

CHAPTER I

INTRODUCTION

1.1 Background

Pregnancy was an important period for fetal growth and development until birth. Nutritional disorders during pregnancy can have a significant impact on maternal and fetal health. Physiological changes in pregnant women, such as decreased haemoglobin levels, can be caused by increased blood plasma volume and decreased hematocrit and plasma protein levels. One of the nutritional problems that often occurs in pregnant women is iron deficiency anaemia.¹ Anaemia occurs when the number of red blood cells or oxygen-carrying capacity (haemoglobin) is insufficient to meet the physiological needs of the body. Anaemia usually occurs in adolescents and pregnant women.²

Anaemia in pregnant women is still a public health problem worldwide, including in Indonesia. Globally, the prevalence of anaemia in pregnant women in 2019, based on the *World Health Organization* (WHO), is 7%.³ Based on Basic Health Research (RISKESDAS) 2018 data, the prevalence of anaemia in pregnant women also showed an increase due to an increase in 2013 from 37.1% to 49.5%.⁴

One of the factors causing anaemia in pregnant women is insufficient protein and iron intake and an unhealthy diet.⁵ The nutritional adequacy of pregnant women profoundly impacts the physical and cognitive development of the baby who will be born, as well as the growth and development of the baby in

¹ Harna Et Al., "Prevalensi Dan Determinan Kejadian Anaemia Ibu Hamil Prevalence And Determinant Of Anaemia Pregnant Women," *Jik (Jurnal Ilmu Kesehatan)* 4, No. 2 (2020): 78–83.

² Elpira Asmin Et Al., "Hubungan Pengetahuan Dan Kepatuhan Ibu Hamil Konsumsi Tablet Tambah Darah Dengan Kejadian Anaemia Di Kecamatan Leitimur Selatan Dan Teluk Ambon," *Jurnal Epidemiologi Kesehatan Komunitas* 6, No. 1 (2021): 229–36, <https://doi.org/10.14710/Jekk.V6i1.10180>.

³ Who "Prevalence Of Anaemia In Pregnant Women (Aged 15-49) (%)," Accessed January 27, 2025, [https://www.who.int/data/gho/data/indicators/indicator-details/Gho/Prevalence-Of-Anaemia-In-Pregnant-Women-\(-\)](https://www.who.int/data/gho/data/indicators/indicator-details/Gho/Prevalence-Of-Anaemia-In-Pregnant-Women-(-)).

⁴ Riset Kesehatan Dasar (Riskesdas), "Laporan Riskesdas 2018 Nasional.Pdf," Lembaga Penerbit Balitbangkes, 2018.

⁵ Meilinda Ulfiatus Soleha, "Hubungan Asupan Protein Hewani Dan Nabati Dengan Kejadian Anaemia Pada Ibu Hamil Trimester 3 Di Desa Dawuhan," *Assyifa : Jurnal Ilmu Kesehatan* 2, No. 1 (2024): 18–28, <https://doi.org/10.62085/Ajk.V2i1.34>.

the future.⁶ According to RISKESDAS in the Technical Guidelines for the provision of local PMT 2023, the target of receiving additional food is Chronic Energy Deficiency. Pregnant Women and Risk Pregnant Women.⁷ Based on this, the PMT only focuses on pregnant women with SEVERE to fulfil the adequacy of macronutrients and micronutrients.⁸ One of the interventions that must be carried out in anaemic pregnant women is the fulfilment of nutritional intake high in protein, fat, and iron to prevent anaemia in pregnant women from getting higher and restore normal Hb status.⁹

One of the food sources of iron and protein is *Moringa* leaves (*Moringa oleifera* L).¹⁰ *Moringa* contains nutrients that are good for body health, such as vitamin A, vitamin B, vitamin C, calcium, protein, potassium, and iron in very high amounts.¹¹ *Moringa* leaves are currently used as an alternative treatment for pregnant women who experience anaemia evidenced by research by Novarta Tika *et al.* in 2023 stating that giving moringa leaves for 1 month can increase Hb levels by 3.8 g/dl - 4.0 g/dl, compared to other plants such as spinach which only increased by 1.2 g/dl, potatoes 1.0 g/dl broccoli 1.3 g/dl, seaweed 1.5g/dl, even beets which reached only 1.8-2.0 g/dl.¹²

⁶ Anugrah Novianti Et Al., “Efektivitas Program Pemberian Makanan Tambahan Pada Ibu Hamil Kekurangan Energi Kronik Di Puskesmas Cikupa, Kabupaten Tangerang,” *Idea Pengabdian Masyarakat* 2, No. 03 (2022): 132–40, <https://doi.org/10.53690/IpM.V2i03.121>.

