseline data collection, (4) intervention program , and (5) end line survey.
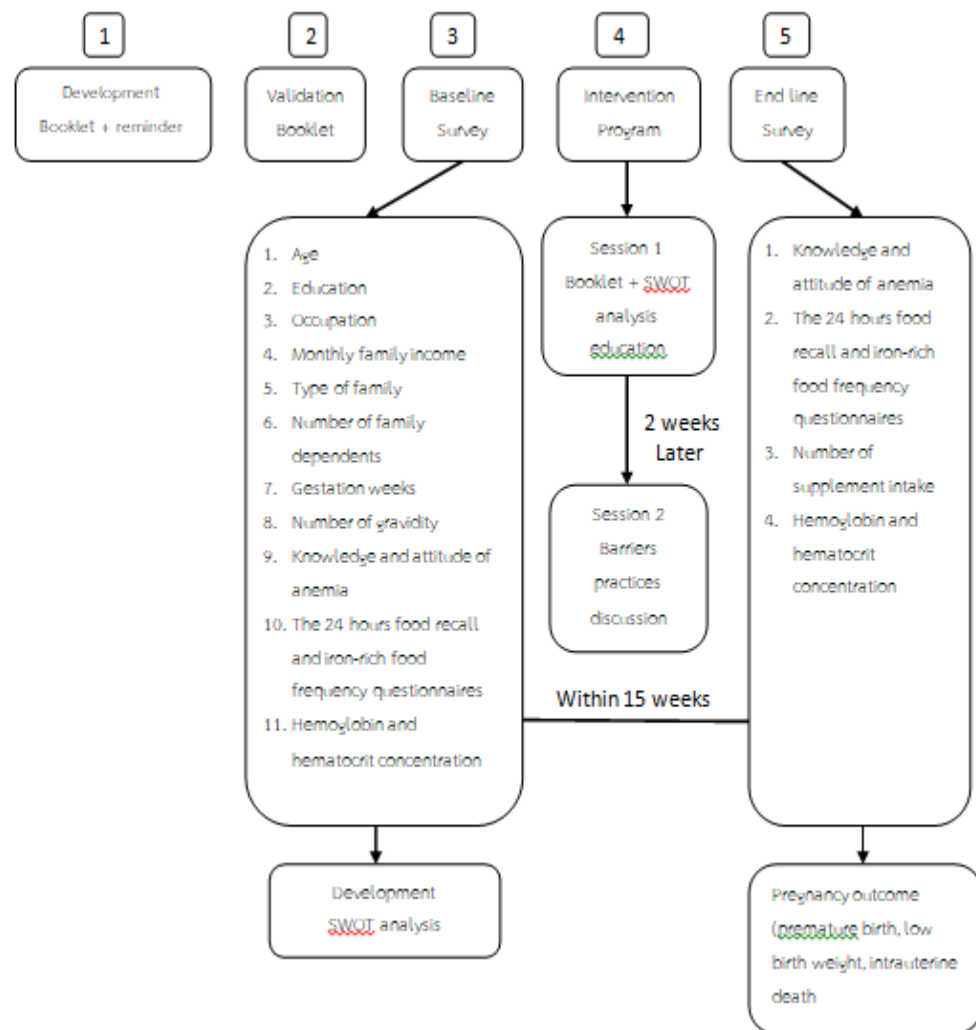
Figure 6 **Study phases**

3.4. Study Population

Study population is the first antenatal visitor of anemic pregnant women at Kota Langsa Municipality (intervention area) and Kota Lhokseumawe Municipality (control area).

3.5. Sample Size and Sampling Technique

3.5.1. Sample size calculation

Sample is calculated by G power 3.1.9.2 application using effect size from previous study which has similarity outcome and intervention to current study. According to meta-analyses study by (Girard & Olude, 2012), the effect size of provided nutrition education and counseling with nutrition support in the form of food supplement, micronutrient supplement or nutrition safety nets for outcome risk of anemia during pregnancy on maternal is 0.58 which defined as medium effect size by (Cohen, 1977). Thus, current study use 0.50 (medium effect size) to calculate the sample size. Several data input in application are:

Test family	: t –test
Statistical test	: Means : Different between two independent mean (two groups)
Type of power analysis	: A priori : compute required sample size, given α. power and effect size
Tail (s)	: Two
Effect size d	: 0.5
α	: 0.05
Power	: 0.8
Allocation ration N1/N2	: 1
Sample size per group	: 64
Total sample size	: 128

A total of 10% is added to the sample for possible losses of follow up; 64 x 10% = 6, then for each group the sample is 70 pregnant women with anemia and the total sample size is 140 pregnant women with anemia.

3.5.2. Sampling technique

The anemic pregnancies that screened by Sahli's haemoglobinometer method during antenatal care were registered by midwife village and nominated to be invited to study. To gain of each 70 participants from the midwife registration, a simple random sampling was applied. After enumerating the eligible participant, researcher, midwife village, nutritionist and laboratory officer came to anemic pregnant women house to ask about the willingness to participate in the study and to implement the baseline survey as well.
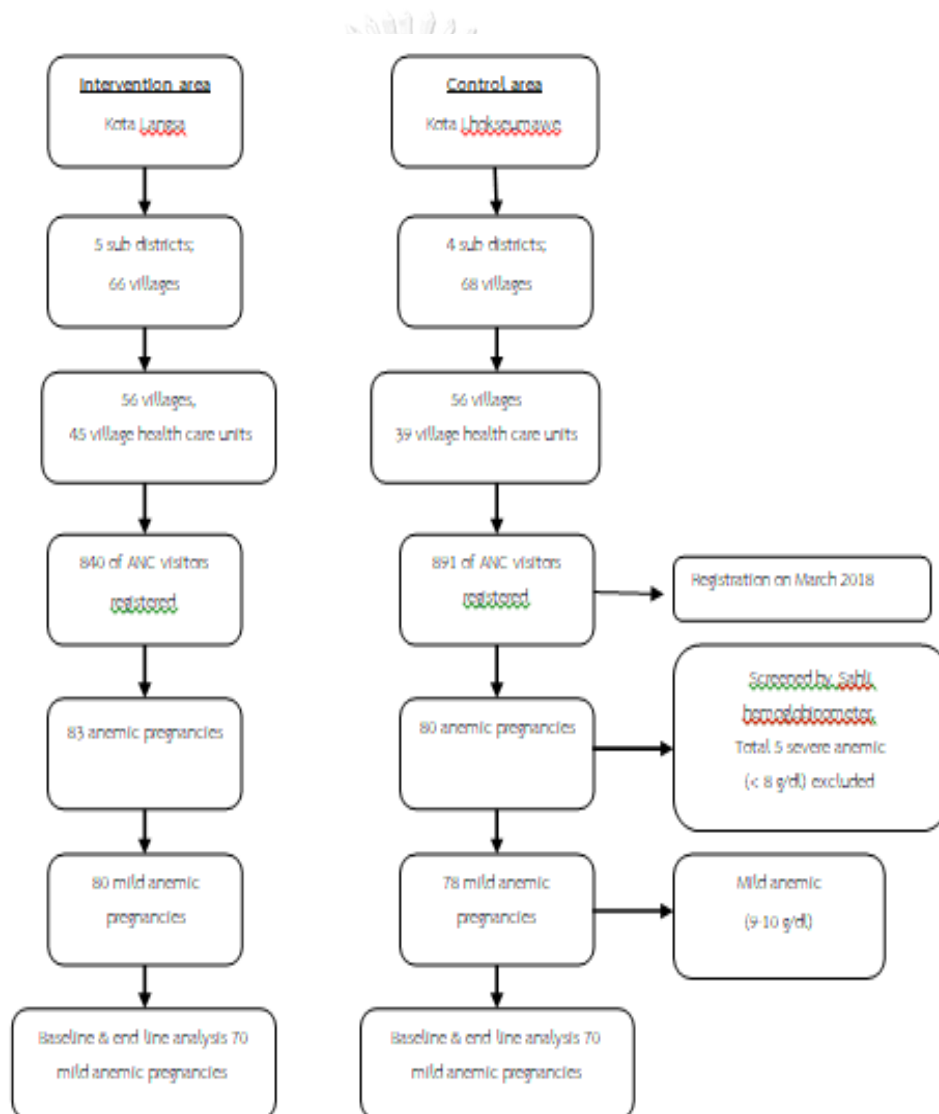
Figure 7   **Flow chart of sampling technique**

3.6. Inclusion and Exclusion Criteria

3.6.1. Inclusion Criteria

    a. Pregnant women at age ≥20 years' old

    b. Anemic pregnant women who were registered at village health care units

    c. Willing to participate in the study

3.6.2 Exclusion Criteria

    a. Pregnant women indicated as severe anemia (<8 g/dl) will receive blood transfusion and more intense monitoring by midwife village

    b. Pregnant women with infectious diseases (pulmonary TB, malaria, intestinal worms) and any bloods disease, example: Thalassemia that are found out through interviewing during data collection and in case confirmed by health report of the pregnant women

    c. Pregnant women who has planned to move within 6 months or delivery outside the municipality

3.7. Study Phases

3.7.1. Development of booklet and reminder

There were 2 session of Focus Group Discussion (FGD) with duration 2-3 hours per each session in this phase , first was about participatory to contribute to the content of the booklet and second was about participatory to reach an agreement of the booklet. The FGD was with a group of seven women consisting of two pregnant women, three non-pregnant women and two health volunteers. Women who participate in first and second FGD are the same people.

The FGD session was guided by a trained and experienced moderator in performing FGD on nutritional anemia, education of magister in community nutrition. Moderator introduced topics for discussion and helped the group to participate in a lively and natural discussion. In first session, discussion guidelines were focused on gathering information about participant's doubts and educational need about iron deficiency anemia, nutritional anemia and behavior to lower risk of anemia (Appendix C). The field notes (flip chart notes by moderator assistant and observer notes) were performed during the FGD.

The FGD result were analyzed by reviewing answers line by line and performing data coding through two stages (Charmaz, 2006). The first stage was generating numerous category codes without limiting the number of codes. The research team list emerging ideas, drawn relationship diagrams and identified keywords used by participants frequently as indicators of important themes. The second stage was focusing on coding where the research team eliminated, combined or subdivided the coding categories identified in the first step to present the themes. The themes had risen were used in guiding the topics and content in booklet and supplement reminder.

In another FGD session, they were requested to read first draft of the booklet and analyze it in terms of understanding the vocabulary, as well as the adequacy of illustrations, indicating the unknown or difficult terms, and suggesting other substitutive terms considered easier and understandable (Appendix E). Their recommendations were integrally accepted and incorporated in revising the booklet.

Inclusion criteria of women in this phase:

a. Woman at age above 20 years old

b. Woman who is not currently pregnant but have experienced of anemia at latest pregnancy, woman who currently pregnant with anemia or without anemia

c. Woman is willing to participate in two sessions of FGD

d. Woman is literate. It is recommended as suitable to use the range of six to eight years of study pregnant women who participated in the evaluation of educational material (Doak, Doak, & Root, 1996; Jones et al., 2011).

e. Commit to actively speaking

Exclusion criteria

Pregnancy woman at gestational age of > 6 month, due to travelling reason to FGD location

3.7.2 Validation of booklet

The booklet was validated by 9 health personnel work in municipality primary health center consist of a medical doctor, 2 of master degree in community nutrition, a master degree in health education, 5 of midwives village. The parameters (Appendix G) consist of structure, content, language and illustrations (Luz ZMP, Denise NP, Rabello A, Schall V, 2003).

The consensus revision approval was obtained through individual anonymously evaluation. Each of health personnel was given the summary of all the suggestions and was requested to vote to include or exclude the information along with considerations behind. Result of the booklet validation of nine helth personnel is on page 31-32.

Moreover, after being validated by the health personnel, booklet also was reviewed by 30 pregnant women at government health care facilities (hospital and primary health care units). The questionnaire was based on Suitability of Assessment Materials (SAM) (Appendix I) questionnaire and rated by percentage rating (0-39% is not suitable material, 40-69% is adequate material, 70-100% is superior material) within six of domain rating (message content, literacy demand, pictures and graphs, layout and typography, learning stimulation and motivation, cultural suitability), and open suggestion surely (Ribeiro & Spadella, 2018; Tuot, Davis, Velasquez, Banerjee, & Powe, 2013). The SAM questionnaires in English version in converted to Bahasa Indonesia, we invited convenience five house wife women aged 20-35, educated of 12th grades to discuss about their understanding to the questionnaire and revised sentences according to their inputs. Result of the booklet pre-test by pregnant women is on page 33.

3.7.3. Development the strengths, weaknesses, opportunity and threats (SWOT) analysis

To support the booklet education about iron-rich food intake, current study developed the SWOT analysis to gain a good understanding of current dietary behavior and so of challenges and opportunities to recommend behavioral changes. The themes and strategies of SWOT analysis was structured using participant's baseline data; quantitative data (socio demographic, knowledge of anemia, the 24 hours food recall, food frequency questionnaire, focus group discussion (FGD) result with seven anemic pregnant women in quantitative part who were interest to contribute in FGD using guidelines of maternal nutrition (Appendix K), literature review of municipality's health profile and related studies.

It has two-step process; the first step was identifying the core themes that fall into each SWOT elements, the second step was to combine and transform core themes into strategies; strengths-opportunities (S-O), weaknesses-opportunities (W-O), strengths-threats (S-T), and weaknesses-threats (W-T) (Balamuralikrishna & Dugger, 1995)

Our SWOT strategies were determined from four sources: (1) balanced nutrition guidelines of Indonesia; name of food, frequency of serving, gram per serving and recommended iron intake of milligram per day for pregnancy (Ministry of Health Indonesia, 2014b) (2) suggestions from the midwives village previously involved as judges of booklet, (3) input from anemic pregnant women involved in FGD ; and (4) input from the research team. It helped to provide the draft of the SWOT strategies to initiate which might be feasible for the participants to take action on.

3.7.4. Implementation of intervention program

The midwife villages of intervention area received one-day training about how to implement booklet and SWOT matrix during education program. The education was run through counseling session; two homes visit of once a week at 45 minutes per session. In session one, participant received information about anemia using the booklet, continued with discussion of the SWOT strategies to enhance iron-rich eating practice and iron-folake intake. At the end of session one, a supplement paper-based reminder was given to anemic pregnant women, midwife helped to do home-tour to choose where to place the reminder. The second home visit was held two weeks after the first home visit. In session two, counseling was conducted for question and answers, discuss the dietary and iron intake practices after the first home visit.

In other hand, anemic pregnant women in control group received usual antenatal care by the midwife village. Part of this care was the provision of iron tablets to all pregnant women, nutritional education and hemoglobin test. However, they will not receive additional education using booklet, the SWOT matrix neither reminder.

3.8 Research instruments

The measurement of outcome are attained through comparing the knowledge and attitude about anemia, iron-rich eating practice, hemoglobin and hematocrit concentration and pregnancy outcome within group and between group of experimental and control.

3.8.1. Questionnaires of socio demographic, anemia risk, knowledge, attitude, eating practices, and pregnancy outcome (Appendix M)

The questionnaire is comprised of the following six parts;

Part 1: Socio-demographic data

It consist of close and open questions about (pregnant women's age, educational level, occupation, monthly family income, type of family, number of family dependents, gestation weeks, number of gravidity)

Part 2: Hemoglobin and hematocrit concentration, number of iron-folate intake (pre-post tool).

It records the hemoglobin and hematocrit concentration, the blood collection for hemoglobin and hematocrit examination was carried out during the home visit by a laboratory officer from primary health care unit of municipality. There are open questions about the date of receipt of the iron tablets, the number of iron tablets received, the number of remaining tablets, and barriers of iron supplement consumption.

Part 3 : Pregnant women's knowledge about anemia (pre-post tool).

There are 20 items of knowledge close questions about anemia and nutrition. It is included definition, symptom, causes, consequences, benefit of iron tablet, compliance to drink iron tablet, iron tablet effect, nutritional anemia. The choice of answer is true, false and do not know. Correct answer was given a score point of "one", wrong and do not know answer was given score "zero". Maximum score of the questionnaire was 20. Scoring is categorized as follow: Poor knowledge: <80% (score 0-15 point), Good knowledge: ≥ 80% (score 16-20 point) (Notoatmodjo S, 2010).

Part 4 : Pregnant women's attitude about anemia (pre-post tool).

There are 15 items of attitude close questions about perceived susceptibility, perceived severity, perceived benefits, and perceived barriers of anemia during pregnancy. The choices of answers is composed of statement of Likert scale (Likert, 1932), that used for assessment of respondent attitudes and beliefs. The scale had five response alternatives (ranged from strongly agree, agree, un-decidable, disagree to strongly disagree). For ease comparison, the responses are re-grouped into three categories: agree, partially agree, dissagree (Hazavehei, Taghdisi, & Saidi, 2007). Attitude is denoting as favorable and unfavorable attitudes. The attitude was defined as "favorable" for a score ≥50% and as "unfavorable" for a score <50% (Teferi & Shewangizaw, 2015).

Part 5 : Pregnant women's eating practices (pre-post tool)

As recommended (Sato, Fujimori, Szarfarc, Borges, & Tsunechiro, 2010), to better measure food consumption, a 24-hour recall instrument was used concomitantly with the Food Frequencies Questionnaire (FFQ). Food Recall 24 hours performed by recording type and amount of food consumed in the period 24 hours, total 3 days of food recall will be recorded at baseline and post intervention time; 2 days on weekdays and 1 day on weekend. The tables of food recall

consist of column eating time, name of menu, name of food ingredients, weight of food ingredients in household size unit (obtained from the usual type of utensils used in households such as plates, cups, spoons, bowls, whereas for fruits and vegetables used unit pieces, portion etc.). The composition of iron of food is analyzed using the Nutri Survey Indonesia software resulted in milligram/day. The food recall 24 hours aims to describe average daily of iron food intake of pregnant women.

The intake of iron in food recall was compared to Recommended Dietary Allowance (RDA) Indonesia, which is known as *Angka Kecukupan Gizi (AKG)* (Hartriyanti et al., 2012). Recommended Dietary Allowance is average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%-98%) healthy people (National Institutes of Health, 2016). The recommended of iron food intake for adult women aged 19-49 years is 26 mg/day, addition to first trimester pregnancy is 0 mg, second trimester is +9 mg and third trimester is +13 mg. Our participants was at second trimester of pregnancy, they were expected to fulfill the the recommended iron food intake of 35 mg/day at their second trimester and 39 mg/day at their third trimester (Ministry of Health Indonesia, 2013c).

The food frequency questionnaire (FFQ) is performed by recording frequency of iron-rich food consumed in period of last month. The tables of FFQ consist of column list of food rich of iron, frequency consumption (daily, weekly, or never). The FFQ of animal and plant rich of iron were characterized by iron content no lower than 0.1 mg per 100 g (Głąbska, Guzek, Ślązak, & Włodarek, 2017) based on Indonesia food composition tables (Association of nutritionists Indonesia, 2013). The higher scores reflect higher frequency of dietary intake behavior.

Part 6: Pregnancy outcome

The questionnaire is regarding term of pregnancy, birth weight and fetal death. It is close question then being categorized to yes and no answer of premature labor status and low birth weight, and intrauterine death.

3.8.2 Questionnaire of supplement reminder evaluation

The questionnaire is open questions regarding participant's appraisal on the usability reminder (Appendix O).

