

UNIVERSITI TEKNOLOGI MARA

**VALIDATION AND RELIABILITY OF THE NEWLY
DEVELOPED FOOD FREQUENCY QUESTIONNAIRE FOR
IRON INTAKE AMONG PREGNANT WOMEN (P-FeFFQ)**

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ABSTRACT

Background: Iron deficiency anemia is common among pregnant women in Malaysia, posing risks to both maternal and fetal health. This study aimed to develop and validate a Food Frequency Questionnaire (FFQ) to assess iron intake among pregnant Malaysian women. **Method:** The P-FeFFQ was created using data from 24-hour dietary recalls and literature reviews on iron-rich foods. An expert panel reviewed an initial list of 74 food items, which was refined to 63 based on content validity index (I-CVI) scores and feedback. Validation was performed against three-day dietary records from 21 pregnant women. Descriptive statistics summarized sociodemographic data and iron intake, while Pearson's correlation and Bland-Altman plot analyses assessed validity. **Results:** Participants had a mean age of 29.8 years and a pre-pregnancy BMI of 26.0 kg/m². The P-FeFFQ showed excellent content validity (I-CVI score of 0.93) and was culturally relevant. The mean iron intake estimated by the P-FeFFQ was 14.09 mg/day, compared to 12.38 mg/day from dietary records. Pearson's correlation coefficient was 0.648 ($p = 0.001$), indicating a moderate positive relationship. Bland-Altman analysis showed a mean difference of 1.71 mg/day, with most data points within the limits of agreement, suggesting reasonable accuracy. **Conclusion:** The P-FeFFQ is a valid and reliable tool for assessing dietary iron intake among pregnant women in Malaysia. While it slightly overestimates iron intake, its ease of use and cultural relevance make it suitable for large-scale assessments and public health interventions. Future research should refine the P-FeFFQ for enhanced accuracy across diverse Malaysian populations.

Keywords: Iron deficiency anemia, pregnant women, Food Frequency Questionnaire, dietary assessment, Malaysia, nutritional epidemiology, validation stu

TABLE OF CONTENTS

LIST OF TABLES	V
LIST OF FIGURES	VI
LIST OF ABBREVIATIONS	VII
ABSTRACT	VIII
CHAPTER 1: INTRODUCTION.....	1
1.1 Research Background	1
1.2 Research Problem.....	2
1.3 Significance of the study	3
1.4 Research Questions	4
1.5 Objectives of the study	4
1.6 Hypothesis of the study	4
1.7 Research Framework	5
CHAPTER 2: LITERATURE REVIEW.....	6
2.1 Introduction to Anemia.....	6
2.1.1 Definition and Prevalence of Anemia.....	6
2.1.2 Risk Factors of Anemia	7
2.1.3 Complications of Anemia	9
2.2 Food Frequency Questionnaire (FFQ)	11
2.2.1 Introduction to Food Frequency Questionnaire (FFQ)	11
2.2.2 Available Food Frequency Questionnaires	12
2.2.3 Methodologies in FFQ Development.....	13
CHAPTER 3: MATERIALS AND METHODS	17
3.1 Study Sample	17
3.2 Material	18
3.2.1 Sociodemographic, anthropometric & obstetric information	18
3.2.2 Diet Records	18
3.2.3 Content Validity Forms.....	19
3.3 Development of the Food List.....	20
3.4 Validation of the Food List.....	21
3.5 Statistical analysis.....	22
3.6 Ethical Considerations	23

CHAPTER 1: INTRODUCTION

1.1 Research Background

The World Health Organization defined anemia as a condition in which the haemoglobin level in the blood is less than 11g/dl and can be categorized as mild, moderate and severe. Such conditions may lead to symptoms like tiredness, weakness, light-headedness, and difficulty breathing, among other manifestations. According to WHO, it was estimated that the prevalence of anemia in pregnancy is 37% as of May 2023. Meanwhile, in Malaysia, the prevalence of anemia during pregnancy ranged from 19.3 to 57.4% and it was found that Terengganu has the highest prevalence of anemia in Malaysia, which is 57.4% (Rahman et al., 2022). In Selangor, a previous study found that the prevalence of anemia among pregnant mothers is 33% (Soh et al., 2015).

According to Beckert et al. (2019), anemia in pregnancy can lead to adverse outcomes to both the mother and fetus. It was discovered that the mortality rate for pregnant mothers with severe anemia was double that of mothers without the condition which was contributed by severe hemorrhage during childbirth or the postpartum period, as well as complications resulting from anemia, including heart failure (Khaskheli et al., 2016). Anemia also increased the risk of premature birth and small baby (Nair et al., 2016). Thus, its management poses challenges to the healthcare professionals.

According to WHO, anemia can result from various factors, including insufficient dietary intake or absorption of nutrients, infections, inflammation, chronic illness, gynecological and obstetric issues, as well as inherited disorders affecting red blood cells. Among these, iron deficiency is the most common cause of anemia in pregnancy, especially in low socioeconomic countries, as highlighted by Rahman et al. (2022). Iron deficiency, defined by a serum ferritin level below 15µg/L, is particularly critical