⁷ Kemenkes Ri, “Petunjuk Teknis Pemberian Makanan Pmt Berbasis Pangan Lokal,” Kemenkes, 2023.

⁸ Gelora Mangalik Et Al., “Program Pemberian Makanan Tambahan: Studi Kasus Pada Ibu Hamil Dengan Kurang Energi Kronis Di Puskesmas Cebongan Salatiga,” *Jurnal Ilmu Keperawatan Dan Kebidanan* 10, No. 1 (January 25, 2019): 111, <https://doi.org/10.26751/Jikk.V10i1.537>.

⁹ Mulyanti Mulyanti, Ramadhan Trybahari Sugiharno, And Jeri Bura, “Pemberdayaan Pangan Lokal Sebagai Pmt Ibu Hamil Dalam Upaya Pencegahan Stunting Di Daerah Endemik Malaria,” *Jurnal Abmas Negeri (Jagri)* 4, No. 2 (December 12, 2023): 146–52, <https://doi.org/10.36590/Jagri.V4i2.768>.

¹⁰ Ana Novitaroh Et Al., “Sifat Sensoris, Kadar Protein Dan Zat Besi Pada Cookies Daun Kelor” 11, No. 1 (2022): 32–44.

¹¹ Yuliana Tampubolon, “Pengaruh Pemberian Daun Kelor Pada Ibu Hamil Trimester Iii Dengan Peningkatan Kadar Hb Di Wilayah Kerja Puskesmas Gedung Sari Kecamatan Anak Ratu Aji Kabupaten Lampung Tengah Tahun 2020,” *Jurnal Kebidanan Malahayati* 7, No. 4 (2021): 801–8, <https://doi.org/10.33024/Jkm.V7i4.3168>.

¹² Tika Novarta Et Al., “Pengaruh Pemberian Daun Kelor Pada Ibu Hamil Dengan Peningkatan Kadar Hb Di Bpm Wirahayu, S.Tr. Keb Kecamatan Panjang Bandar Lampung” 3, No. 1 (2023): 34–41.

Soybeans are a food ingredient believed to help overcome iron deficiency anaemia. The protein and iron content in soybeans stimulates the production of red blood cells, helping to treat anaemia.¹³ The protein content of soybeans in 100 grams contains 30.2g of protein, which is the bean that has the best protein value when compared to protein from other types of beans, such as green beans 22.9g, red beans 22.1g, and peanuts 27.9g.

The food provided in the PMT program is *cookies*, which are of course made with quality, guaranteed content, and safety.¹⁴ *Cookies* are one type of food that has a good texture and taste. So, it can be used as a distraction by making innovations, namely *cookies*, to be used as a companion to additional food (PMT).¹⁵ In this study, the Cookies are made with local ingredients high in protein, fat, and iron, namely moringa flour and soybeans.

According to Yulianti's research in 2020 regarding Hb levels in Trimester II and III pregnant women, it was found that the level of energy, protein, and iron adequacy had a statistically significant relationship with haemoglobin levels in Trimester II and III pregnant women.¹⁶ In addition, according to Rahmad in 2020, there is a strong relationship between protein intake and haemoglobin levels, where

¹³ Sinta Nur Annisa And Inne Indraaryani Suryaalamshah, "*Formulasi Cookies Dari Tepung Hati Ayam Dan Tepung Kedelai Sebagai Makanan Sumber Zat Besi Pencegah Anaemia Pada Remaja Putri*," Muhammadiyah Journal Of Nutrition And Food Science (Mjnf) 4, No. 1 (May 28, 2023): 14, <https://doi.org/10.24853/Mjnf.4.1.14-27>.

¹⁴ Miftakhul Huda Et Al., "Pemberian Biskuit Ibu Hamil Di Posyandu Jati Wetan Kecamatan Jati Kabupaten Kudus Sebagai Program Pencegahan Kekurangan Gizi," N.D.

¹⁵ Nurasmı Nurasmı And Irnawati Irnawati, "*Efektivitas Pemberian Cookies Tepung Kelor Dengan Penambahan Tepung Ubi Banggai Dan Tepung Kedelai Sebagai Alternatif Makanan Tambahan Dalam Meningkatkan Bb Pada Balita Wasting*," Jurnal Keperawatan Muhammadiyah 8, No. 1 (March 31, 2023), <https://doi.org/10.30651/Jkm.V8i1.16159>.