3.8.3 Validity and Reliability of the Questionnaire

The questionnaire content of knowledge and attitude was developed according to literature review (Fadlun & Feriyanto, 2012). The three days 24-hours food recall and iron-rich food frequency questionnaire template was according to literature review (Association of nutritionists Indonesia, 2016). The Index of Item-Objective Congruence (IOC) was used so as to find the content validity. In this process, the questionnaire was checked by three experts including, two medical doctors and one nutritionist. The Item-Objective Congruence (IOC) was used to evaluate the items of the questionnaire based on the score range from -1 to +1. Congruent = + 1 Questionable = 0 Incongruent = -1. The items that had scores lower than 0.5 were revised. On the other hand, the items that had scores higher than or equal to 0.5 were reserved (Turner & Carlson, 2003).

A preliminary study was also conducted to test the consistency reliability of the questionnaire, Cronbach's alpha coefficient of knowledge was 0.752, attitude was 0.732 and food frequency questionnaire was 0.786 for 22 food items. The coefficient correlation of iron intake from food using 24 food recall; between two week days is 0.582, between average of two weeks day and one weekend day is 0.664.

3.9. Educational Materials

The anemia pictorial booklet (Appendix Q), iron-rich eating and iron-folate intake SWOT matrix and paper-based of supplement reminder (Appendix R) was developed during preparation of study intervention. These materials were used to provide education to anemic pregnant women in intervention area focused on iron-rich eating and iron supplement behavior through home visit counseling.

3.10. Data Collection

The questionnaire was performed during home visit by a trained interviewer at each municipality. Interviewer was woman having nutrition diploma education and experienced of 2-3 times of food recall survey. The blood collection for hemoglobin and hematocrit examination of venous blood, measured by complete blood count (CBC) was also carried out during the home visit by a laboratory officer from primary health care unit of municipality. The distance between measurements was average of 15 weeks from baseline where all participants had entered the third trimester of pregnancy, then followed until delivery. The number of iron-folate intake was evaluated by counting the rest of tablet, the pregnancy outcome data obtained from maternal record by midwife village.

Measurements of food recall 24 hours as follows: (Supariasa, 2011)

a. Provide 24-hour recall questionnaire

b. Interview and record all food and drink consumed respondents in household size over a period of 24 hours ago.

c. In addition to the main meals, small meals or snacks and meals eaten outside the home in the note.

d. To determine the size of the weight (grams) of food, interviewer show the book of food photos; 3 dimension food pictures (Ministry of Health Indonesia, 2014a).

e. Input the data into Nutrisurvey software to know the iron intake in mg /day. Nutrisurvey program is available in other countries , for example in Thailand (Srisura, 2019), Somalia (Joseph, James, & Noreen, 2004), and Tanzania (Christine et al., 2018).

Measurements of Food Frequency Questionnaire as follows : (Supariasa, 2011)

a. Provide FFQ questionnaire

b. Interview and record the frequency of eating the kind of iron rich food in daily,   weekly and monthly.

c. Each item were ranked on a 5 scale according to how frequently the behavior were performed as followed; 5 when ingested more than once a day, 4 when ingested at least once a day, 3 when ingested 4-6 times a week, 2 when ingested 2-3 times a week, 1 when ingested once a week or never consume it during the last one month (Schlundt et al., 2007) The total possible score ranged from 22 to 110 point.

3.11. Data Analysis

SPSS 16.0 version under licensed of Chulalongkorn University will be used to analyze the descriptive and inferential statistics in the result of this study.

3.11.1 Descriptive analysis

Table 2 **Descriptive Statistic Analysis**

No	Variables	Frequency and proportion	Mean (Standard deviation)	Media (Interquratile range)

1	a. Education,
	b. Occupation
	     c. Type of family
	     d. Number of gravidity
	     e. Premature birth
	     f. Intrauterine death
		√	-	-

2	a. Age b. Number of family member c. Montly family income d. Knowledge e. Attitude f. Food frequency questionnaires g. Hemoglobin concentration h. Hematocrit concentration i. Low birth weight	√	√	-
3	a. Gestational age b. Number of iron supplement intake	-	-	√
4	a. Daily food iron intake of the 24 hours food recall	√	-	√

3.11.2 Inferential statistics

The Kolmogorof Smirnov test used the chec the normality of data. The Chi square test,

Student's t-test, Wilcoxon ranked test, Man U Whitney and Ancova test were used to compare

the differences between the intervention group and the control group across time measurement.

All analyses used a 95% CI, and the level of significance for all the statistical tests was set at p-value <0.05.

Table 3 **Inferential statistical analysis**

No	Variables	Numerical data		Categorical data
		Test for within group	Test for between group	
1	a.Knowledge b.Attitude c.Food frequency score	Paired t-test	Unpaired t-test	Chisquare test
2	a. Daily food iron intake of the 24 hours food recall	Wilcoxon ranked test	Man-Whitney U test	Chisquare test
3	a. Number of iron supplement intake	Ancova test	Man-Whitney U test	-
4	a. Hemoglobin concentration b. Hematocrit concentartion	Paired t-test	Unpaired t-test	Chisquare test
5	a. Prematurity birth b. Intrauterine death	-=	=	Chisquare test
6	a. Birth weight	=-	Unpaired t-test	Chisquare test

3.12. Ethical Consideration

This study was approved by Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Universitas Gajah Mada Indonesia (KE/FK/0609/EC/2017) (Appendicx U). A permission to carry out the study is obtained from each head of municipality health office. Prior to taking part in the study, the study objectives and data collection processes were fully explained to the anemic pregnant women, who then signed a written consent form in Indonesia language to indicate their willingness to join the study

CHAPTER IV
RESEARCH RESULT

This is a quasi-experimental study to evaluate the effect of anemia booklet education and supplement reminder to knowledge and attitude regarding anemia, iron-rich eating practice, number of iron-folate intake subsequently to affect the hemoglobin and hematocrit concentration along with pregnancy outcomes of anemic pregnant women in province Aceh Indonesia. Study area is between two comparable municipalities; Kota Langsa municipality (intervention area) received the antenatal care education using anemia booklet and supplement reminder, while Kota Lhokseumawe municipality (control area) received the usual antenatal care. Total of 70 first antenatal care visitor of anemic pregnant women at each municipality were invited to participate in this study. The final outcome analysis was 140 pregnant women.

The result of this study consist of 3 parts; development of booklet and reminder, development of SWOT analysis of baseline survey data and measuring the knowledge and attitude (scoring), iron-rich eating practice (iron intake in mg/day and food frequency questionnaire score), number of iron-folate intake, hemoglobin and hematocrit concentration, pregnancy outcomes (premature birth, birth weight and intrauterine death).

4.1. Development of booklet and supplement reminder
Development of materials was prepared before participant recruitment; pregnant women involved in this stage were not participated in intervention program.

4.1.1. Development content through Focus Group Discussion (FGD)

The FGD was held based on Health Believe Model (perceived susceptibility and severity of anemia during pregnancy, perceived benefit and barriers to prevent and treat anemia) and cue to the educational needs for pregnant women.

a.   The characteristics of the FGD participants

Seven women aged between 25 to 35 years old with educational background of secondary school or higher were convenience selected to participate. The group consists of pregnant women, non-pregnant women and health care volunteers (Table 4).

Table 4 **The characteristics of FGD Participants**

No	ID	Age	Education	Occupation	Additional Information
1	A	24	SC	Housewife	Pregnant women (16 weeks of GA)
2	B	29	BD	Housewife	Pregnant women (20 weeks of GA)
3	C	25	DD	Housewife	Non- pregnant women
4	D	32	SC	Housewife	Non- pregnant women
5	E	32	SC	Housewife	Non-pregnant women, having experience of anemia at previous pregnancy
6	F	30	SC	Housewife	Health Volunteer
7	G	35	SC	Housewife	Health Volunteer

Abbreviation: SC: Secondary school (completed 9th grades), DD: Diploma degree, BC : Bacheloor degree, GA : Gestational age

b.   Result of FGD session

<u>Topic of definition of anemia</u>

All of participants admitted to have awareness of anemia term from midwife or doctor. Mostly mentioned it with the term of *"kurang darah"* (English= shortage of blood/ bloodless disease). The   term of *"kurang darah"* is well known in Indonesia to define of anemia. Indeed, one of health education material by the ministry of health Indonesian entitled "Healthy since in the womb to the elderly" also used the term "*kurang darah"* in the following quotation *"Young*

women perhaps to take daily of iron-folate supplement during menstruation, and once a week

when not menstruating, to stay healthy and avoid anemia (kurang darah) ".

However, they feel difficult to explain the meaning of "*kurang darah" /*shortage of

blood/bloodless disease term eventually. None of women mentioned about blood test or

hemoglobin level instead of mentioning the symptoms. Participants mentioned sign and

symptom such as dizziness, headache, weaknesses, poor appetite, sleepy and pale of skin to

define anemia. All of them declare of had ever experience of blood test with midwife but they

were not sure to mention what is the meaning of the test.

" The Midwife said it is (blood test) to check conditions of my pregnancy , and when i am

detected to have anemia I was told to consume more food and to take the tablets (iron tablet)

every day" (Participan E, experienced anemia).

Participants expressed their interest about the function/mechanism of blood and

hemoglobin in the body regarding anemia.

"How the blood can causes dizziness and headaches?, and what is the meaning of

hemoglobin?" (Participan E, experienced anemia)

Research team proposed the answer of this question in the booklet. However, there was

participant assumed anemia as same as low blood pressure (Hypotension).

"Anemia is about often experiencing dizziness, head ache and low blood pressure" (Participant

A, currently pregnant).

Topic of perceived susceptibility of anemia

Participants were asked about the risk of having anemia during pregnancy. The answer

was mostly based on their own experience. Women having anemia at latest previously expressed

that she did not realize it until she had blood test. Other women were not confidence to discuss about it.

"I did not realize of having anemia until the midwife checked my blood (six month of gestation), I believed I have good diet during pregnancy but I wonder why I have anemia. I think women need to be informed what kind of suggested food to eat and not to eat during pregnancy"(Participant E, experienced anemia).

"The Midwife talk about anemia and gave me the tablet (iron tablet), she (midwife) asked me to eat more food contain of iron and the example are fish and soya juice. Now, I wonder other kind of food that contains of iron" (Participant A, currently pregnant).

The booklet subtitle about "Definition Anemia" and "Sign and symptom of anemia", comprise of:

1) "*kurang darah*" term to be part of anemia definition in the booklet followed with the hemoglobin cut of point to indicate anemia

2) Function of blood and hemoglobin test

3) Schedule and place to obtain hemoglobin test

4) Sign and symptom of anemia

Topic of the causes of anemia

The commonest answers were severe tired and lack of rest. Others were due to staying up late at night, eating less food, lack of nutritious food consumption.

" ...maybe because of severe tired and lack of nutritious food consumption" (Participan A, pregnant women).

" Pregnant women are weak but still have to do household work day by day instead than having enough rest" (Participant C, non- pregnant women).

"I think it is meat and fish are nutritious food*, but I do not have idea about vegetables"* (Participant C, non- pregnant women)

None women mentioned lack of iron-rich food as the cause of anemia neither other nutrient types. None also related anemia with the infectious disease. Hence, facilitator informed and exposed women the list of animal and plant rich of iron-, vegetables and fruit rich of vitamin C. Women were asked to discuss which food that are recognize and available locally to put in booklet.

The booklet **subtitle** about **"Causes of Anemia"** in the booklet comprises of;

  1)   Lack of iron-rich consumption, types of iron-rich food pictures

  2)   Several diseases related to anemia

Topic of consequences anemia to mother and child

Women mostly mentioned the effect of anemia were weaknesses and dizziness. Only one health volunteer mentioned about the risk of hemorrhage during delivery and related anemia with baby born health status.

"As I remember the midwife told me anemia can cause over hemorrhage during delivery the baby and born unhealthy baby" (Participant F, health volunteers)

Women said that they were expected to deliver healthy baby which defined by one participant as *".....free from physical disability, smart and beautiful* (Participant B, pregnant women).

Topic of perceived severity of Anemia

Facilitator exposed women with information of anemia prevalence and consequences, thus all participants agreed anemia is serious problem in province Aceh and Indonesia. Facilitator asked participant perception about how to increase the awareness of seriousness of anemia, and they suggested creating horrible pictures in the booklet to illustrate the effects of anemia.

" ...*put a lot of blood and horrible pictures about impact of anemia* " (Participant E, experienced anemia)

Among negative outcomes related to anemia informed by facilitator, women choose three disadvantage outcome that they claimed are easy to understand about the condition; pregnancy hemorrhage, low birth weight and risk of death of maternal and child. The booklet subtitle about "Consequences anemia to mother and child" comprises of flow diagram of the disadvantage outcomes.

Topic of prevention and treatment of anemia

Along with their answer about causes of anemia, participants suggest pregnant women to have more sleep, eat more quantity of food, drink vitamin and iron tablet.

"Pregnant women must avoid too much work; eat whatever food available in their home. Soya juice is very good for pregnancy" (Participant D, non- pregnant women)

"It is very important to drink vitamin and iron tablet to make pregnant women stronger. Eat more fish to have smart baby and green been porridge to make the baby skin smooth" (Participant F, health volunteer).

Indeed, women agreed that prevention and treatment anemia is through propert food and iron-folate intake. However, they admitted not to have enough knowledge about nutrient need during pregnancy either nutrient content in the food.

Moderator conducts activity to classify the food that they choose and summarize during topic of the causes of anemia discussion previously (animal and plant rich of iron, vegetables and fruit rich of vitamin C) to the group food. Participants agree to divide the group food in the booklet as animal food rich of iron, vegetables rich of iron, nuts and bean food, fruit rich of vitamin C. Women also discuss about how to present the portion/size of food in the booklet, the large, medium and small size portion of food was accompanied by information of size in gram according to participant's consensus.

"We need to put both (large/medium/small and gram size), it helps us to imagine the actual portion. Some are familiar with the gram size because we know the weight of food stuff when we are shopping." (Participant F, health volunteers).

The booklet sub title of prevention and treatment of anemia compose of pictures of animal and plant rich of iron and food rich of vitamin C as enhancer of iron absorption. Booklet also include the picture of "My plate" ; describe the size of food based on its proportions on a plate and nutrition balance message for pregnancy from government.

"The 'My plate'picture did not support us to imagine the food volume / height of food when served to a plate". The gram size is appropriate complementing information to describe suggested portion of each group food. (Participant B, pregnant women).

The information about iron-folate intake was discussed and to include in the booklet about dose (daily) tablets should be taken, how to get the tablets, how to take the iron tablet (avoid inhibitor such as not to drink with tea, enhance with vitamin C).

Topic of perceived benefit and barrier to provide iron-rich food and iron tablet compliance

Women agreed pregnant women should consume more animal foodstuff, vegetables and fruits compared before pregnancy rather than increase the amount of carbohydrate source (rice) only.

"After educated by midwife village I know several foods that are suggested such as meat, soya juice and green leaves vegetables because contained of nutrient something. However, I do not think I will remember for long time about many kind of food because I do not understand about nutrient and type of food containing it , unless I have list of them to remind me" (Participant B, pregnant women).

Women stated the benefit of this iron tablet is in order not to feel weak during pregnancy and not to feel dizziness, and improving maternal health generally.

"I received 30 tablets last week from midwife villages, it has to be taken daily to gain more strength during pregnancy and she (midwife village) suggest me to finish it and I will be given again another 30 tablet while my second ANC. I keep it in above the refrigerator to be easy to see" (Participant A, pregnant women).

I cannot say that taking this tablet make me strength because I feel good, I take it (iron tablet) because midwife said it is good the my health and my baby growth" I keep the tablet on the dining room beside the spoon place because that the place we usually put drugs" (Participant B, pregnant women)

These participant's answer lead the discussion about how to keep the tablet properly; it should not be exposed to direct and hot temperature since it easily damaged due to contact with air (oxidation) especially when exposed to heat (Ministry of Health Indonesia, 1999).

"I have never heard about this before, what if I put all medicine inside the refrigerator" (Participant G , experienced of anemia).

Participant mentioned the barriers to take them are dislike of the tablet smell, filling nausea after taking it, and forget to take then mostly; when they miss it one day than they might forget it until they remember it again by themself. Another reason mentioned is about some people indeed disliking to take any kind of medicine that possibly caused the low compliance of iron tablet intake.

"I feel nauseous after drinking the iron tablet and I do not like the smell so I am not excited to drink it" (Participant D, non- pregnant women).

"There are people dislike taking any medicine, so they would not drink it (iron tablet)" (Participant F, health volunteer).

The booklet subtitle about iron supplement comprise of several subtitles ; benefit and side effect of iron supplement intake, how to minimize side effect, how to keep the tablets propertly, and how to build the habits of tablet intake tailor with routine.

Cue for action to create the booklet and reminder

Participants agreed that the reading interest of pregnant women was very low, but they also agreed that books were very important in increasing knowledge.

"There is proverb said that 'reading is the window to the world', if we want to be smart we must read. Because from the television there is no information, the radio also does not exist, we can look through the internet from a smartphone also to read the information. It is now depends on the mother's willing to know about information or not" (Participant F, health volunteer)

"We do not know whether this (anemia) book will be read or not but government must provide it for pregnant women like the pink book (maternal and child health book" (Participant G, health volunteer)

"I feel excited to read this book because this is my first pregnancy, but I don't like thick book" (Participant B, pregnant women)

"I suggest the titles in the book are written with interesting letters and full colors and images. The book should not too thick and apply big letters" (Participant D, non- pregnant women)

Women did not have an idea about the reminder, however some of them mentioned about to create a list or checklist in a paper.

"May also be tried to help pregnant women calculate the amount that has been taking" (Participant D, non- pregnant women)

Moderator explained that this reminder function is for visual attraction, thus pregnant women should put it at visible spot/place and supported with checklist spaces on it. Moderator offered the advice of taking the iron-folate tablets before the sleeping, but a participant expressed experience of difficult to sleep after taking it, then the message of tailoring with specific routine was not included in the reminder.

"So it is like sticker, than we can put it at the wall and we can mark for the list available" (Participant C, non-pregnant women)

"If this reminder is nicely pictured would be interesting" (Participan B, pregnant women)"

All participants agreed with the title of the booklet. Low input related to it due to the "healthy pregnancy without anemia" word is obviously illustrates the content of booklet.

"Displaying 'Kreu Seumangat' word is very good because this is a good word. Parents in the old days always say this to their children such as praying and encouraging their children" (Participant G, health volunteer).

The process of layout creation, formatting and illustration of the booklet was carried out by professional graphic artist. The first version of booklet had 33 pages, however after validation process its final version had 21 pages. It was printed in colorful background and letters, sized of 17 x 12 cm with the title; *Krue Seumangat*, Healthy Pregnancy without Anemia".

4.1.2. Validation of anemia booklet

a. Booklet reviewed by women involved during FGD of booklet development

The women who participated in developing booklet were invited to evaluate the first version through another FGD using instruction and question at Appendix E. Participants and facilitator agreed to systemize of reading and look down per pages to make consensus revision of the booklet. All participants performed a positive evaluation of the booklet. The main suggestions of pregnant women are shown in table 5 and the consensus of revision was obtained at same day.