¹⁶ Yuliantisari Retnaningsih Et Al., "*Hubungan Asupan Protein, Fe, Vitamin C Serta Ketepatan Konsumsi Zat Tannin Dan Kafein Terhadap Kadar Hemoglobin Ibu Hamil Trimester Iii Di Puskesmas Kota Yogyakarta*," Jurnal Nutrisia 22, No. 1 (November 1, 2020): 8–15, <https://doi.org/10.29238/Jnutri.V22i1.177>.

lower protein intake leads to lower haemoglobin levels in women.¹⁷ One of the causes of iron deficiency anaemia in pregnant women is iron deficiency.¹⁸

Based on this description, it is necessary to research substituting moringa flour and soybeans in making *Cookies* as an alternative PMT for anaemic pregnant women.

1.2 Research Problem

The research problem in this study was:

Is there a difference in protein, iron fat, and organoleptic levels in *cookies* substituted with moringa flour and soybeans as PMT for anaemic pregnant women?

1.3 Research objective

1. General Objective

To determine the differences in protein, fat, iron, and organoleptic levels as PMT for anaemic pregnant women on protein, fat, iron, and organoleptic levels of *cookies* substituted with moringa flour and soybean flour or anaemic pregnant women.

2. Special Objective

- a. Analyzing the difference in protein levels in *cookies* substituted with moringa flour and soybeans as PMT for anaemic pregnant women.
- b. Analyzing the difference in fat content in *cookies* substituted with moringa flour and soybeans as PMT for anaemic pregnant women.
- c. Analyzing the difference in iron levels in *cookies* substituted with moringa flour and soybeans as PMT for anaemic pregnant women.
- d. Analyzing the differences in organoleptic colour taste, aroma, and texture in *cookies* substituted with moringa flour and soybeans as PMT for anaemic pregnant women.

¹⁷ Agus Hendra Al Rahmad, "Pengaruh Asupan Protein Dan Zat Besi (Fe) Terhadap Kadar Hemoglobin Pada Wanita Bekerja," Jurnal Kesehatan 8, No. 3 (November 30, 2020): 321, <https://doi.org/10.26630/Jk.V8i3.509>.

¹⁸ Harna Et Al., "Prevalensi Dan Determinan Kejadian Anaemia Ibu Hamil Prevalence And Determinant Of Anaemia Pregnant Women."

1.4 Research Benefit

1. Theoretical Benefit

Theoretically, this research is expected to provide scientific information and develop knowledge about nutrition regarding the utilization and usability of moringa leaves and soybeans as an alternative food supplement to overcome anaemia in pregnant women and as an effort to increase food variety

2. Practical Benefits

a. For Researchers

Increase knowledge in the fields of food, nutrition, and health, especially in applying how to make *cookies* with moringa and soybean flour substitutions to protein, fat, iron, and acceptability levels for PMT for pregnant women.

b. For the Community

1. This research is expected to indirectly help the community overcome the problem of anaemia in pregnant women.
2. Increase the utilization of moringa leaves and soybeans as supplementary food for pregnant women with anaemia, which is rich in protein, fat, and iron.

1.5 Authenticity of Research

This research is related to moringa flour *cookies* and soybean flour with various variations of raw materials and their manufacture has been carried out by several similar studies and has been carried out by previous studies but with several research modifications. In table 1, we can see the differences between previous research and current research:

Table 1. Research Authenticity

No.	Research Title	Research Method	Variables	Results	Research Differences
1.	Substitution of Red Bean Flour (<i>Phaseolus Vulgaris L.</i>) and Moringa Leaf Flour (<i>Moringa Oleifera L.</i>) in Biscuits for Patients with	Experimental with the research design of Completely Randomized Design (CRD)	Independent: Substitution of Red Bean Flour (<i>Phaseolus Vulgaris L.</i>) and Moringa Leaf Flour (<i>Moringa Oleifera L.</i>) in Biscuits for	The best treatment level P1 (60:5:35) is the best treatment level with a serving suggestion of 60 grams (6 pieces) with an energy content of 235.1 Kcal, protein of 5.6 grams, fat of 3.5 grams, carbohydrates of 45.4	Independent: Substitution of Soy Bean Flour as a PMT for Anaemia Pregnant Women.