Table 5 **Suggestion by women for the booklet**

No	Subjects	Suggestions	Approval status
1	Color	Prevent color of black, grey and white	Approved
2	Letters	Use bigger letter, do not use black color letter	Approved
3	Illustration	Improve the color of the foodstuff , add more husband picture rather than at cover only	Approved
4	Words of "abortion"	Change the "abortus" (medical term) to "keguguran" (Indonesia language) to be more easier to understand	Approved
5	Elaborate the meaning of inhibitor	Inhibit: that would prevent absorption of iron nutrient contain in food	Approved
6	Portion size; elaborate the meaning of it	Portion size per serving	Approved

Women were shown the booklet revision at further meeting appointment and they accepted and satisfied with the revision. Although, there are some gradient color and background in the layout that they want to be changed, research team was considering it including in next validation process by health personals.

b. Booklet validation by health personals

The nine health personnel were convenience selection; one of medical doctor, two of master in community nutrition, one of master degree in health behavior and five of midwives village. The language was considered easy to understand by all of them. The health personnel suggestions are given for inclusion and exclusion of information. Individual evaluation of material was applied and summarized (table 6) after the questionnaire returned within one week (Appendix G). The consensus revision approval was obtained through individual anonymous evaluation. Each of health personnel were given the summary of suggestions and were requested to choose/vote to include or exclude the information along with considerations behind.

Table 6 **Suggestion by health personals for the booklet**

No	Subjects	Suggestions	Approval status	Consideration
1	Definition of anemia	Elaborate about iron requirements based on trimester	Not approved	This will be confusing for the mother, because iron absorption is influenced by many factors not only based on the actual intake
2	Causes of anemia; Lack of iron rich consumption	Deleted pictures of iron-rich food in this subtitle because it is repetition in subtitle of prevent and treat anemia about these	Not approved	Because this is important repetition. In the subtitle prevent and treat anemia has more explanation compare in subtitle

		types of iron rich food		causes of anemia then it is considerate as little repetition
3	Causes of anemia	Elaborate healthy behaviors related to the anemia-related diseases; intestinal worms, tuberculosis and malaria	Not approved	It is deviate from the topic of anemia. It must focus on anemia and minimize the pages
4	Consequences of anemia	Adding word "risk" following sentences of miscarriage and prematurity at picture information	Approved	-
3	Types of iron rich-food	Deleted portion size in gram	Not approved	Because we cannot serve target with three dimension picture ,thus household size must be complement with gram size to give an idea to the target about the size of the food
4	Nutritional balance messages	Adding nutritional balance messages for pregnancy	Approved	-
5	Antenatal care	ANC schedule to obtain iron tablet	Approved	-
6	Storing iron tablet	Adding text and picture about treating/storing iron tablet	Approved	-

The results of the revision were approved by all health personal, and they were asked to re-evaluate the additional information included into the booklet according to the consensus.

4.1.3. Pre-test the booklet with pregnant women

It is aims to assess the suitability of booklet using suitability assessment material questionnaire (Appendix I). The pregnant women participated; these women were met at health care facility such as government hospital (1 unit) and primary health care facilities (5 units). All of them is housewife with a minimum age is 22 years, maximum age is 34 years old and the mean of age 26 years. Regarding the level education; 10 (33.3%) women completed 9th grades and 20 (66.7%) women completed 12th grades. Evaluation of each domain is in percentage.

Table 7 **Result of suitability assessment material for booklet**

No	Domain rating	Mean (%)	Min (%)	Max (%)
1	Message content	86.3	75	100
2	Literacy demand	89	80	100
3	Pictures & Graphs	92.3	90	100
4	Layout & Typography	90.4	87.5	100
5	Learning stimulation & Motivation	88.3	83.3	100
6	Cultural Suitability	100	100	100
	Overall percentage rating	91.05		

Overall booklet percentage rating is interpreted as superior material. As the booklet meets the pregnant women general need, there was no subsequent revision that made to booklet.

4.2. Development of SWOT Analysis

Present study SWOT analysis was to plan strategies of enhancing iron-rich food intake and iron-folate intake. It was two-step process; the first step (Table 8) was identifying the core themes that fall into each SWOT elements, the second step (Table 9) was to combine and transform core themes into strategies; strengths-opportunities (S-O), weaknesses-opportunities (W-O), strengths-threats (S-T), and weaknesses-threats (W-T) (Balamuralikrishna & Dugger, 1995)

The core themes were structured using result of intervention group baseline data, focus group discussion (FGD) result among 7 anemic pregnant women in intervention group, literature review of municipality's health profile and related studies. Regarding focus group discussion among seven anemic pregnancies about pregnancy diet, it showed consensus on consuming more amount of food than before pregnant, however participants admitted less information about the nutrient needs during pregnancy and nutritional value of food. One participant said *"I eat more but I do not know if food with particularly content (nutrient) need to consume due to the pregnancy"*. Another said *"..., it cannot be supported with the kind of good-food because we do not know which ones is good or bad for pregnancy"*.

The "good-food" was expressed as "nutritious food" and "food content of vitamin", participant were familiar to these terms from health worker. These terms were elaborated as diet composed of animal food, vegetables, fruit and pregnancy milk. Red meat (beef) was discussed as high-quality food followed with chicken and fish. Spinach was mentioned as good source of vitamin while orange, banana, papaya and mango were particularly fruit consumed. Most of them emphasized that milk was not priority (economic constraint) and personally dislike of drinking it. Several participant statement *"Red meat is a very good-food so is the reason of highly- price, it*

is energy enhancing food". "Spinach enriched with vitamin, all vegetables are good for health".

"Banana and Papaya are always available (not seasonal fruit), low in price and good for

digestion, oranges is rich with vitamin C, and many people in surroundings owned mango trees"

Participants stated sources of general health understanding were from health worker,

family, friends and college student went for field study in their neighborhood.

Concerning accessibility to foodstuff, all FGD participants believed that majority women

in their village used to buy foodstuff at their neighborhood shop which is specifically meant to fit

in to the needs and desires of the local community (Krukowski, West, Harvey-Berino, & Prewitt,

2010). The shop distance was identified within 20-30 minutes of walking for back and forth,

several perceived favorable to access by walking, while others perceived importance to prevent

transportation expenses as underlying reasons of shopping at neighborhood. One of them said "I

do not have a vehicle to go to the city market because my husband uses it to go to work, so I

shop near my house. Taking rickshaw is expensive fare, it is better to use the money for buying

more food (than spent it for transportation)"

It was discussed that the shop provided several types of fish, vegetables and cooking

ingredients, while beef, poultry, seafood other than fish either fruits were not available.

Participant defined main daily menu must at least consist of fish and vegetable, hence the

neighborhood shop was considered reliable to provide foodstuff for their daily menu. A

participant shared "This shop provides everything I need such as onions, chilies and other spices

as well. The vegetables, chicken eggs, fish and salted fish were also there. The shop does not

provide fruits".

The ministry of health Indonesia recommended the singleton pregnancy to eat protein animal-food such as meat (three times of serving, of 35 grams/serving) or fish (three times of serving, of 45 grams/serving) and protein plant-food such as tofu and *tempeh* (four times of serving, of 50 grams/serving), vegetables of four times of serving, of 100 grams/serving, and four times of serving, of 50 grams/serving for fruits, the recommendation of iron daily intake during pregnancy is 35 mg/day (Ministry of Health Indonesia, 2014b)

Table 8 **The SWOT core element of iron-rich eating practice and iron-folate intake of anemic pregnant women at intervention group**

Strengths	Weaknesses
1. Fish and chicken egg were animal food consumed predominantly (QN).	1. Less frequent intake of animal food, particularly red meat, poultry and offal (QN, FFQ). Only 27.2% consume 3-4 times/day, others were less (QN- 24FR).
2. More than 80% of participant has monthly family income above poverty line (QN).	2. Less frequent intake of protein-plant food (QN, FFQ). Only 39.9 % consume 1-2 times/day, others were less (QN- 24FR).
3. Anemic pregnant women were consensus that "good-food" compost of animal food, vegetables, fruit and pregnancy milk (FGD).	3. Less frequent intake of vegetable including green leaves vegetables. The gram/serving was only a half than recommendation (QN, FFQ). Only 41.1% consume 1-2 times/day, others were less, of 40 gram (QN- 24FR).
4. Antenatal care at least 4 times visit was 95% (LR) (Health office of Aceh, 2017)	4. Less frequent fruits particularly enriched with vitamin C (QN, FFQ). Only 24% consume 1-2 times/day, others were less (QN- 24FR).
5. Iron tablet distribution for 90 tablets was 95% (LR) (Health office of Aceh, 2017)	5. Iron intake was 1.8 mg/day of 35 mg/day recommendation (QN- 24FR).
6. No charge for iron-folate supplement tablets from government (LR) (Health office of Aceh, 2017)	6. More than 80% pregnant women drink tea at least once a day and with breakfast (QN- 24FR).
7. Iron-folate is available in village health care unit (LR) (Health office of Aceh, 2017)	7. More than 60% participant's education were 9th grades (QN).

	8. More than 50% participants did not know that green leaves intake can prevent anemia, drinking tea with meal can inhibit iron absorption from food, food with vitamin C can improve iron absorption (QN).
	9. Less consume of red meat (beef), poultry was discussed due to cost factor (FGD).
	10. Perceived of less acknowledgement about micronutrient-rich food (FGD).
	11. Lately access first antenatal visit; mean of 19 weeks gestation (QN).
	12. Forgetfulness (LR,(Wiradnyani, Khusun, & Achadi, 2013) FGD); less method of reminder, pregnant women count on themselves to remind of taking iron-folate supplement (FGD).
	13. Most of women experienced nausea from supplement intake (QN)
Opportunities	**Threats**
1. Counseling on micronutrient-rich food during antenatal (LR, (Kavle & Landry, 2018), FGD	1. Cost of food and availability of varieties foodstuff at the neighborhood shop (LR,(Kavle & Landry, 2018) FGD).
2. There were foodstuffs shops in participant's neighborhood that is consider to be ease to access by women (FGD).	2. Personal preference/taste of food (LR, (Kavle & Landry, 2018)
3. Counseling of iron-folate supplements (LR, (Berti et al., 2014), FGD)	3. Side effect experienced ; nausea, smell of the iron-folate tablets from government (FGD)
4. There were private clinic that are closer to the mother's house (FGD).	

Abbreviations: QN, quantitative data; 24-FR, 24 hours food recall; FFQ, food frequency questionnaire; FGD, focus group discussion; LR, literature review.

Table 9 **The SWOT strategies of iron-rich eating practices and iron-folate intake of anemic pregnant women at intervention group**

Strengths- Opportunities	Weaknesses- Opportunities
1. Maintain, improve method and material for nutrition education during antenatal care (S1-4, O1).	1. Increase frequency animal food consumption to 3-4 times/day; focused on fish and eggs (W1, W9, O1-2).
2. Empower community/religious leader, family, private clinic, health volunteer to promote early first antenatal visit (S4, O1, O3, O4).	2. Increase frequency of soy-based food , frequency, gram/serving and varieties of green vegetables; single to mix vegetables menu as well as fruits intake (W2-W4, O1-2)
3. Conduct assessment of micronutrient-rich food available at neighborhood foodstuff store (S1-3, O2).	3. Review of nutrition guideline to promote more iron-rich food and vitamin C food; affordable in cost, local available, and recognized by the community. Iron-rich food; animal food: local type of oyster, plant based food: beans, nuts, and certain types of tubers, fruit: *salak* fruit, dates. Vitamin C rich food; potatoes, sprouts, cauliflower, guava, water melon, jack fruit, star fruit, avocado (W5, O1-2)
4. Maintain and increase accessibility of iron-folate supplementation (S4-7, O3).	
5. Initiate to expose the anemia issue to the community across gender, age, profession. Paper-based media put in potentially places visited by the community and mothers such as government village offices, with prior permission at health volunteers homes and foodstuff stores in villages, central public markets, government billboard and digital billboard (available at intervention area) located at the protocol roads (S4-7, O3).	4. Change the habit of drinking tea separately at least 2 hours from meal time (W6, O1)
	5. Create pictorial media of micronutrient food (W7, W8, W10, O1)
6. Supplement provided by private clinic without bad smell and taste, no gastrointestinal discomfort side effect (S2, O4)	6. Encourage pregnant women to access early antenatal care below 12 weeks gestation at any time pregnancy and help to promote this behavior to their family and

		friend of reproductive age (W11, O3-4).	
		7. Integrate iron intake with routine activities or create other system reminder (W12, O3)	
Strengths- Threats		**Weaknesses-Threats**	
1. Anemic pregnant women was strongly suggested not to shop at the same neighborhood shop continuously, visit more than one store to assess the varieties food available (S2, T1, T2).		1. Local government facilitates the discussion between neighborhood shop and community regard demand and avalaibility micronutrient- rich food avalaibility (W1-5, T1-2).	
2. Practices to processed foods according to preference taste (S1-3, T2).		2. Enhance perceived of risk, seriousness of anemia, benefit of iron supplement intake (W11-12, T3).	
3. Taking government iron tablets alternately with iron tablets sold at pharmacies to less gastrointestinal discomfort (S2, T3)			
4. Approach local government health care to include vitamin B complex with iron supplement to less gastrointestinal discomfort (S5-7, O3).			

Abbreviations: S, strengths; W, weaknesses; O, opportunities; T, threats

There were 19 strategies raised in SWOT matrix (Table 9), and 12 strategies was exposed to anemic pregnant women during the counseling; (S-O)1, (W-O)1-7, (S-T)1-3, and (W-T)2.

4.3. Quantitative result

4.3.1 Socio demographic and pregnancy characteristics of anemic pregnant women at baseline survey

The results (Table 10) revealed that socio demographic and pregnancy characteristics were similar in both groups (p-value > 0.05) included age, education, occupation, type of family, number of nuclear family dependents, monthly family income, gestational age in weeks and number of pregnancy (gravidity). The total participants were 140 anemic pregnant women; 70

women in intervention group and 70 women in control group. The mean age of women in intervention group was 28.47(SD ±3.512) years and 28.24 (SD±3.821) years in control group. Most of them were completed 9th years of formal education; 65.7 % in intervention group and 54.3 % in control group, majority of them were house wife; 95.7 % in intervention group and 92.9 % in control group. In term type of family, almost all of them were nuclear family; 88.6% in intervention group and 85.7% in control group with the number of nuclear family dependents was mostly small family (≤4 person) as many 78.6% with mean of 3.3 person in the intervention group and 81.4% with mean of 3.4 person in the control group respectively.

As for monthly family income there were 81.4% family in the intervention group and 70% in the control group have monthly family income above poverty line. All of pregnancies were in second trimester with gestational age median (IQR) was 20 (2) weeks in intervention group and median (IQR) was 20 (0) weeks in the control group. In addition, most of women experienced more than once pregnancies; 51.4% of 2nd-3td pregnancies and 31.4% of ≥ 4th pregnancies in intervention group and 45.7% of 2nd-3td pregnancies and 35.7% of ≥ 4 pregnancies in in the control group respectively.

Table 10 **Comparison on socio demographic and pregnancy characteristics between intervention and control group at baseline survey**

No	Characteristics		Intervention group (n=70) n(%)	Control group (n=70) n(%)	X^2/U (value)	P value
	Socio demographic characteristics					
1	Age in year	20- 30	48 (68.6)	51 (72.8)	0.034[a]	0.855[a]
		> 30	22 (31.4)	19 (27.2)		
		Mean ± SD	28.5 ± 3.51	28.2 ± 3.82		
		Min, Max	21, 35	20,35		
2	Education	9th grades	46 (65.7)	38 (54.3)	1.905[a]	0.168[a]
		12th grades and higher	24 (34.3)	32 (45.7)		
3	Occupation	Housewife	67 (95.7)	65 (92.9)	0.530[a]	0.466[a]
		Working	3 (4.3%)	5 (7.1)		
4	Type of family	Nuclear	62 (88.6)	60 (85.7)	0.255[a]	0.614[a]
		Joined	8 (11.4)	10 (14.3)		
5	Number of family dependents	Small family (≤ 4 person)	55 (78.6)	57 (81.4)	0.179[a]	0.673[a]
		Medium family (5-6 person)	15 (21.4)	13 (18.6)		
		Extended (≥ 7 person)	0	0		
		Mean	3.3	3.4		
		Min, Max	2,6	2,6		
6	Monthly family income (Rupiah)	Under poverty line	13 (18.6)	21 (30)	2.486[a]	0.115[a]
	Rp. 808.094/ person/month	Above poverty line	57 (81.4)	49 (70)		
		Mean	1.770.000	1.740.000		
		Min, Max	300.000, 3.000.000	200.000, 5.000.000		

	Pregnancy characteristics					
7	Gravidity (Number of pregnancy)	Primigravida (1st)	12 (17.1)	13 (18.6)	0.467	0.792^{a}
		Multigravida (2nd-3th)	36 (51.4)	32 (45.7)		
		Grande multigravida (≥4th)	22 (31.4)	25 (35.7)		
		Min, Max	1,5	1,5		
8	Gestational age in		Median (IQR)	Median (IQR)		
	weeks		20 (2)	20 (0)		0.502^{b}
		Min, Max	13,20	14,20		

*Significant at p-value < 0.05, a=Chi-square test, X^{2} value, b= Man-Whitney test, U value

4.3.2 Knowledge and attitude score, daily food iron intake and food frequency score according to time measurement between intervention and control group

There was not a statistically significant difference on knowledge (p= 0.744) and attitude score (p= 0.430), daily food iron intake (p= 0.517) and food frequency score (p= 0.070) between intervention and control group at baseline. While after the intervention program , there was 19.7% improvement of knowledge and 15.5% of attitude score, and 20.1% of food frequency score in intervention group (p= <0.001). Meanwhile there was no significant change in control group, indeed knowledge score and daily iron intake decremented at post intervention time. Thus, there were statistically differences on knowledge (p= 0.002) and attitude score (p= 0.004), daily food iron intake (p= <0.001) and food frequency score (p= <0.001) between intervention and control group at post intervention time . The median presented in iron food intake means that than 50% of intervention group have iron intake <1.8 mg/day while another 50% is ≥ 1.8 mg /day at baseline time (Table 11).

Table 11 Comparison on knowledge and attitude score, daily food iron intake, food frequency score according to time measurement between intervention and control group (n=140)

No	Variables	Intervention group (n=70)	Control group (n=70)	t/U value	P value
1	Knowledge	Mean (SD)	Mean (SD)		
	Baseline	13.7 (2.44)	14.0 (2.53)	-0.78	0.744[a]
	Post-invention	16.4 (2.06)	13.7 (3.0)	5.21	0.002[a]
	P value	<0.001[b]	0.439[b]		
	Improvement changes	19.7%	-0.2%		
	Baseline (Min, Max)	8, 20	7,20		
	Post-intervention (Min, Max)	12,20	7,19		
2	Attitude	Mean (SD)	Mean (SD)		
	Baseline	22.6 (4.20)	24.3 (3.49)	-2.62	0.430[a]
	Post-invention	26.1 (2.11)	24.6 (3.0)	3.42	0.004[a]
	P value	<0.001[b]	0.493[b]		
	Improvement changes	15.5%	1.2%		
	Baseline (Min, Max)	15,30	15,30		
	Post-intervention (Min, Max)	20,30	15,30		
3	Daily food iron	Median (IQR)	Median (IQR)		
	Baseline	1.8 (5.47)	2.2 (5.32)	2294.5	0.517[c]
	Post-intervention	4.2 (3.42)	1.9 (2.58)	1064.5	<0.001[c]
	P value	<0.001[d]	0.104[d]		
	Baseline (Min, Max)	0.33, 23.33	0.37, 24.90		
	Post-intervention (Min, Max)	1,38	0.60, 25.17		
4	Food frequency score	Mean (SD)	Mean (SD)		
	Baseline	48.2 (4.39)	48.1 (5.36)	0.69	0.070[a]
	Post-invention	57.9 (2.69)	48.2 (4.61)	15.92	<0.001[a]
	P value	< 0.001[b]	0.785[b]		
	Improvement changes	20.1%	0.2%		
	Baseline (Min, Max)	38,58	36,60		
	Post-intervention (Min, Max)	53,63	40,58		

*Significant at p value < 0.05, a- Un paired t test, b- Paired t test, c- Man Whitney U test, d - Wilcoxon signed rank test

In post intervention time, more pregnant women have an improved score in knowledge and favorable attitude in the intervention group compared with the control group. The recommended daily intake/RDA of iron (39 mg/day), however has not sufficiently during the third trimester. There were still many women having inadequate of iron food intake withs only 17 women (24.3%) women in intervention group, no women in control group achieveimg adequate daily iron intake (Table 12).

Table 12 **Comparison on knowledge and attitude score, daily food iron intake (categories) according to time measurement between intervention and control group (n=140)**

No	Variables	Intervention group (n=70) n(%)		Control group (n=70) n(%)		x^2 (value)	P value
1	Knowledge	Poor	Good	Poor	Good		
	Baseline	43 (61.4)	27 (38.6)	41 (58.6)	29 (41.4)	0.12	0.730[a]
	Post intervention	15 (21.4)	55 (78.6)	40 (57.1)	30 (42.9)	14.25	<0.001[a]
2	Attitude	Unfavorable	Favorable	Unfavorable	Favorable		
	Baseline	33 (47.1)	37 (52.9)	36 (51.4)	34 (48.6)	0.26	0.612[a]
	Post intervention	10 (14.3)	60 (85.7)	31 (44.3)	39 (55.7)	14.83	<0.001[a]
3	Daily food iron intake	Inadequate	Adequate	Inadequate	Adequate		
	Baseline	70 (100)	0	70 (100)	0		-
	Post intervention	53 (75.7)	17 (24.3)	70 (100)	0	19.35	<0.001[a]

*Significant at p-value < 0.05, a= Chi-square test

Almost all participants of this study having drinking tea behavior for 1-2 times per day. It was not statistically significantly different in proportion between intervention and control group across the time of measurement (Table 13).

Table 13 **Comparison on drinking tea behavior (iron factor inhibitor) according to time measurement between intervention and control group (n=140)**

No	Variables	Intervention group (n=70) n(%)		Control group (n=70) n(%)		X² (value)	P value
1	Drinking tea	Yes	No	Yes	No		
	Baseline	51 (72.9)	19 (27.1)	60 (85.7)	10 (14.3)	2.71ᵃ	0.741ᵃ
	Post intervention	60 (85.7)	10 (14.3)	58 (82.9)	12 (17.1)	0.26	0.642ᵃ

*Significant at p-value < 0.05, a= Chi-square test

During baseline time, women usually drink tea with their breakfast and dinner. After intervention program, women of intervention group changed the timing of drinking tea to at least 2 hours before/after meal time (Table 14).

Table 14 **Comparison on time of drinking tea behavior (iron factor inhibitor) according to time measurement between intervention and control group**

No	Variables	Intervention group n(%)		Variables	Control group n(%)	
		With meal	At least 2 hours before/after meal		With meal	At least 2 hours before/after meal
1	Drinking tea			Drinking tea		
	Baseline (n=51)	49 (96)	2 (4)	Baseline (n=60)	50 (83.3)	10 (16.7)
	Post intervention (n=60)	12 (20)	48 (80)	Post intervention (n=58)	50 (86.2)	8 (13.8)

There were 10 anemic pregnant women in intervention group and 9 anemic pregnant women in control group who did not have iron-folate tablet during baseline data survey. There was statistically significant difference of iron-folic abid supplement consumption between intervention and control group at baseline (p= 0.006) and post intervention time as well (p<0.001). The total iron-folic acid tablet consumption (baseline + post intervention

measurement), however shows that women in intervention group consumed at least two third (65 tablet) until 90 tablet, otherwise in control group consumed only about one third (20-45 tablets) of tablet (Table 15).

Table   15Comparison on iron-folate intake between intervention and control group (n=140)

No	Variables	Intervention group (n=70)	Control group (n=70)	U/t (value)	P value
1	Number of iron folate intake	Median (IQR)	Median (IQR)		
	Baseline	21.5 (26)	10 (18)	-2.748-	0.006[a]
		Mean (SD)	Mean (SD)		
	Post-invention	55.5 (18.69)	23.2 (11.62)	12.299	<0.001[b]
	Baseline (Min, Max)	0, 52	0,35		
	Post-intervention (Min, Max)	11, 90	0,45		
	Total Intake	74 (10)	36 (7)	0.00	<0.001[b]

*Significant at p-value < 0.05, a= Man-Whitney U test, b= Ancova test, c= Wilcoxon rank test

During baseline time, more anemic pregnant women reported obstacles regard iron-folate intake. The nausea is the leading side effect experienced by anemic pregnancy; 67.1% in intervention group and 80% in control group. The others group of obstacles among intervention group included experiencing of dark feses, vomiting, weakness, difficult to sleep and laziness, while in control group was similar with intervention group with addition of constipation and fear to take any medicine (Figure 8).
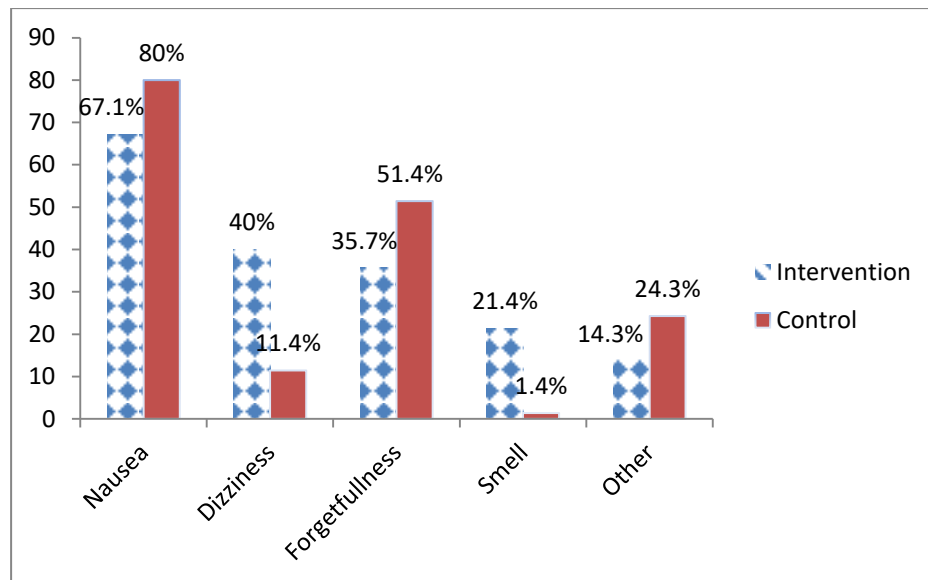
Figure 8 Obstacles of iron-folate intake at baseline time

After intervention period, the nausea side effect is still experienced mostly by the anemic pregnant women; decrease slightly in intervention group (51.4%) and in control group (71,4%). Lower anemic pregnant women report the dizziness and forgetfulness in intervention group compare to control group as well (Figure 9)
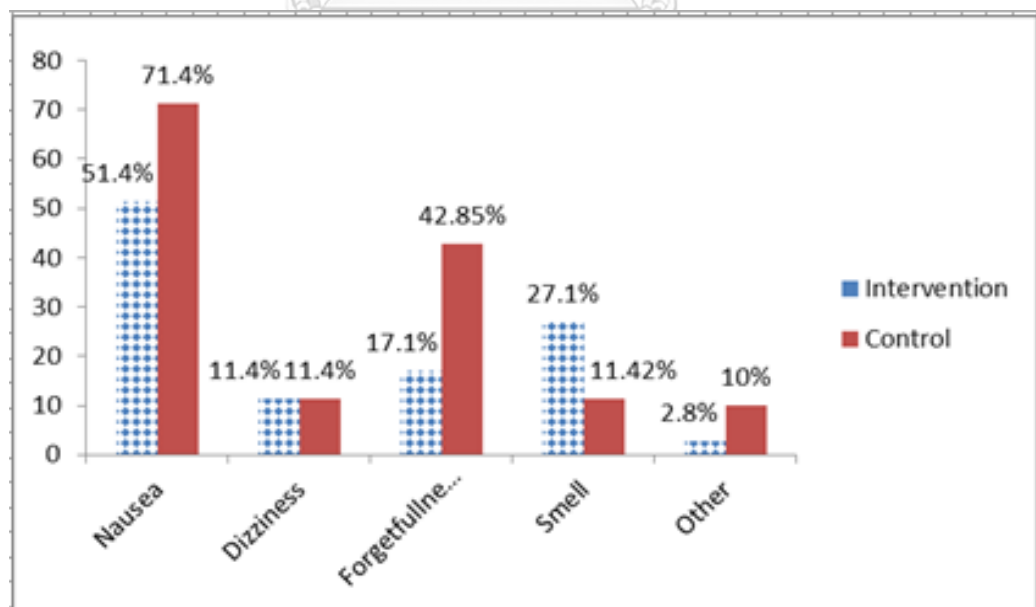
Figure 9 Obstacles of iron-folate intake at baseline data

There was no statistically significant difference of hemoglobin and hematocrit concentration between intervention and control group at baseline time (p=0.156). There was statistically significant difference of hemoglobin (Hb) and hematocrit (Ht) concentration between intervention and control group at post intervention time. The improvement change of Hb and Ht in intervention group was 13.6% and 12.4% respectively, while 0.9% for Hb and 0.6% for Ht in control group (Table 16).

Table 16 **Comparison on hemoglobin and hematocrit concentration (mean) according to time measurement between intervention and control group (n=140)**

No	Variables	Intervention group (n=70)	Control group (n=70)	t value	P value
1	Hemoglobin	Mean (SD)	Mean (SD)		
	Baseline	10.3 (0.28)	10.4 (0.23)	-0.79	0.156[a]
	Post-invention	11.7 (0.37)	10.5 (0.50)	16.25	<0.001[a]
	P value	<0.001[b]	0.620[b]		
	Improvement changes	13.6%	0.9%		
	Baseline (Min, Max)	9.7, 10.8	9.9, 10.8		
	Post-intervention (Min, Max)	11, 12.4	9,5,11.5		
2	Hematocrit	Mean (SD)	Mean (SD)		
	Baseline	31.3 (0.72)	31.0 (0.73)	2.09	0.926[a]
	Post-invention	35.2 (0.81)	31.2 (0.92)	28.62	<0.001[a]
	P value	<0.001[b]	0.603[b]		
	Improvement changes	12.4%	0.6%		
	Baseline (Min, Max)	29.4, 33	29, 32.6		
	Post-intervention (Min, Max)	33.8, 37	29,33.3		

*Significant at p-value < 0.05, a= Un-paired t test, b= Paired t test

All of the pregnant women in intervention were non anemic according to hemoglobin and hematocrit concentration, meanwhile only 14 (20%) pregnant women were non anemic in control group at post intervention times (p=<0.001) as shown at Table 17.

Table 17 Comparison on hemoglobin and hematocrit concentration (categories) according to time measurement between intervention and control group (n=140)

No	Variables	Intervention group (n=70) n(%)		Control group(n=70) n(%)		X^2 (value)	P value
1	Hemoglobin	Anemia	Non anemia	Anemia	Non anemia		
	Baseline	70 (100)	0	70 (100)	0	-	-
	Post intervention	0	70 (100)	61 (87.1)	9 (12.9)	93.33	<0.001[a]
2	Hematocrit						
	Baseline	70 (100)	0	70 (100)	0	-	-
	Post intervention	0	70 (100)	65 (92.8)	9 (12.9)	1.14	<0.001[a]

*Significant at p-value < 0.05, a= Chi-square test   *

There were no premature birth and intrauterine death cases among all participants in both group. There was significant difference of birth weigh between intervention and control group (Table 18). The mean birth weight in intervention group was higher compared in control group (p=<0.001)

Table 18 Comparison on pregnancy outcome between intervention and control group (n=140)

No	Variables	Intervention group (n=70)	Control group (n=70)	t value	P value
		Yes, n (%)	No, n (%)		
1	Prematurity	0	70 (100)		
2	Intrauterine death	Yes n (%)	No n (%)		
		0	70 (100)		
3	Birth weigh	Mean (SD)	Mean (SD)		
		3324.3 (354.04)	2975.7 (279.44)	6.47	<0.001[a]
	Min, Max	2700, 4200	2400,3500		

*Significant at p-value < 0.05, a= Independent t test

Indeed, there were three low birth weight cases (< 2500 gram) in control group (Table 19).

Table 19 **Comparison on birth weight (categories) between intervention and control group (n=140)**

No	Variables	Intervention group (n=70) n(%)		Control group(n=70) n(%)		X^2 (value)	P value
1	Birth weigh	Low weight	Normal	Low weight	Normal		
	Post Intervention	0	70 (100)	3 (4.3)	67 (95.7)	1.28	<0.001[a]

*Significant at p-value < 0.05, a= Chi square test

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CHAPTER 5

DISCUSSION

At the end of the follow up period, the intervention group showed a significant (p< 0.005) improvement in knowledge and attitude about anemia, daily food iron intake, food frequency score, iron-folate supplement intake, hemoglobin and hematocrit concentration and birth weight when compared to control group. There were no anemic pregnant women in intervention group, while 92.8% pregnant women remained anemic in the control of study at the end line of study. Although the iron food and iron folic intake improved at post intervention time, however these are still not achieving the recommendation.

5.1. Socio demographic and pregnancy characteristic

As regards to socio-demographic characteristics, it was found that almost 70% of anemic pregnant women were aged from 20-30 years. This study finding is consistent with studies about effect of nutritional and iron supplementation education among group of anemic pregnant women in Saudi Arabia and Egypt that found majority of participants was 25 to less than 35 years (Ibrahim, El Sayed, & El-aal; Yakout, Taha, Badawy, & Al-Salooly, 2014). Indeed, the Indonesia national survey reported that anemic pregnancy was high at all age; of 15-24 years (86.4%), of 25-34 years old (33.7%), of 35-44 years (33.6%) and aged of 45-54 (24%) (Ministry of Health Indonesia, 2018).

The present study observed that more than a half of anemic pregnant women were 9th graders. Education has been reported to reduce the risk of being anemic in several studies, women who had secondary or higher education were less likely to be anemic compared to their counterparts (Karaoglu et al., 2010; Melku, Addis, Alem, & Enawgaw, 2014; Souganidis et al., 2012). Educated pregnant women have better income and eat nutritious food and hence do not get nutritional anemia (National Bureau of Statistics & ICF Macro, 2011). Unlike low income characteristics of anemic pregnancy in developing countries, more than 70% of our anemic pregnancy had monthly family income above poverty line. Dietary intakes of pregnant women in Korea also did not meet the requirements of iron and folic acid through diet alone and did not differ between high income and low income group (Jung & Choi, 2017).

Anemia in the present study was observed among women belonging to nuclear family, similar to study in Turkey (Karaoglu et al., 2010), India (Bedi, Acharya, Gupta, Pawar, & Sharma, 2015), Ethiopia (Jayanthigopal & Demisie, 2018) but in contrast with another study in India (Suryanarayana, Chandrappa, Santhuram, Prathima, & Sheela, 2017) that mostly anemic pregnancy were from joined family. Number of family member was reported associated with anemia in pregnant women, our participant family member were of 3-4 person in both group. Based on the finding of the study in India (Mulepati & Chaudhary, 2017) and in Ethiopa (Obse, Mossie, & Gobena, 2013) showed that pregnant women who came from more than five family members were significantly association with anemia. Another study done in Northwest, Ethiopia also showed that pregnant mothers who had been living within a family of more than four members were 3.79 times more likely to anemia (Melku et al., 2014).

All of anemic pregnancy in our study enrolled at second trimester gestation weeks, it is similar with studies about effect of nutritional and iron supplementation education among group of anemic pregnant women in India (Shivalli, Srivastava, & Singh, 2015) and Iran (Khoramabadi et al., 2016) that majority the participant were completed gestation 20 weeks and above. Profound hormonal changes and minor ailments (nausea, vomiting and morning sickness), a loss of appetite would be expected in the first semester (Shivalli et al., 2015). Study among first antenatal care of Nigerian women commenced prenatal care as early as the second trimester of their gestation significantly recovered from their anemia contrary to those who commenced later in the third trimester (Ikeanyi & Ibrahim, 2015).

The obstetric history displayed that nearly a half of anemic pregnancy in this study were multi gravid. This result is congruent with several studies among anemic pregnancy in Jordania, Kenya, Qatar, and Egypt that studied the prevalence of iron deficiency anemia increased with increasing parities (Ibrahim et al.; Okube, Mirie, Odhiambo, Sabina, & Habtu, 2016; Salahat & Ibrahim, 2012; Selim, Al-Mass, Al-Kuwari, & Ismail, 2016).

5.2 Knowledge about anemia and nutrition

Knowledge regarding anemia of participants at baseline time indicated that 61.4 % pregnant in intervention group and 58.6% in control group had poor knowledge (p=0.730). There are 5 knowledge questions in intervention group which detected to have lower score than others; as many 57.2% pregnant women does not know that anemia in pregnancy is nutritional disorder (Q4), 61.5% pregnant women does not know that anemia can cause intrauterine death (Q9) , 61.5% pregnant women does not know that green leaves consumption can prevent anemia (Q15), 74.3% pregnant women does not know that drinking tea with meal can inhibit iron

absorption from food (Q18) and 55.7% pregnant women does not know food with vitamin C can improve iron absorption (Q19) ". After education intervention, the overall correct answers in intervention increased 19.7% from baseline score and 78.6% pregnant women have good knowledge compared with remained 42.9% in control group at the end of study (p< 0.001).

Similar to findings in current study, the majority pregnant women in District Srinagar India were unaware that iron rich food can improve anemia and unaware of iron should not be taken with milk, coffee and tea, differently with our population, the mother in India study responded correctly that the fetus will be affected by severe anemia (Nelofar, Mukhtar, & Bashir) (Nivedita & Shanthini, 2016). Another study in India at a hospital obstetrics and gynecological out-patient department also reported poor knowledge of pregnant women about awareness that anemia in pregnancy is nutritional disorder, green leafy vegetables and sprouted grains are rich in iron, citrus fruits promote absorption. The correct answer among them is majority was given by women who were educated up to higher secondary level (Yadav, Swamy, & Banjade, 2014). Meanwhile, in The Kyrgyz Republic, pregnant women who received information about anemia is in higher proportion of knowing that tea consumption affects iron absorption compare to pregnant women who did not received information (Viljakainen, 2016). Pregnant women have good information about the influence of vitamin C and tea to iron but their information is not good enough since they do not know enough on foods that contain iron and vitamin C according to study in Al Bahah , Saudi Arabia (Othman et al.)