No.	Research Title	Research Method	Variables	Results	Research Differences
	Hypercholesterolemia on Nutrient Content and Organoleptic Quality ¹⁹		Patients with Hypercholesterolemia. Dependent: Nutrient Content and Organoleptic Quality.	grams, and fibre of 1.3 grams.	Dependent: Analysis of Protein Content, Fat Content, and Iron Content.
2	Substitution of <i>Moringa</i> Leaf Flour (<i>Moringa Oleifera</i> L.) in Cookies on Physical Properties, Organoleptic Properties, Proximate Content, and Fe Content. ²⁰	True experimental with four treatments	Independent: Substitution of <i>Moringa</i> Leaf Flour (<i>Moringa Oleifera</i> L.) in Cookies. Dependent: Physical Properties, Organoleptic Properties, Proximate Content, and Fe Content.	<i>Cookies</i> B have a greenish colour, and are slightly scented with moringa leaves, a sweet taste, and a slightly hard texture. The highest levels of protein, fat, ash, and Fe are found in <i>cookies</i> D, namely 11.95%; 16.52%; 3.665%; and 31.52 ppm. The highest carbohydrate and water content is found in <i>cookies</i> A, 62.485% and 15.77%.	Independent: Substitution of Soy Bean Flour as a PMT for Anaemia Pregnant Women. Dependent: Protein Content and Fat Content Analysis.
3	Formulation of Tempeh and Moringa Leaf Flour Cookies as a Snack for Underweight Adolescents. ²¹	Experimental	Independent: Formulation of Tempeh and Moringa Leaf Flour Cookies Dependent: Nutrient Content and Organoleptic Quality.	The results of the normality test with Shapiro-Wilk showed a p-value (0.000) < α (0.05), which was not normally distributed. The Kruskal Wallis test results showed a significant difference in panellist's liking for colour in formulas F1 and F2 and formulas F1 and F3 and taste in formulas F1 and F3 and formulas F2 and F3. Laboratory test results show that	Independent: Substitution of Soy Bean Flour as a PMT for Anaemia Pregnant Women. Dependent: Protein Content, Fat Content, and Iron Content Analysis.

¹⁹ Oktavia Indri Safitri, I Komang Suwita, And Maryam Razak, "Kadar Zat Gizi Dan Mutu Organoleptik," N.D.

²⁰ Devillya Puspita Dewi, "Kelor Leaf Flour Substitution Of Cookies On Physical And Organoleptic Characteristic," 01, No. 02 (2018).

²¹ Andini Aulia Rohmah Et Al., "Formulasi Cookies Tepung Tempe Dan Tepung Daun Kelor Sebagai Makanan Selingan Untuk Remaja Underweight: Formulation Of Cookies With Tempe Flour And Moringa Leaf Flour As A Snack For Adolescent With Underweight," Jurnal Inovasi Bahan Lokal Dan Pemberdayaan Masyarakat 2, No. 1 (May 13, 2023): 38–46, <https://doi.org/10.34011/jibpm.V2i1.1301>.

No.	Research Title	Research Method	Variables	Results	Research Differences
4	Substitution of <i>Moringa</i> Leaf Flour (<i>Moringa Oleifera</i> L.) and Mung Bean Flour (<i>Vigna Radiate</i> L.) in Cookies as an Alternative Supplementary Food for Breastfeeding Mothers. ²²	Experimental with a completely randomized design (CRD).	Independent: Substitution of <i>Moringa</i> Leaf Flour (<i>Moringa Oleifera</i> L.) and Mung Bean Flour (<i>Vigna Radiate</i> L.) Dependent: Nutrient Content and Organoleptic Quality.	every 100 grams of cookies with the best formulation (formula 2) contains 551 kcal of energy, 51.71 grams of carbohydrates, 12.20 grams of protein, 32.81 grams of fat, and 5.11 milligrams of iron. Results: The organoleptic test results of the most preferred colour and taste parameters were P1, while the most preferred aroma and texture parameters were P2. The results of the P3B nutritional content test showed ash content (2.46%), fat (29.28%), and energy (514.5%). The highest water content was found in P2A (5.93%). The highest protein content was found in P3A and P2B (7.78%). The highest carbohydrate content was found in P1A (56.69%).	Independent: Substitution of Soy Bean Flour as a PMT for Anaemia Pregnant Women. Dependent: Protein Content, Fat Content, and Iron Content Analysis.
5.	Soybean Flour and Moringa Leaf Flour in Making Crispy Cookies Interlude Food to Prevent Wasting. ²³	True experiment with a complete randomized design (CRD) research design.	Independent: Soybean Flour and Moringa Leaf Flour Dependent: Nutrient Content and Organoleptic Quality.	The results showed that the higher the addition of soy flour, the higher the protein content in <i>crispy cookies</i> . There is a significant difference (sig <0.05) in protein content and breakability of the <i>crispy cookies</i> .	Independent: PMT for Anaemia Pregnant Women. Dependent: Protein Content, Fat Content, and Iron Content Analysis.

²² Marliyana Puspitadini And Irwan Budiono, “*Substitusi Tepung Daun Kelor (Moringa Oleifera L.) Dan Tepung Kacang Hijau (Vigna Radiate L.) Pada Cookies Sebagai Alternative Makanan Tambahan Ibu Menyusui*,” 2023.

²³ Ninis Lestiarini, “*Tepung Kedelai Dan Tepung Daun Kelor Dalam Pembuatan Crispy Cookies Sebagai Makanan Selingan Cegah Wasting*” 11, No. 1 (2023).