The lack knowledge of pregnant women on the seriousness impact of anemia (Q9) and the association of nutrition with anemia (Q4, Q15, Q18, Q19) is clearly will prevent pregnant women from healthy behavior related to nutritional anemia and iron intake. Educating women with appropriate dietary information helped them to include nutritional value of locally available vegetables and fruits in their diet (Omari, Quorantsen, & Omari, 2017) (International Fund for Agricultural Development, 2018b).

5.3 Attitude about Anemia

Attitude regarding anemia of participants at baseline time indicated that 47.1 % pregnant in intervention group and 51.4% in control group had unfavorable attitude regarding anemia (p=0.612). There are 3 attitude questions in intervention group which detected to have lower score than others; anemia is not a dangerous health problem (Q3), Blood/hemoglobin test is performed after the signs and symptoms of the anemia had occurred (Q5), When the women feels the signs and symptoms of anemia repeatedly over time, it will be disappeared by itself without any medication treatment (Q6) . After education, the overall attitude score increased 15.5% from baseline score and 85.5 % pregnant women in intervention group have favorable attitude compared with 55.7% in control group at the end of study (p< 0.001).

Regarding the perceived severity of anemia (Q3 and Q6), similar to women in Mumbai India (Chatterjee & Fernandes, 2014) and Anambara State, Nigeria (Onyeneho & Igweonu, 2016) studies that perceived weakness and fatigue are considered normal during pregnancy. As of the majority of respondents in India do not seek treatment for anemia unless symptoms become severe although mentioning that anemia can be serious enough to require a blood transfusion (Chatterjee & Fernandes, 2014).

Anemic pregnancy in intervention group were lower attitudes about hemoglobin examination (Q5), it might reflected that according to our population the hemoglobin test is not preventive (early detection) but it is anemia treatment after the sign and symptom occurred. Pregnant women who report to earlier antenatal in the first trimester are expected to have any factor that predisposes them to anemia to be timely managed and hence the less tendency for them to be anemic, compared to their counterparts who report beyond the first trimester. Women who wait until the second and third trimester were 2.73 and 1.71, respectively, more likely to develop anemia than those who seek it at an earlier gestational age (Ahenkorah, Nsiah, & Baffoe, 2016).

Although 83.7% of pregnant women in Indonesia and 80% Aceh pregnant women (Health Office of Province Aceh, 2017) accessed at least four times of antenatal care, there is lack information about gestation age of the first antenatal care. In Westmoreland, Jamaica antenatal visits are primarily conducted by midwives in the health center as similar in Indonesia. The majority of women surveyed in Westmoreland did not present to clinics for antenatal care until their second or third trimester (Charles, Campbell-Stennett, Yatich, & Jolly, 2010), making it impossible for them to receive the recommended number of iron tablets and nutrition education in pregnancy (Girard & Olude, 2012). According to the health belief models, response to health conditions depends largely on the perception of the severity of the health condition as well as susceptibility and efficacy of remedies (Rosenstock, 1974).

5.4 Iron-Rich Food Eating Practices According to 24- hours' Food Recall and Food Frequency Score

5.4.1. Iron intake from food

Daily iron intake data according to 24- hours' recall at baseline time indicated that 100% pregnant women in both group had inadequate daily iron intake compared to recommended daily allowances (RDA) of Indonesia 35 mg/day ; median intake of 1.8 mg/day and 2.2 mg/day in intervention and control group respectively. Our population intake was lower than a study in Bogor city, Indonesia that reported median intake of iron among pregnant women is 16 mg/day (Madanijah et al., 2016), pregnant women in China consumed mean of 18 .7 mg/day of recommendation 30 mg/day (Gao et al., 2013), pregnant women in Ontario, London consumed mean of 13 mg/day of recommendation 27 mg/day (Roy, Evers, & Campbell, 2012) and pregnant women in Kenya consumed of 29.9 mg/day of recommendation 30 mg/day (Muthoni, 2017).

After intervention, the mean daily iron intake in intervention increased to median of 4.2 mg/ day, however it is still far below the daily RDA of 39 mg/day for third trimester pregnancy. Distressingly, in control group the mean intake decreased to median of 1.9 mg/day at the end line of study. The food frequency score is also improving 20.1 % from baseline score in intervention group compared to only 0.2% improvement in control group at the end.

The improvement is probably due to the strengths, weaknesses, opportunities and treats (SWOT) analysis in present study has been assist the booklet in presenting comprehensive and integrative strategies to enhance iron-rich eating behavior and the iron-folate intake according to anemic characteristic and contextual factors. The SWOT strategies of eating behavior provided suggestions to maintain and improve customs animal and plan rich of iron, food rich of vitamin C

consumption. The strategies was also to enhance intake of more varieties of affordable, locally available and community recognized of iron and vitamin C rich food. In eastern Maluku and North Maluku provinces, Indonesia where malnutrition levels are high, study of nutrition-sensitive value chains suggested to strengthened value chains for local foods such as bananas, cassava, maize, spinach, sweet potatoes and fish (International Fund for Agricultural Development, 2018a).

Iron rich food in present study content of 1mg-1mg/100g, mostly 2-4 mg/100g. There were food with more iron content but these foods were not recognized neither consumed by our population of study. In addition intake from non-heme is more varieties than heme, indeed it is difficult to fill the need from dietary alone (Jung & Choi, 2017). However, the interaction of vitamin &mineral affect each other in response to iron & synthesis of blood (Gao et al., 2013). Moreover, the absorption of iron is higher at iron deficiency anemia (WHO, 2001).

Studies about diet behavior modification of anemic pregnant women in Egypt using booklet and Trans-Theoretical Model providing appropriate strategies based on participants current intention for diet behavior modification also show improvement toward diet behavior (Ibrahim et al.). Another study applied Health Believe Model on dietary behavior of Iranian pregnant women to illustrates the relationship between beliefs and health using posters, photograph and pamphlets was effective reducing major obstacles for the healthy diet and dietary behavior noted by participants; time and expense needed to be spent for preparing the necessary and nutritive foods (Khoramabadi et al., 2016). Our study intervention program used combination of the Health Believe Model and SWOT analysis theories, none existing study of SWOT analysis using pre and post intervention design to dietary behavior of anemic pregnant women is limited the comparison result of current study.

The educational booklets supported by SWOT analysis in this study turned out to have positive impact on eating practices of pregnant women about good and needed food during pregnancy. The impact summarized in enhancement of type of food (diversity), weight of portions and frequency of consumption.

5.4.2 Iron inhibitor intake

There are 72.9 % and 84.3% pregnant women drinking tea with breakfast in intervention and control group respectively at baseline data of current population. Studies on pregnant women who continue to consume tea and / or coffee during pregnancy can also be found in in Turkey (Karaoglu et al., 2010) and China (Gao et al., 2013). In Croatia, although pregnancy's psychology leads to lowering or abstinence of drinking tea/coffee, these beverages highly consumed by pregnant women and presented as important factor that affect iron bioavailability (Banjari, Kenjeric, & Mandic, 2013). Iron absorption is not a problem when sufficient amounts of heme iron and nonheme iron-enhancing factors are present in the diet. Iron absorption enhancers as present in most industrialized countries overcomes inhibition of iron absorption from even large amounts of tea (Fan, 2016).

After intervention, as many 80 % women intervention group who drink tea with breakfast has switch their habit to drink it at brunch time or afternoon time according to recommendation in our message education to drink tea least for one hour before and after meals (Reyes & Cornelis, 2018) instead of during the meal. Tea has a weaker inhibitory effect on iron absorption when it is consumed between meals (Fan, 2016). Simultaneous consumption of black tea and iron-containing foods inhibits iron absorption by about 60 to 70%, independently of the strength of the tea. While between-meal tea consumption inhibits non-heme iron absorption by about

20% (Zijp, Korver, & Tijburg, 2000). Another study among women in UK observed that tea intake reduces nonheme iron absorption by ≥37% when compared with water used as a control beverage. It also shows that a 1-hour time interval between tea intake and a meal has impact in counteracting the inhibitory effect, by ≥1.6-fold (Ahmad Fuzi et al., 2017).

5.5. Iron-Folate Compliance and the Reminder

There was average of 105 days between measurements from baseline to end of study; range of baseline gestational is 13-20 weeks and post intervention is in range of 30-34 weeks. There is a significant mean different amount of iron supplement intake was observed in intervention group compared with control group; 55 tablet and 23 tablet respectively. However, none of pregnant women in both group comply the iron-intake for daily basis. The causes were probably due to the nausea effect from iron supplement is still encounter, lack of willingness of to buy non-government iron tablet to be consumed alternately with tablet from government, and daily based dose concomitantly with side effect caused low encourage. Intake of 2-4 weeks of taking regular iron supplements response to hemoglobin (World Health Organization, 2016b) (Pavord et al., 2012), should continue to replenish iron stores (generally for at least 2-3 months, until 6 weeks postpartum) by serum ferritin check (Achebe & Gafter-Gvili, 2017).

Most of studies in Indonesia about iron folate intake measured amount of intake recommended minimum 90 days or more during their most recent pregnancy (MOH 2013; Statistics Indonesia et al. 2013) regardless the regularity. The cross sectional study among pregnant women regardless anemia status in four districts of province Banten , Indonesia demonstrated the compliance to 90 tablets ranged 59.59%- 84.45% (Titaley et al., 2017), while in Surabaya, Indonesia reported 57.8% pregnant women admitted to consume the iron-daily tablets of every day (Triharini, Sulistyono, Adriani, Armini, & Nastiti, 2018).

Study in Nepal (Ratanasiri & Koju, 2014) and two other countries (Lacerte, Pradipasen, Temcharoen, Imamee, & Vorapongsathorn, 2011) (Lutsey, Dawe, Villate, Valencia, & Lopez, 2008) categorized iron-folate acid adherence into two groups: (a) good adherence-use supplement for between 90 and 180 days; or (b) poor adherence-use supplement for <90 days. In Nepal, among the 406 pregnant women, 297 (73.2%) had good adherence, whereas 26.8% had poor adherence.

Study in Kyrgyz Republic showed that 44% of women between the years 15 and 49 years took iron tablets or syrup in current pregnancy. Most of the women took iron supplements for fewer than 60 days (National Statistical Committee of the Kyrgyz Republic & International, 2013). An association between regular intake and hemoglobin levels was found in a study on compliance of iron and folic acid therapy in India that showed the significant fall in hemoglobin was observed when less than 50 tablets were consumed as compared to more than 125 tablets were consumed by pregnant women (Nivedita & Shanthini, 2016).

At the end of present study, as many 41.4% pregnant in intervention group and 57.1% in control group reported barriers of consuming iron supplement that were mostly was nausea. There are 17.1% women in intervention group still reported forgetfulness and 42.8% women in control group. Despite of these barriers admitted, mothers never really stopped trying to take iron tablets, they quit someday than to continue again to drink. Another effort by 17.4% women and 20% women intervention and control group respectively is to buy private brand of iron tablets that they claimed of none side effects; these tablets are taken alternately with tablets from the government. However, the intervention group consumed more tablets than group controls.

At end line study there were 17.1% participant in intervention group and 42.8% in control group reported forgetfulness still barriers the iron-folate intake. According to our reminder evaluation (Appendix O), our participants appreciated to the reminder since none of them build reminder system about the iron folate intake. All of them rely on themselves to remember supplement intake. The color and municipality iconic picture (welcoming stone) is attractive according to the participant; however 55% of them regretted the absence of The Al-Qur'an verses in the reminder as available at the pages of booklet. We provided 4 verses from Al-Quran related with prayer to be given a "good" child, such as Surah Ali –Imran verses 38: " *My Lord, Grant me from You, a good offspring. You are indeed the All Hearing of prayer* "

The places of reminder were 43% in the family room (television room, near the calendar, on the wall beside room entrance), 28.6% inside the room, and 10% of other (kitchen, dining room). There are 28.5% whose not willing to do checklist on the reminder because they did not want to "destroy" they reminder by doing the check list, they wonder to have reusable reminder, thus they prefer to consider the present study reminder as visual attraction only not as monitoring tool (checklist).

5.6 Anemia status and birth weight status

All anemic pregnant women in intervention group turned to non-anemia at the end of study, differently with remaining 92.8% anemic pregnancy in control group. There were no premature birth and intrauterine death cases among all participants in both groups. The mean birth weight in intervention group was higher compared in control group (p=<0.001) , indeed there was 3 of low birth weight cases outcome in the control group. A cohort study in Tanzania among anemic pregnancy observed that among 529 pregnant women who had complete

information on hemoglobin, prevalence of anemia is 18% (mild –severe anemia); at delivery, there were 10 stillbirths (2.3%), 16 low birth weight newborns (3.6%), and 2 (0.45%) preterm birth cases, two out of 432 infants died within the first 7 days (0.5%). There is no association was found between anemia and low birth weight, preterm birth, or stillbirths in this Tanzania study (Stephen et al., 2018). However, a systematic review and meta-analysis reported that there were significantly higher risks of low birth weight, preterm birth, perinatal mortality, and neonatal mortality in pregnant women with anemia. Overall, in low- and middle-income countries, 12% of low birth weight, 19% of preterm births, and 18% of perinatal mortality were attributable to maternal anemia. The proportion of adverse pregnancy outcomes attributable to anemia was higher in low-income countries and in the South Asian region (Rahman et al., 2016).

5.7 Effect of Nutritional Anemia Education and Reminder

There are still limited studies that used the combination of education and reminder to improve the anemia status of pregnant women. However, we found two studies to compare with present study. A study among rural pregnant women of Varanasi in India (Shivalli et al., 2015) implemented education to pregnant women and their family members about diet and iron – folate compliance with the help of the reminder material. The Behavior Change Communication (BCC) was used in modifying the social-cultural norms. Pregnant women in intervention group received three home visits (assessment, negotiation, evaluation) with material reminder, and only assessment and evaluation received in the control group. The effect was assessed after 12 weeks intervention. The reminder material in the study is one of the pages of maternal and child protection booklet, displaying key messages with pictures supplied under Reproductive Maternal Neonatal Child and Adolescent Health of National Health Mission India government with name of Mother and Child Protection Cards (MCP cards).

The study claimed MCP card is considerate as more feasible and effective in Indian rural settings. The study result found the reducing of the anemia prevalence in intervention group a half than baseline time, while increased by 2.4 % in control group. As 85% of the pregnant women in intervention group were compliance for iron-folate and only 38% were among controls. Mean intake of iron also improved from 19 mg/day to 21.58 mg/day in intervention group compared to 19.05 mg/day to 19.96 mg/day in control group of the Indians pregnancy recommended dietary allowance (RDA) of iron; 38 mg/day. However this study did not follow until delivery time and the participant included the non-anemia pregnant women.

Another study in Oman, Jordan (Seshan, Alkhasawneh, Al Kindi, Al Simadi, & Arulappan, 2018) was set among anemic pregnant women of antenatal visitor at tertiary reference hospital serving a whole Oman. The study stated that the use of a specially designed culturally-tailored nutrition education intervention with follow-up reminders can reduce the occurrence of gestational anemia. The Trans Theoretical model (TTM) has been the basis for developing effective interventions to promote healthy behavior change. The anemic pregnant women assigned to the intervention group participated in the nutrition educational organized by trained – nurse research assistants. The pregnant women assigned to the control group were allowed to leave the antenatal outpatient department after receiving routine antenatal care.

The interventional package comprised of a PowerPoint presentation with information about the dietary management of anemia, which included an awareness of choosing iron-rich foods, the importance of compliance to iron supplementation as well as a pamphlet that covered information about gestational anemia and its effect on pregnant women and newborns. During the period from 24 to 36 weeks gestation, every fourth week, follow-up WhatsApp

reminders via infographics were sent to the women in the study group to enhance their knowledge of the prevention and management of gestational anemia. The effect was assessed after 12 weeks intervention. There is improvement of hemoglobin mean at end line of study in intervention group from 9.9 g/dl to 11 g/dl , while in control group was 10.2 g/dl to 10.7 with no statistical significant difference between groups. Regard the birth weight, mean of birth weight in intervention group was 2800 gram and 2900 gram in control group with no statistical significant difference between groups.

In line with the United Nation's Sustainable Development Goal (SDG 3) with respect to maternal and neonatal health, the results of these studies include present study can guide an evidence-based and culturally-tailored change in policy development on interventions and strategies in relation to the prevention of gestational anemia (Secretariat Commonwealth, 2017).

5.8. Strengths and Limitation of study

The first strength of our study is that we provided an initial study describing the process of using a SWOT analysis to improve anemia status of anemic pregnant women. The second strength is that our SWOT analysis frameworks was resulted from combination of quantitative and focus group discussion evidences. Third, we developed our own education material (booklet and reminder) with participatory process, validating by health professional and pre-test to pregnant women. Forth, our study described behavior change in the longer term duration (average of 15 weeks) than other studies (Al-Tell, El-Guindi, Soliman, & El-Nana, 2010; Baharzadeh, Marashi, Saki, Zare Javid, & Araban, 2017; Khoramabadi et al., 2016; Shivalli et al., 2015). A fifth study strength is that the outcome variables were not measured by a questionnaire based, subjective self-report only but by objective measurement of the biological markers hemoglobin and hematocrit

concentration as well. The scientific literature in every social science discipline and worldwide reports the frequent recall biases and socially desirable answer biases linked to questionnaire based self-reported behavior. Hence the strength of validating self-reported questionnaire based measurement adding biological markers measurement as done in this research.

However there were some limitation included in this study, first limitation is that iron deficiency status was demonstrated by decreased levels of serum ferritin, serum iron, and transferrin saturation with an elevated total iron-binding capacity,(Kelly, McSorley, Patel, & Talwar, 2017), as present study did not provide these laboratories test is the limitation of the study. Second limitation is that the 'unfavorable pregnancy outcome' was measured by questionnaire based, subjective self-report subject to the above mentioned biases. Given the limited number of study participants, it would have been feasible and much more valid to measure pregnancy outcome by reviewing the delivery records at the health facilities where the participants delivered their babies. Record biases and socially desirable answer biases linked to questionnaire based self-reported behavior. Hence the strength of validating self-reported questionnaire based measurement. A third study limitation is that pregnant women aged 20 years or older only were included in the study. It is, however, while known that all pregnant women are most vulnerable to anemia (World Health Organization, 2015), adolescent is well documented in literature review (Cunnington, 2001) (Anisa, 2018) as well as in individual studies conducted in high income (Briggs, Hopman, & Jamieson, 2007), middle income (Pinho-Pompeu, Surita, Pastore, Paulino, & Pinto e Silva, 2017) and low income (Chalise et al., 2018). The forth limitation is present study did not discuss about number of antenatal care visit. The fifth limitation is the possibility of our population of study visited antenatal care to private clinic and receive another brand of iron supplement.

5.9 Conclusion

From the findings of the present study it can be concluded that educating anemic pregnant women in province Aceh about nutritional anemia using booklet, SWOT analysis principles and material reminder has improved the knowledge and attitude about anemia, and iron-rich foods practices.

5.10. Recommendation

5.10.1 Recommendation for future study anemia study

First is to run the serum ferritin test to gain more valid iron level in the blood. Second is to review the pregnancy outcomes data from health care facility record where the participants delivered their babies. Third is to include the pregnant women below 20 years as they are vulnerable group of anemic pregnancy as well. Fourth is to assess the effect of number and source of antenatal care (government, private or both sources) to the anemia status. Fifth is to record and evaluate the effect of iron supplement intake according to source of iron supplement (government, private or both sources) to iron in blood. The sixth recommendation is since this study is relevant to the situation in Indonesia, Aceh in particular, the state or central government should consider supporting further study at least in the areas as recommended, taking into account the limitation as herein described. In this regard, fresh proposal needs to be developed for consideration of the government.

5.10.2 Recommendation for health policy

First is to expand the free -charge of antenatal care services (universal health coverage) not only with private clinics in the city but also with private clinics in the villages (midwife private clinics), perhaps the more alternative places for pregnant women to perform antenatal care visit will improve accessibility and willingness of the pregnant women to do earlier and frequent antenatal care visit. Second is to resolve the nausea effect of iron folic acid supplement by government as the majority side effect reflected in our population of study. Third is to emphasize nutrition education of antenatal care about behavioral intake of local food rich with iron and folate, intake of iron supplement on regular basis. Fourth is the Indonesia government shall enhance rice fortification evidence research or studies (Better Rice Initiative Asia Indonesia, 2016) to initiate a comprehensive evidence results so the fortified rice can be consumed by larger community. The fifth is he government should be consider for application through incorporating it in the appropriate program and guidelines for practice, especially at health center level since there are a number of good findings from the thesis report which are relevant to the local situation in Indonesia.

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Appendix A : Consent Form

I have read and understand the information in this consent form. All my questions

regarding the study and my participation in it have been answered to my satisfaction. I

have been informed of the risks involved and my rights as a research subject.

I voluntary agree to participate in this study. I understand that I will receive a

signed and dated copy of this consent form. By signing this consent form, I have not

waived and any the legal rights which I otherwise would have as a subject in a research

study.

_____

Printed name of participant   Participant's signature

_____

Place and Date

The above-named subject has been fully informed of the study.

Putri Nahrisah

_____

Signature of person conducting informed consent discussion   Place and Date

LEMBAR PENJELASAN KEPADA CALON SUBJEK

Saya, Putri Nahrisah, SKM, M. Comm Health SC (Cand) dan DR. Samlee Plianbangchang yang diketuai oleh Putri Nahrisah, SKM, M. Comm Health SC, PhD (Cand) dari College of Public Health Sciences, Chulalongkorn University Thailand akan melakukan penelitian yang berjudul **"Krue Seumangat; Kehamilan Sehat Tanpa Anemia" Booklet Efek Terhadap Anemia pada Ibu Hamil yang Mengalami Anemia: Studi Kuasi Eksperimen**. Penelitian ini disponsori oleh The 90th Anniversary of Chulalongkorn University , Rachadapisek Sompote Fund.

Penelitian ini bertujuan untuk mengetahui pengaruh pendidikan melalui booklet yang dikembangkan dengan partisipasi Bidan desa, Kader dan Ibu hamil terhadap pengetahuan dan sikap tentang Anemia, perilaku konsumsi makanan kaya zat besi, kepatuhan meminum tablet zat besi yang selanjutnya akan memberikan efek terhadap kadar hemoglobin dan hematokrit serta hasil akhir kehamilan ibu hamil yang mengalami Anemia

Peneliti mengajak ibu untuk ikut serta dalam penelitian ini. Penelitian ini membutuhkan sekitar 140 subyek penelitian, dengan jangka waktu keikutsertaan masing-masing subyek sekitar 7 bulan.

A.   Kesukarelaan untuk ikut penelitian

Ibu bebas memilih keikutsertaan dalam penelitian ini tanpa ada paksaan. Bila Ibu sudah memutuskan untuk ikut, Ibu juga bebas untuk mengundurkan diri/ berubah pikiran setiap saat tanpa dikenai denda atau pun sanksi apapun.

Bila Ibu tidak bersedia untuk berpartisipasi maka Ibu tetap akan akan menerima perawatan dari pihak Poskesdes sebagaimana biasanya.

B. Prosedur Penelitian

Apabila Ibu bersedia berpartisipasi dalam penelitian ini, Ibu diminta menandatangani lembar persetujuan ini rangkap dua, satu untuk Ibu simpan, dan satu untuk untuk peneliti. Prosedur selanjutnya adalah:

Ibu akan diwawancarai oleh tim peneliti untuk menanyakan: Nama, usia, alamat desa, , pendidikan terakhir, pekerjaan, pendapatan keluarga, jumlah kehamilan, jumlah anak hidup, kadar hemoglobin dan hematocrit, kepatuhan meminum tablet besi, pengetahuan dan sikap tentang Anemia, pola makan makanan kaya zat besi. Selain itu, perkembangan kehamilan ibu sampai ibu melahirkan juga dicatat dan dianalisa dalam penelitian ini berupa usia akhir kehamilan, berat badan lahir bayi dan adanya kematian janin/bayi sebelum dilahirkan.

Pada hari pertama dimulainya penelitian, Ibu akan diwawancara sekitar 30 menit oleh seorang Sarjana Gizi Masyarakat. Wawancara ini adalah untuk mengetahui data awal (baseline data) berupa pengetahuan dan sikap tentang Anemia serta pola makan kaya zat gizi yang dipraktekkan oleh ibu pada saat kehamilan ini.

Selain di wawancara, Ibu juga akan melakukan pemeriksaan darah berupa pemeriksaan Hemoglobin dan Hematokrit oleh petugas Laboratorium yang juga merupakan tim peneliti.

Setelah melalui tahap wawancara tahap awal (baseline data), peneliti akan meminta Ibu untuk mengikuti sesi pendidikan pertama tentang Anemia oleh Bidan Desa menggunakan booklet yang dikembangkan pada penelitian durasi 30 menit. Selain itu ibu juga akan mendapatkan sebuah poster pengingat yang dapat ibu letakkan di tempat yang mudah dilihat untuk mengingatkan ibu agar minum tablet besi sebelum tidur. Setelah sesi selesai Ibu boleh membawa pulang booklet tersebut untuk dipelajari di rumah dan melakukan beberapa aktivitas yang disediakan di dalam booklet tersebut.

Sebulan setelah sesi pertama, peneliti akan meminta Ibu untuk mengikuti sesi pendidikan kedua oleh Bidan desa berupa konseling kesulitan yang dialami ibu dalam menerapkan kepatuhan minum tablet besi dan pola makan kaya zat besi .

Sebulan setelah sesi kedua, ibu akan diwawancara kembali mengenai untuk mengetahui pengetahuan dan sikap tentang Anemia serta pola makan kaya zat gizi yang dipraktekkan oleh ibu pada saat kehamilan ini.

C.   Kewajiban subyek penelitian

Sebagai subyek penelitian, Ibu berkewajiban mengikuti aturan atau petunjuk penelitian seperti yang tertulis di atas. Bila ada yang belum jelas, Ibu bisa bertanya lebih lanjut kepada peneliti atau tim peneliti.

D.   Risiko dan Efek Samping dan Penanganannya

Intervensi pendidikan sejauh ini sudah banyak dilakukan dan tidak memberikan efek samping yang berbahaya khususnya terhadap kesehatan fisik. Selama penelitian, peneliti menyiapkan perlindungan yang diperlukan seandainya terjadi sesuatu yang tidak diinginkan. Perlindungan yang diberikan oleh peneliti adalah merujuk pasien yang mengalami peningkatan Anemia kategori berat ketika sedang berlangsungnya penelitian ke fasilitas kesehatan pemerintahan di tempat dilaksanakannya penelitian. Segala obat dan biaya perawatan yang timbul akibat Anemia berat tersebut tidak ditanggung oleh peneliti.

E.   Manfaat

Keuntungan langsung yang Ibu dapatkan adalah menambah ilmu kesehatan kehamilan terkait Anemia serta pencegahan dan penanganan Anemia pada saat sebelum maupun pada saat hamil.

F.   Kerahasiaan

Semua informasi yang berkaitan dengan identitas Ibu akan dirahasiakan dan hanya akan diketahui oleh peneliti dan tim peneliti. Hasil penelitian akan dipublikasikan tanpa mencantumkan identitas subyek penelitian.

G.   Kompensasi

Ibu akan mendapatkan uang lelah pengganti penghasilan yang hilang akibat berpartisipasi dalam penelitian ini sebesar Rp.50.000/orang di akhir penelitian.

H.   Pembiayaan

Semua biaya yang terkait penelitian akan ditanggung oleh peneliti dan The 90th Anniversary of Chulalongkorn University , Rachadapisek Sompote Fund.

I.   Informasi Tambahan

Ibu diberi kesempatan untuk menanyakan semua hal yang belum jelas sehubungan dengan penelitian ini. Bila sewaktu-waktu terjadi efek samping atau membutuhkan penjelasan lebih lanjut, Bapak/Ibu dapat menghubungi Putri Nahrisah SKM, M. Comm Health SC, PhD (Cand) pada no. HP 082370651903 atau tim peneliti.

Ibu juga dapat menanyakan tentang penelitian kepada Komite Etik Penelitian Kedokteran dan Kesehatan Fakultas Kedokteran UGM (Telp. 0274-588688 ext 17225 atau +62811-2666-869; email: mhrec_fmugm@ugm.ac.id).

Dengan menandatangani formulir ini , saya setuju untuk ikut serta dalam penelitian ini.

Nama   Tanda tangan

Nama Saksi   Tanda tangan

Appendix C : Questionnaire of participatory for inputs contribution of   anemia booklet and

reminder

Activity   : Focus group discussion

Participant   : 7 (pregnant women, non-pregnant, health volunteers)

Facilitator   : Research Assistant (Master in Community Nutrition) and Researcher

Duration   : 2-3 hours

The following questionnaires will be asked to pregnant women in encouraging them to

participate in developing booklet and poster reminder:

1.   Knowledge and attitude about anemia during pregnancy

    a.   Have you ever heard about Anemia? From who do you heard it?

    b.   What do you know about it:

    -    Definition

    -    Cause

    -    How to know that you are anemia

    c.   Do you think you have the risk of anemia during pregnancy?

    d.   Do you think anemia is dangerous? why do you think it is (yes/no) dangerous?

    e.   Do you have idea how to treat about anemia?

2.   Practice of iron-rich food consumption

    a.   Do you change your eating habits during pregnancy (amount, type and frequency?

    b.   Do you have any food restriction or taboos during pregnancy?

    c.   Can you give example of your daily menu?

    d.   How many glasses of water do you drink for a day?

3.	Compliance to take iron supplement?

a.	Do you think antenatal care important during? Why? Where to go to get antenatal care?

b.	Do you think you have enough information about anemia, iron tablet, nutrition information during antenatal care?

c.	How do you receive iron supplement, from antenatal service /helath volunteer /others?

d.	What do you think about the benefit of the iron tablet?

e.	What do you think about the obstacles of the iron tablet?

f.	What do you about encourage iron compliance intake?

Pertanyaan-pertanyaan berikut ini digunakan untuk menstimulasi partisipasi ibu hamil dalam mengembangkan booklet dan poster pengingat.

1. Pengetahuan dan sikap tentang anemia selama kehamilan

   a. Pernahkah mendengar tentang anemia? Darimanakah sumber informasi yang diperoleh tentang Anemia?

   b. Apa yang Ibu ketahui tentang hal –hal berikut ini:

   - Pengertian anemia

   - Penyebab anemia

   - Bagaimana cara mengetahui bahwa kita mengalami anemia?

   c. Menurut Ibu, apakah Ibu memiliki resiko mengalami anemia selama kehamilan?

   d. Menurut Ibu, apakah Anemia berbahaya? Mengapa anemia (berbahaya/tidak berbahaya?

   e. Apakah Ibu tahu cara mencegah dan mengatasi anemia?

2. Perilaku mengkonsumsi makanan mengandung zat besi

    a. Apakah ada yang berubah tentang pola makan Ibu selama hamil dibandingkan

        sebelum hamil (jumlah, jenis dan frekuensi?

    b. Apakah Ibu memiliki pantangan makanan (berdasarkan kepercayaan /mitos)

        selama kehamilan?

    c. Berikanlah contoh menu makanan Ibu sehari-hari? Sehari pada hari kerja dan

        sehari pada hari libur

    d. Berapa gelas air yang Ibu minum setiap hari?

3. Kepatuhan minum tablet tambah darah?

    a. Menurut Ibu, apakah pemeriksaan kehamilan adalah penting ? Kemanakah Ibu

        memeriksakan kehamilan?

    b. Apakah ibu mendapatkan informasi tentang Anemia, tablet tambah darah,

        dan tentang gizi selama kehamilan ketika memeriksakan kehamilan?

    c. Apakah Ibu menerima tablet tambah darah ketika memeriksakan kehamilan?

    d. Apakah Ibu tahu manfaat meminum tablet tambah darah?

    e. Apakah kesulitan yang dihadapi meminum tablet tambah darah?

    f. Bagaimana cara untuk meningkatkan kepatuhan minum tablet besi?

Appendix E : Questionnaire of participatory to evaluate first draft of anemia booklet and reminder by women at first FGD (Appendix C)

Activity   : Focus group discussion

Participant   : 7 pregnant women

Facilitator   : Research Assistant (Master in Community Nutrition)

Duration   : 2-3 hours

The following questionnaires will be asked to pregnant women in evaluating the first draft and the following revised booklet:

1.   Does vocabularies used in the booklet are common words?

2.   Do you find any unknown or difficult term/sentences in the booklet?

3.   Does Illustrations (pictures, graphics, tables) used in the booklet are relevance and show the purpose?

4.   Is the layout (tittle & sub tittle) in a systematic way (according to the order of thinking)?

5.   Do you have any suggesting content to be added in the booklet?

6.   What suggestions would you give in order to improve the material?

7.   Do you satisfy with the booklet and reminder?

Kegiatan   : Focus group discussion

Peserta   : 7 orang ibu hamil

Fasilitator   : Asisten peneliti (Master Gizi Masyarakat) dan peneliti

Durasi   : 2-3 jam

Pertanyaan –pertanyaan dibawah ini akan ditanyakan kepada ibu hamil untuk mengevaluasi konsep serta revisi booklet yang dirancangan pada penelitian ini
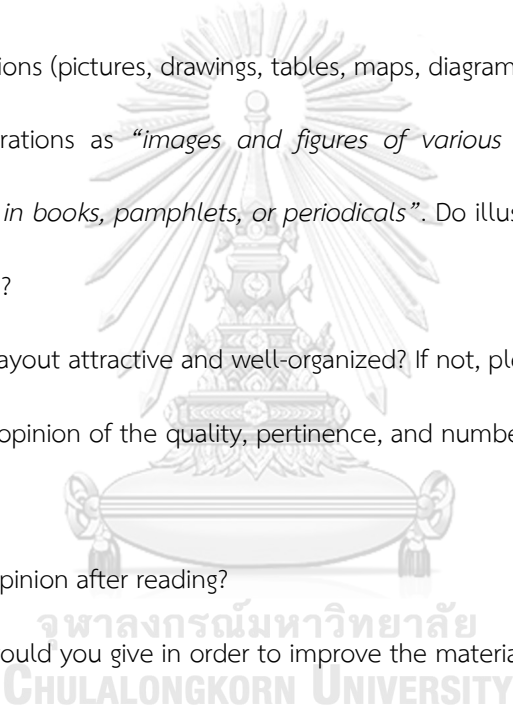
1. Apakah kosakata yang digunakan dalam booklet ini adalah kata-kata yang umum dalam kehidupan sehari -hari ?

2. Apakah ibu menemukan kata-kata/kalimat yang sulit dipahami dalam booklet ini?

3. Apakah ilustrasi (gambar, graik, table) yang digunakan pada booklet ini sesuai tujuannya dalam menyampaian pesan?

4. Apakah judul dan sub judul pada booklet ini memiliki urutan yang mudah dipahami (sistematis)?

5.   Apakah Ibu memiliki saran tentang isi yang bisa ditambahkan ke dalam booklet ini?

6. Apakah saran Ibu untuk memperbaiki /meningkatkan kualitas booklet ini?

7. Apakah Ibu merasa puas dengan booklet dan pengingat ini?

Appendix G : Questionnaire for validation of anemia booklet by experts

Activity : Self report

Participant : 1. One of Medical Doctor

2. Two of Master in Community Nutrition

3. One of Master degree in health education

4. Five of Midwife village

The following questionnaires will be asked to expert in evaluating the draft and the following revised booklet:

1. Concerning the structure/format, what is your opinion of:

a. Size (dimensions) of material?

b. Is the size of text (number of pages) adequate?

c. Quality of paper?

d. Quality of illustrations?

e. Does the material cite authors and collaborators?

f. Does the material define the target public?

2. Concerning the content:

a. Is the information correct? Please identify any distorted or incorrect concepts in the material.

b. Is the information appropriate to the target population?

c. Is the information presented in a context that is suitable to the target population?

d. Does the text include a lack of or too many definitions?

e. Are bibliographic references appropriate and up-to-date in relation to date of publication?

f. Are there important definitions or facts that were not approached?

g.   Have definitions of greater or lesser importance been given due emphasis?

3. Concerning language:

a.   Is the language comprehensible and suitable to the target population?

b.   Have all important concepts been approached clearly and objectively?

c.   Have you noticed any biased or prejudiced ideas concerning the information in the text?
      If so, please indicate page and paragraph and state your opinion.

4. Concerning illustrations (pictures, drawings, tables, maps, diagrams):

a.   Defines illustrations as *"images and figures of various kinds used to clarify and/or arrange text in books, pamphlets, or periodicals"*. Do illustrations in the material follow this definition?

b.   Is the visual layout attractive and well-organized? If not, please explain as in item 3c.

c.   What is your opinion of the quality, pertinence, and number of illustrations?

5. What is your final opinion after reading?

6. What suggestions would you give in order to improve the material?

7. Please add any other comments you find relevant and that have not been included in this questionnaire.

Appendix H : Questionnaire for validation of anemia booklet by experts

'Bahasa Indonesia Translation'

Kegiatan   : Self report

Peserta   : 1. Satu orang Dokter

2. Dua orang Master Gizi Masyarakat

3. Satu orang Master Ilmu Perilaku Kesehatan

4. Lima orang Bidan Desa

Pertanyaan-pertanyaan berikut ini akan ditanyakan kepada partisipan untuk mengevaluasi konsep

dan revisi booklet yang dikembangkan dalam penelitian ini:

1. Berkaitan dengan struktur /susunan, bagaimana pendapat Anda tentang:

a. Ukuran booklet

b. Ukuran huruf dan jumlah halamannya sesuai

c. Kualitas kertas

d. Kualitas ilustarsi (gambar, grafik, table)

e. Pencantuman penulis dan kontibutor

f. Kesesuaian booklet ini sebagai media pendidikan yang digunakan Bidan desa, kader

maupun untuk dipelajari secara mandiri oleh ibu hamil?

2. Berkaitan dengan isi booklet:

    a.   Apakah informasi didalam booklet tersebut seluruhnya benar? Silakan mengidentifikasi informasi yang salah di dalam booklet

    b.   Apakah informasi dalam booklet sesuai untuk Bidan desa, kader dan ibu hamil?

    c.   Apakah cara penyajian informasi dalam booklet sesuai untuk Bidan desa, kader dan ibu hamil?

    d.   Apakah uraian di dalam booklet terlalu sedikit atau terlalu banyak?

    e.   Apakah referensi yang digunakan sesuai dan terbaru?

    f.   Apakah ada definisi penting atau fakta-fakta yang belum tercantum dalam booklet ini?

    g.   Apakah ada uraian- uraian yang memerlukan penekanan lebih besar atau sebaiknya penekanan yang sedikit saja di booklet ini?

3. Berkaitan dengan Bahasa yang digunakan:

    a.   Apakah Bahasa yang digunakan secara keseluruhan sesuai untuk Bidan desa, kader dan ibu hamil?

    b.   Apakah seluruh konsep/informasi yang penting telah tercantum secara jelas dalam booklet ini ?

    c.   Apakah Pernahkah Anda memperhatikan ide bias atau prasangka mengenai informasi dalam teks? Jika demikian, silakan menunjukkan halaman dan kalimat dan silahkan menyatakan pendapat Anda.

4. Berkaitan dengan ilustrasi (gambar, tabel, peta, diagram):

    a.   Penggunaan ilustrasi adalah sebagai "gambar yang digunakan untuk memperjelas dan / atau mengikuti teks dalam booklet". Apakah ilustrasi dalam materi mengikuti definisi ini?

    b.   Apakah tata letak visual yang menarik dan terorganisir dengan baik? Jika tidak, silahkan jelaskan dalam butir 3c.

    c.   Apa pendapat Anda tentang kualitas, ketepatan, dan jumlah ilustrasi?

5. Apakah pendapat Anda setelah membaca booklet ini?

6. Apakah saran Anda untuk meningkatkan kualitas dari booklet ini?

7. Silahkan tambahkan komentar / hal- hal yang ingin Anda sampaikan tetapi belum/tidak termasuk dalam kuesioner ini.

Appendix I : Suitability Assessment of Material (SAM) questionnaire

Activity : Interview

Participants : 30 pregnant women

Items	Superior (2)	Adequate (1)	Inadequate (0)
Message Content			
1. The content covered is relevant for prevention anemia during pregnancy			
2. The content is suitable for the target (pregnant women)			
3. The content is enough to supply the pregnant women's need			
4. The content can be easily applied in the pregnant's women daily routine			
Literacy demand			
5. Vocabulary used common word			
6. Easy to read font size			
7. Easy to read font type			
8. Paragraph and sentences easy reading			
9. Instruction broken into easy –to-read part			
Graphic/illustration			
10. The cover effectively design			
11. Illustration are adequate to and match the theme of the support material			
12. Illustration are clear and allow easy understanding			
13. The number of illustration is contemt-suitable in support material			
14. Visual culturally relevant			
Layout/ Typography			
15. Colors are adequate and ease reading			
16. Visual composition is attractive and organized			
17. The size and number of pages of the			

booklet are appropriate			
Learning stimulation, Motivation			
18. The content is motivating and encourages full reading			
19. The content awakens interest			
20. The content solves doubts, clear things up, and educates the target audience			
Cultural appropriateness			
21. The booklet content sensitive to cultural differences			
22. The illustration used appropriated with the culture			
Total SAM score: 44			
Total possible :			
Percent score :			
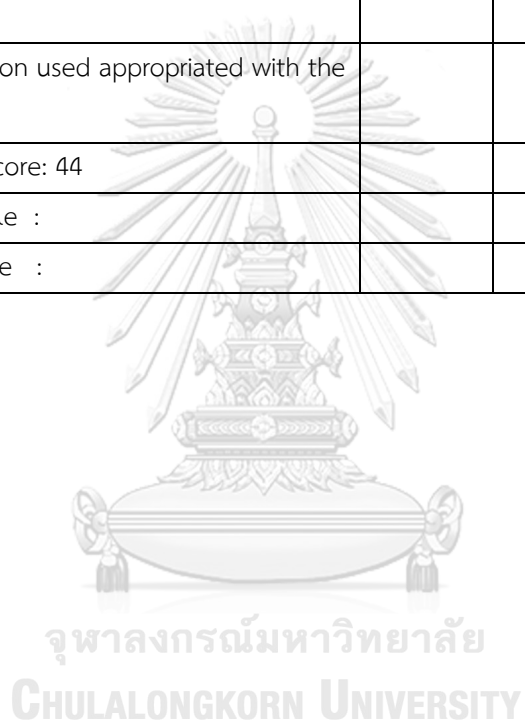
Appendix J : Suitability Assessment of Material (SAM) questionnaire
'Bahasa Indonesia Translation'

Activity : Wawancara

Participants   : 30 ibu hamil

Pertanyaan	Bagus (2)	Cukup (1)	Tidak cukup (0)
Isi			
1. Isi booklet sesuai dengan tujuan untuk mencegah anemia selama kehamilan			
2. Isi booklet memenuhi kebutuhan ibu hamil terhadap informasi tentang anemia			
3. Isi booklet memberikan informasi yang cukup untuk ibu hamil tentang anemia			
4. Anjuran/saran isi booklet mudah dilakukan di kehidupan sehari-hari ibu hamil			
Pemahaman isi booklet			
5. Kata-kata yang digunakan adalah kata yang dapat dimengerti			
6. Ukuran huruf mudah dibaca			
7. Jenis huruf mudah dibaca			
8. Isi paragrap dan kalimat mudah dimengerti			
9. Anjuran/saran yang disampaikan mudah dimengerti			
Gambar			
10. Gambar halaman judul			
11. Jumlah gambar yang disediakan cukup dan sesuai dengan uraian buku			
12. Gambarnya jelas dan mudah dimengerti			
13. Jumlah gambar yang terdapat dalam bukunya cukup untuk mendukung penjelasan yang diberikan			
14. Gambarnya tidak melanggar norma setempat			
Tampilan buku			

15. Warna yang digunakan			
16. Latar belakang dan tulisan yang digunakan sesuai			
17. Ukuran dan jumlah halaman			
Pembelajaran			
18. Termotivasi untuk membaca keseluruhan isi			
19. Isi buku menimbulkan ketertarikan terhadap informasi yang diberikan			
20. Isi buku memberikan pengetahuan tentang anemia			
Kesesuain dengan budaya			
21. Isi buku mewakili kebiasaan/pengalaman masyarakat			
22. Gambar yang digunakan sesuai dengan norma/ budaya			
Total nilai : 44			
Total nilai responden :			
Persen nilai :			

Topic   : Pregnant women and diet (include for SWOT analysis)

Participant : 7 anemic pregnant women at baseline survey

Facilitator : Master of Community Nutrition

Duration : 1-2 hours

Main topic	Key questions	Probes
Awareness and knowledge of special needs during pregnancy	What do you think about your diet pre and during pregnancy?	How is the quality and quantity of diet?
	Did you change some diet habits? What? Why?	What are the changes? How much it changes in term of frequency, amount and types
	From who or what that you know about your current pregnancy diet?	Probe different sources of information: people in the family, relatives outside of the house, health practitioners, radio, TV, etc. Would they follow the advice? Why and why not?
Food availability or access	Where do you shop for your food stuff? Why? How do you reach the place?	Access and availability of sufficient and high-quality food (iron-rich food), especially animal-source foods, due to poverty as well as to market, environmental, and

		geographic issues.
	What do you buy?	Obtain information on the availability and costs of different foods or potential food options in the diet.
Availability and access to iro-folate supplements	How do you get the supplement? What do you think about the low compliance of iron-folate intake	Is it from antenatal service, health volunteer or others? Low compliance issues

Appendix L: Focus group discussion guide 'Bahasa Indonesia Translation'

Topik　　　　　: Pola makan ibu hamil (bahan SWOT analysis)

Peserta　: 7 ibu hamil yang anemia pada baseline survei

Fasilitator　　　: Master nutrisi masyarakat

Durasi　　　: 1-2 jam

Topik	Pertanyaan utama	Yang ingin diketahui
Pengetahuan tentang pola makan saat hamil	Bagaimana menurut Ibu tentang pola makan sebelum dan ketika hamil ? Apakah ada pola makan yang Ibu ubah? Darimana sumber informasi tentang pola makan maupun kesehatan yang biasanya ibu dapatkan ?	How is the quality and quantity of diet? Pola makan apa yang berubah? Apakah perubahannya signifikan? Dlam hal frekuensi, jumlah dan jemis makanan? Sumber yang berbeda seperti keluarga, teman, petugas kesehatan, TV. Radio dan lain-lain. Apakah ibu mengikuti yang disarankan oleh sumber tersebu ? kenapa ya ? kenapa tidak?
Ketersediaan atau akses makanan	Di mana ibu berbelanja untuk makanan? Mengapa? Bagaimana ibu mencapai tempat itu?	Akses dan ketersediaan makanan yang cukup dan berkualitas tinggi (makanan kaya zat besi), terutama makanan sumber hewani, karena

	Apa yang ibu beli?	kemiskinan serta masalah pasar, lingkungan, dan geografis. Dapatkan informasi tentang ketersediaan dan biaya berbagai makanan atau pilihan
Ketersediaan dan akses ke suplemen iron-folat	Bagaimana ibu mendapatkan suplemen? Apa pendapat ibu tentang rendahnya kepatuhan asupan zat besi-folat?	Apakah itu dari pelayanan antenatal, sukarelawan kesehatan atau lainnya? Masalah kepatuhan rendah

Appendix M : Questionnaires Knowledge , Attitude, Eating Practices, Anemia Risk and

Pregnancy Outcome

Activity   : Interview

Participant   : pregnant women with Anemia

Data Collector   : Diploma Nutrition

Duration   : 1-1.5 hours

Part 1: Sociodemographic, Hemoglobin & Hematocrit concentration

1.   Participant no......   Age ....years old   Village..... ....

2. Level of education

a. Uncomplete education   b. Primary school

c. Junior High school   d. Senior high school

e. Diploma   f. Bachelor degree and higher

3. Occupation:

a. Housewife   b. Government worker

c. Farmer   d. Other, specify...........

4. Family Income : Rp. ..../month

5.Participant's status of Gravid .... Para........ Gestational age.................weeks

6. Hemoglobin concentration ....g/dl

   Anemia level:

a. Normal: >11 g/dl   b. Mild Anemia: 8-11 g/dl c. Severe Anemia: <8 g/dl

7. Hematocrit concentration:..............%

Part 2 : Iron Compliance

1. The date of receipt of the iron tablets : ....
2. The number of iron tablets received: ....
3. The number of remaining tablets: ....
4. Proportion of iron tablets consumption: ....
5. Barriers of taking iron tablets:

Part 3 : Knowledge

Please remark (√) in the column that you think is the appropriate answer for statements provided

No	Statement	True	False	Don't know
1	Anemia is known as shortage of blood disease			
2	Anemia is diagnosed by testing of hemoglobin level in the blood			
3	Dizziness, pallor face and weakness are significant signs and symptoms of Anemia during pregnancy			
4	Anemia is a nutritional disorder			
5	Anemia is due to under iron-nutrition intake			
6	One can get Anemia due to , parasitic infections i.e. deworming			
7	Anemia can cause increase risk of hemorage during delivary			
8	Anemia can cause premature birth			
9	Anemia can cause intrauterine death			
10	Mother need to consume iron-rich food			
11	Mother need to take iron-folate supplement			
12	Iron-folate tablet is access at antenatal care and free of charge			
13	Iron-folate tablet side effect are nausea and vomiting			
14	Iron-folate tablet has side effect to baby development			
15	Green leaves vegetables can prevent anemia			
16	Red been and green bean contain of iron			
17	Red meat, liver, spinach are rich of iron			

18	Drinking tea with meal can inhibit iron absoption			
19	Vitamin C can enhace dapat iron absoption			
29	Orange, mango, papaya are good sources of vitamin C			

Part 4: Attitude

Please remark (√) in the column that you think is the appropriate answer for statements

provided

No	Statement	Agree	Partially agree	Disagree
1	Pregnant women more likely to have anemia than non-pregnant women			
2	You think that you are at risk of getting Anemia during pregnancy			
3	Anemia is not dangerous			
4	Anemia makes you weak			
5	Blood/hemoglobin test perform after sign and symptom occured			
6	When feel the sign or symptom over time , however it will disappear with no any medication need			
7	Anemia makes pregnant women too tired to work			
8	It is possible to prevent anemia in pregnancy			
9	Anemia threats pregnant & fetus health			
10	Iron-folate intake is good for mother and child health			
11	Anemia in pregnancy can be prevented			
12	Adherence of having iron pills supplement necessary during pregnancy			
13	Adherence to have sufficient diet with iron is necessary during pregnancy			
14	Taking iron making delivery more difficult			
15	Taking iron tablets can cause a large baby			

Part 5 : Eating practices

5.1.   Food Recall 24 hours

No	Date & eating time	Name of menu	Name of food ingredients	Weight		Iron (mg)
				Household unit	Gram	
1	Meals a. b					

5.2.   Food Frequency Questionnaire food rich with iron and vitamin C

NO	Food items	Frequency (t= times) per (d=day) or (w=week)				
		1 or more/day (5)	once/ day (4)	4-6 times/ week (3)	2-3 times/ week (2)	1 or none/ week (1)
1	Red meat/beef					
2	Poultries					
3	Egg					
4	Fish					
5	Others seafood					
6	Spinach					
7	Morning glory					
8	Cassava leaves					
9	Green mustard					

10	*"Melinjo"* leaves					
11	Sprout					
12	Potatoes					
13	Tubers					
14	*Tempe*					
15	Tofu					
16	Soya					
17	Green bean					
18	Ground nut					
19	*Kacang panjang*					
20	*Salak* fruit					
21	Date					
22	Guava					
	Vitamin C food					
1	Guava					
2	Banana					
3	Orange					
4	papaya					
5	Avocado					
6	Cauli flower					

Part 6: Pregnancy Outcome

1.   Term of pregnancy : ....weeks

☐ Normal term   ☐ Premature term

2.   Birth weight : ....gram

☐ Normal birth weight   ☐ Low birth weigh

3.   Fetal Death /Intrauterine death

☐ Yes   ☐ No

Appendix N Questionnaires Knowledge , Attitude, Eating Practices, Anemia Risk and Pregnancy Outcome 'Bahasa Indonesia Translation'

Bagian 1: Sosio-ekonomi, Kadar Hemoglobin & Hematocrit

1. Partisipan nomor...... Umur ....tahun

    Desa..... ....

2. Tingkat pendidikan

    a. Tidak menamatkan sekolah b. Sekolah Dasar

    c. Sekolah Menengah Pertama d. Sekolah Menengah Atas

    e. Diploma f. Sarjana & seterusnya

3. Pekerjaan Ibu:

    a. Rumah Tangga b. Pegawai Negeri Sipil

    c. Petani d. Lain –lain, sebutkan......

4. Pendapatan keluarga Rp. ..../bulan

5. Jumlah kehamilan Ibu termasuk kehamilan sekarang..........kali

    Jumlah anak yang lahir hidup........anak

    Usia kehamilan saat ini.................minggu

6. Kadar Hemoglobin ....g/dl

7. Kadar Hematokrit ....%

Bagian 2 : Kepatuhan minum tablet darah

6. Tanggal menerima tablet besi : ....

7. Jumlah tablet besi yang diterima: ....

8. Jumlah tablet besi yang tersisa: ....

9. Proporsi (%) tablet yang diminum = jumlah yg diterima/jumlah sisa x 100 ....

10. Kesulitan dalam mengkonsumsi tablet besi:

    -.

11. Jika meminum tablet besi selain dari pemerintah, sebutkan nama/merk nya......

Bagian 3 : Pengetahuan

Berilah tanda(√) pada kolom jawaban yang anda anggap sesuai dengan berdasarkan pernyataan yang tersedia

No	Pernyataan	Benar	Salah	Tidak Tahu
1	Anemia disebut juga penyakit kurang darah			
2	Untuk mengetahui Anemia, maka harus dilakukan pemeriksaan kadar hemoglobin dalam darah			
3	Pusing, muka pucat, lemas adalah gejala dan tanda Anemia			
4	Anemia adalah masalaj kesehatan bersumber dari gizi makanan			
5	Anemia disebabkan kurangnya asupan makanan yang mengandung zat besi			
6	Seseorang dapat mengalami Anemia disebabkan infeksi seperti cacingan			
7	Anemia menyebabkan pendarahan ketika melahirkan			
8	Anemia menyebabkan keguguran			
9	Anemia menyebabkan kematian bayi dalam kandungan			
10	Memakan makanan yang mengandung zat besi sangat dibutuhkan ketika hamil			
11	Ibu hamil dan wanita usia subur perlu meminum tablet tambah darah/tablet besi			
12	Tablet tambah darah/tablet besi untuk ibu hamil dapat diperoleh di bidan desa secara gratis			
13	Tablet besi memiliki efek samping seperti mual dan muntah			
14	Kacang merah dan kacang hijau adalah makanan yang mengandung banyak zat besi			
15	Konsumsi sayuran hijau dapat mencegah anemia			
16	Meminum teh ketika makan dapat meningkatkan penyerapan zat besi dalam darah			
17	Daging merah, hati sapi, bayam adalah makanan yang mengandung banyak zat besi			
18	Meminum teh dengan tablet besi dapat menghambat penyerapan zat besi dalam darah			
19	Vitamin C dapat meningkatkan penyerapan zat besi			
20	Buah jeruk, manga, tomat adalah makanan yang mengandung vitamin C			

Bagian 4: Sikap

Berilah tanda(√) pada kolom jawaban yang anda anggap sesuai dengan berdasarkan pernyataan yang tersedia

No	Pernyataan	Setuju	Ragu-Ragu	Tidak setuju
1	Ibu hamil lebih mudah mengalami Anemia dibandingkan ibu yang tidak hamil			
2	Anemia dapat dialami oleh wanita usia subur dan ibu hamil			
3	Anemia bukan masalah kesehatan yang berbahaya			
4	Anemia membuat ibu merasa lemas			
5	Pemeriksaan Hemoglobin darah dilakukan setelah timbul tanda dan gejala penyakitnya			
6	Ketika ibu merasakan tanda dan gejala Anemia maka menurut ibu tanda dan gejala itu akan hilang dengan sendirinya			
7	Anemia membuat ibu merasa cepat capek/letih ketika bekerja			
8	Anemia dapat dicegah			
9	Anemia tidak berbahaya			
10	Tablet besi baik bagi ibu dan bayi			
11	Anemia dapat dicegah dengan minum tablet tambah darah/tablet besi selama kehamilan			
12	Anemia selama hamil dapat dicegah dengan makan makanan yang banyak mengandung zat besi			
13	Kepatuhan minum tablet besi penting bagi kehamilan			
14	Minum tablet besi membuat ibu susah melahirkan			
15	Minum tablet besi dapat membuat bayi menjadi besar			

Part 5 : Eating practices

5.3. Food Recall 24 hours

No	Tanggal & waktu makan	Nama makanan	Nama bahan makanan	Berat		Zat besi (mg)
				Ukuran rumah tangga	Gram	
1	Menu a. b					

5.4. Food Frequency Questionnaire makanan kaya zat besi dan vitamin C

NO	Nama makanan	Frekuency				
		1x atau lebih /hari (5)	1x/hari (4)	4-6x /minggu (3)	2-3 x /minggu (2)	1x atau tidak pernah/minggu (1)
1	Daging sapi					
2	Ayam, bebek					
3	Telur					
4	Ikan					
5	Bahan laut lainnya					
6	Bayam					
7	Kangkung					
8	Daun ubi					

9	Sawi					
10	Daun melinjo					
11	Toge					
12	Kentang					
13	Ubi kuning, ungu					
14	*Tempe*					
15	Tahu					
16	Kedelai					
17	Kacang hijau					
18	Kacang tanah					
19	*Kacang panjang*					
20	*Salak*					
21	Kurma					
22	Jambu biji					
	Makanan Vitamin C					
1	Belimbing					
2	Pisang					
3	Jeruk					
4	pepaya					
5	Alpukat					
6	Bunga kol					

Part 6: Hasil akhir kehamilan

1.   Usia akhir kehamilan : ....weeks

    ☐ Normal   ☐ Prematur

2.   Berat badan bayi : ....gram

    ☐ Normal   ☐ rendah dari normal

3.   Kematian janin

    ☐ Ya   ☐ Tidak

Activity   : Interview at post intervention measurement

Participant   : pregnant women with Anemia

Facilitator   : Diploma Nutrition

Duration   : 1-2

Note: This questionnaire will be attached with KAP questionnaire

1.   Does the poster help you to remind of taking the iron supplementation:

☐ Yes   ☐ No

If the answer is No, please go directly to question no. 5

2.   If the answer is yes, please rate how much the poster help you to as reminder:

From 0 to 100 of score, how much will you rate: ....

3.   What do you like the most about the poster?

4.   Where do you put the poster? Why do you put on that spot/location?

5.   Do you other method as reminder to take the iron supplementation? Please specify:

a.

b.

Lampiran P: Questionnaire of Poster Reminder Evaluation 'Bahasa Indonesia Translation'

Kegiatan : Wawancara

Partisipan : Ibu hamil yang mengalami Anemia

Pewawancara : Diploma Masyarakat

Durasi : 1-2 jam

1. Apakah poster pengingat yang diberikan membantu mengingatkan Ibu dalam meminum tablet besi?

    ☐ Ya   ☐ Tidak

Jika jawaban Ibu adalah tidak, silahkan langsung menuju pertanyaan nomor 5.

2. Jika jawaban Ibu adalah ya, silahkan berikan nilai seberapa besar poster pengingat ini membantu mengingatkan Ibu dalam meminum tablet besi?

Dari nilai 0 sampai 100, berapakah nilai yang Ibu berikan:...........

3. Apa hal yang paling Ibu suka dari poster pengingat ini?

4. Dimanakah Ibu meletakkkan poster pengingat ini? Mengapa Ibu meletakkannya di tempat tersebut?

5. Apakah Ibu memiliki cara lain untuk membantu mengingatkan Ibu dalam meminum tablet besi? Silahkan sebutkan:

a.

b.

The booklet subtitle about "Definition Anemia" and "Sign and symptom of anemia", comprise of "*kurang darah*" term to be part of anemia definition in the booklet followed with the hemoglobin cut of point to indicate anemia , function of blood and hemoglobin test, schedule and place to obtain hemoglobin test, sign and symptom of anemia.

The booklet subtitle about "Causes of Anemia" in the booklet comprises of lack of iron-rich consumption, types of iron-rich food pictures and several diseases related to anemia. The booklet subtitle about "Consequences anemia to mother and child" comprises of flow diagram of the disadvantage outcomes; pregnancy hemorrhage, low birth weight and risk of death of maternal and child.

The booklet sub title of prevention and treatment of anemia compose of pictures of animal and plant rich of iron and food rich of vitamin C as enhancer of iron absorption. Booklet also include the picture of "My plate" ; describe the size of food based on its proportions on a plate and nutrition balance message for pregnancy from government. The information about iron-folate intake was discussed and to include in the booklet about dose (daily) tablets should be taken, how to get the tablets, how to take the iron tablet (avoid inhibitor such as not to drink with tea, enhance with vitamin C). The booklet subtitle about iron supplement comprise of several subtitles ; benefit and side effect of iron supplement intake, how to minimize side effect, how to keep the tablets property, and how to build the habits of tablet intake tailor with routine.

KEHAMILAN SEHAT TANPA ANEMIA

"Dan hendaklah takut kepada Allah orang-orang yang seandainya
meninggalkan dibelakang mereka anak-anak yang lemah,
yang mereka khawatir terhadap (kesejahteraan) mereka.
Oleh sebab itu hendaklah mereka bertakwa
kepada Allah dan hendaklah mereka mengucapkan
perkataan yang benar"
Q.S An-Nisaa Ayat 9

PENGERTIAN ANEMIA

- Anemia lebih sering dikenal oleh masyarakat dengan istilah kurang darah.
- Ibu mengalami Anemia jika kadar Hemoglobin (Hb) dalam darahnya kurang dari 11g/dl.
- Kadar Hemoglobin (Hb) adalah untuk mengetahui keadaan fungsi darah.
- Darah fungsinya membawa sari makanan dan oksigen ke seluruh tubuh.
- Jika kadar Hemoglobin (Hb) menurun maka akan membahayakan kesehatan ibu dan perkembangan janin.

Kapan periksa Hb?

Dimana periksa Hb?

Usia kehamilan 1-3 bulan

Usia kehamilan 7-9 bulan

Puskesmas

Rumah Sakit

Poskesdes

1
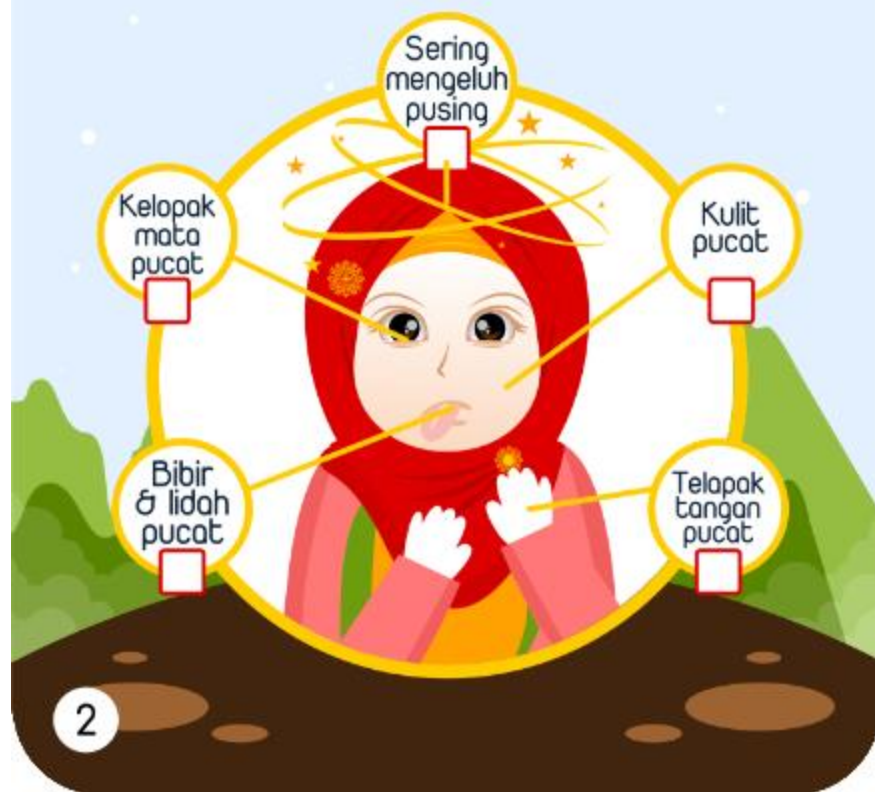
BAHAN MAKANAN YANG MENGANDUNG ZAT BESI

Lauk Hewani	Ukuran Porsi Sekali Makan	Ukuran Dalam Gram
Daging Sapi	1 Potong Sedang	50
Daging Bebek	1 Potong Sedang	45
Hati Sapi	1 Potong Sedang	50
Hati Ayam	1 Buah Sedang	30
Telur Ayam	1 Butir	50
Telur Bebek	1 Butir	60
Cumi	1 Ekor Sedang	40
Udang	5 Ekor Sedang	35
Ikan Sardine	2 Potong Kecil	40

7

TABLET TAMBAH DARAH (TTD)

TTD diminum setiap hari sebanyak 1 atau 2 tablet ●
sedikitnya 90 tablet selama kehamilan

TTD diminum dengan menggunakan air putih dan ●
buah/tablet yang mengandung vitamin C untuk
meningkatkan penyerapan zat besi

TTD jangan diminum dengan air teh atau kopi ●
karena dapat menurunkan penyerapan zat besi

Periksa kehamilan sedikitnya 4 kali yaitu ●

Trimester pertama (1-3 bulan)	1 Kali
Ttrimester kedua (4-6 bulan)	1 Kali
Trimeste ketiga (7-9 bulan)	2 Kali

12

Appendix R: Iron-supplement reminder

Reminder content summary is about to remind the pregnant women to take the iron supplement and instruction to do the checklist to the number on the paper –reminder. A motivation also provided about achieving healthy pregnancy by taking the iron supplements tablets.

Appendix S: Nutrisurvey Program

NutriSurvey for Windows versi Indonesia - F:\nutrisurvey indonesia\Post Lgsa\1.1.epl

File   Edit   Perhitungan   Makanan   Extra'S   T4 ber???

Pregnant > 4 months | 1   Hari   Porsi

	Makanan	Jumlah	kcal	water	protein	fat
1	nasi uduk	90	106.3	0.0	1.9	1.4
2	nasi putih	120	156.0	0.0	2.9	0.2
3	telur ayam	120	186.1	0.0	15.1	12.7
4	minyak kelapa	5	43.1	0.0	0.0	5.0
5	wafer	135	413.0	0.0	8.4	3.5
6	ikan asin kering	14	42.8	0.0	9.3	0.3
7	daun melinjo mentah	15	5.6	0.0	0.6	0.0
8	melinjo (buah)	40	18.8	0.0	0.4	0.0
9	terong putih mentah	40	11.2	0.0	0.3	0.1
10	mie ayam	100	141.0	0.0	4.8	0.7
11	ayam	40	114.0	0.0	10.8	7.6
12	margarin	10	63.6	0.0	0.0	7.2

Total analysis:

energy	1301.5	kcal
water	0.0	g
protein (17%)	54.4	g
fat (27%)	38.8	g
carbohydr. (56%)	179.7	g
dietary fiber	6.8	g
alcohol (0%)	0.0	g
PUFA	7.9	g
cholesterol	562.8	mg
Vit. A	352.1	µg
carotene	0.0	mg
Vit. E	0.0	mg
Vit. B1	0.4	mg
Vit. B2	0.9	mg
Vit. B6	0.7	mg
folic acid eq.	0.0	µg
Vit. C	26.5	mg
sodium	595.4	mg
potassium	764.5	mg
calcium	146.9	mg
magnesium	117.5	mg
phosphorus	576.6	mg
iron	4.8	mg
zinc	4.3	mg
iodine	0.0	µg

Appendix T : Data of Iron Food Intake in Intervention and Control Group

No	Intervention		Control (mg/day)	
	Average of 3 days intake (mg/day)		Average of 3 days intake (mg/day)	
	Baseline	Post intervention	Baseline	Post intervention
1	8.23	9.0	0.56	1.86
2	7.43	8.0	1.36	0.73
3	1.73	4.13	2.66	9.9
4	1.76	36.92	0.93	1.4
5	1.26	4.0	1.56	1.83
6	1.33	5.63	1.26	0.93
7	2.3	3.0	1.6	1.3
8	1.26	5.3	12.13	4.1
9	1.3	4.0	11.06	7.76
10	2.93	3.0	12.66	7.76
11	0.4	38.0	2.7	1.5
12	0.9	18.7	10.0	2.23
13	2.4	18.5	1.16	2.23
14	1.5	7.2	1.4	3.0
15	1.53	7.0	1.7	2.63
16	0.93	2.23	12.3	3.0
17	0.33	2.23	24.9	1.23
18	1.53	3.56	0.93	4.2
19	1.0	4.0	4.6	4.2
20	11.46	3.33	1.96	1.26
21	2.96	5.16	6.93	12.6
22	1.76	3.53	0.83	0.93
23	0.76	8.0	1.96	0.93
24	7.1	5.36	5.46	1.33
25	0.96	4.46	1.43	2.4
26	3.26	4.46	1.73	0.8
27	7.06	9.0	7.53	3.76
28	7.7	14.0	1.6	0.96
29	13.3	3.23	0.66	0.8

30	0.36	9.96	2.06	2.0
31	11.3	3.66	5.46	1.86
32	1.86	7.86	11.2	0.6
33	6.6	5.93	1.5	3.63
34	3.16	5.93	7.26	1.6
35	2.56	4.46	5.46	1.83
36	1.36	4.46	0.93	2.66
37	1.3	8.3	2.3	25.16
38	5.1	7.0	1.43	2.4
39	6.53	2.03	1.43	0.63
40	6.5	5.73	24.16	1.6
41	0.86	2.46	5.7	1.6
42	17.53	4.16	1.73	1.7
43	0.8	2.93	0.8	21.53
44	0.86	3.63	7.7	1.1
45	1.53	8.5	13.3	3.6
46	7.53	4.0	0.36	1.73
47	9.0	4.26	11.3	5.63
48	5.0	3.96	1.86	4.93
49	1.16	4.6	6.6	2.53
50	4.9	4.0	3.16	1.3
51	12.13	3.23	2.56	14.86
52	2.4	3.0	1.36	1.8
53	1.56	4.13	1.3	3.2
54	4.53	36.9	5.1	0.93
55	1.86	4.0	6.53	1.0
56	0.56	5.63	6.5	7.0
57	1.66	1.37	0.86	1.8
58	0.8	5.3	17.53	0.86
59	1.6	4.0	0.8	1.83
60	0.96	1.0	0.86	0.9
61	11.06	2.46	1.53	13.5
62	12.66	4.16	7.53	5.56
63	2.7	12.0	9.0	2.83
64	10.0	3.63	5.0	7.53

65	1.16	3.7	1.16	1.2
66	1.4	4.0	4.9	1.26
67	1.7	13.0	0.96	2.13
68	12.3	3.96	2.4	1.33
69	23.33	3.96	1.56	17.63
70	0.93	4.60	4.53	2.06

Appendix U: Ethical Approval Letter

MEDICAL AND HEALTH RESEARCH ETHICS COMMITTEE (MHREC)
FACULTY OF MEDICINE GADJAH MADA UNIVERSITY
– DR. SARDJITO GENERAL HOSPITAL

ETHICS COMMITTEE APPROVAL

Ref : KE/FK/ 0609/EC/2017

Title of the Research Protocol	: "*Krue Seumangat; Kehamilan Sehat Tanpa Anemia*" Booklet Affect to Anemia Situation Among Pregnant Women at Kota Langsa Municipality Indonesia: A Quasi Experimental Study
Documents Approved	: 1. Study Protocol versi 02 2017 2. Information for Subjects versi 01 2017 3. Informed consent form versi 01 2017
Principle Investigator	: Putri Nahrisah
Date of Approval	: **3 1 MAY 2017** (Valid for one year beginning from the date of approval)
Institution(s)/place(s) of research	: Between two Municipalities in Province Aceh of Indonesia

The Medical and Health Research Ethics Committee (MHREC) states that the above protocol meets the ethical principle outlined in the Declaration of Helsinki 2008 and therefore can be carried out.

The Medical and Health Research Ethics Committee (MHREC) has the right to monitor the research activities at any time.

The investigator(s) is/are obliged to submit:
□ Progress report as a continuing review : Annually
□ Report of any serious adverse events (SAE)
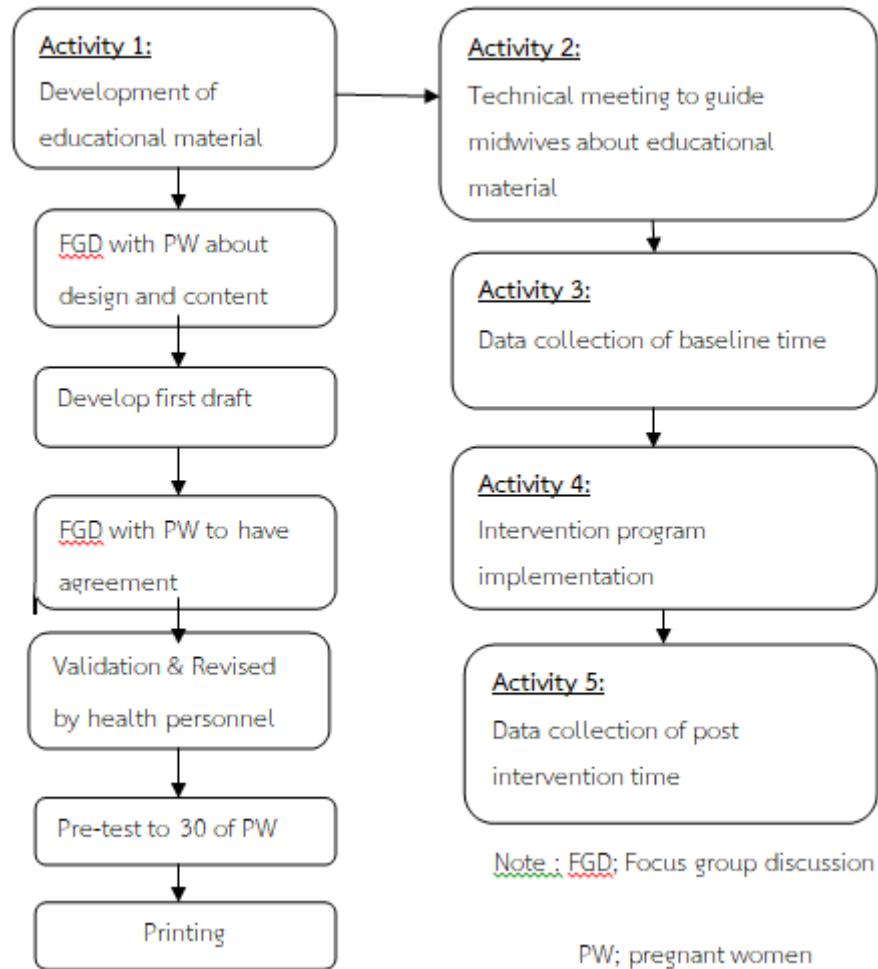☑ Final report upon the completion of the study

Prof. dr. Ngatidjan, M.Sc., Sp.FK(K)
Chairperson

dr. Rizka Humardewayanti Asdie, Sp.PD-KPTI
Secretary

Attachments:
□ Continuing review submission form (AF 4.3.01-014.2013-03)
□ Serious adverse events (SAE) report form (AF 6.1.01- 019.2013-03)

Appendix V : Study activities

Activity 1:
Development of educational material

↓

FGD with PW about design and content

↓

Develop first draft

↓

FGD with PW to have agreement

↓

Validation & Revised by health personnel

↓

Pre-test to 30 of PW

↓

Printing

Activity 2:
Technical meeting to guide midwives about educational material

↓

Activity 3:
Data collection of baseline time

↓

Activity 4:
Intervention program implementation

↓

Activity 5:
Data collection of post intervention time

Note : FGD; Focus group discussion

PW; pregnant women

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CHULALONGKORN UNIVERSITY

Appendix W: Budget

No	Item	Cost (Bath)
	Ethical approval fee	3500
1	Designing and printing the booklet and reminder	20.000
2	Data collection expenses	10.000
5	Laboratory expenses	70.000
6	Research assistant	40.000
7	Monitoring and evaluation meeting (including the focus group discussion)	20.000
8	Indirect expense	20.000
	Total (Bath)	160.000
	Total (Rupiah)	160.000 x Rp.450= Rp.72.000.000

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