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# Compliance with Fe tablet consumption, pregnancy spacing, frequency of antenatal care, and anemia in pregnant women

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## Abstract

**Purpose:** This study aims to determine the effect of compliance with Fe tablet consumption, pregnancy spacing, and frequency of antenatal care (ANC) visits on hemoglobin anemia in pregnant women at the Comoro Community Health Center, Dili, Timor-Leste. **Methods:** We used discriminant analysis on a randomly selected 84 out of 250 pregnant women. **Results:** The statistical analysis using discriminant analysis revealed that compliance with Fe tablet consumption (p = 0.00), pregnancy spacing (p = 0.000), and frequency of ANC visits (p = 0.002) all had significance values less than 0.05, indicating that these three factors significantly affect hemoglobin levels in pregnant women with anemia. **Conclusion:** Compliance with the consumption of Fe tablets was obtained by the “Abnormal” group value, namely a mean or average of 84.31, while the “Normal” group value was a mean or average of 93.29, and the distance between maternal pregnancy and anemia in pregnant women was obtained with the mean or average value of 18.10 (abnormal group) and 23.3 (normal group), so it can show that there is an influence on compliance with the consumption of Fe tablets and the interval between pregnancies and anemia in pregnant women.

**Keywords:** ANC (antenatal care) visits; Fe tablets; hemoglobin; pregnancy spacing

## INTRODUCTION

Pregnancy is a crucial time; a mother must prepare to avoid issues like anemia during birth [1]. Anemia is not just a local issue but a global public health problem that can increase morbidity and mortality rates. Pregnant women who suffer from anemia could experience bleeding during childbirth, which can result in death. The term "potential danger to mother and child" refers to the potential harm that anemia poses to both the mother and the child. Therefore, anemia requires serious attention from all parties involved in health services [2]. Anemia is caused by iron and other micronutrients being transferred from the mother to the fetus through the placenta, resulting in increased iron requirements in pregnant women [3].

The World Health Organization (WHO) reports that maternal deaths are estimated at 303,000 people, or around 216/100,000 live births worldwide. Globally, the prevalence of anemia in pregnant women is 41.8%. About half of anemia cases are caused by iron deficiency. The prevalence of anemia in pregnant

women in Africa is 57.1%, Asia 48.2%, Europe 25.1%, and America 24.1%. Approximately 40% of maternal deaths in developing countries are related to anemia in pregnancy [4]. Overall, 84% of women aged 15–49 years received ANC services from a skilled provider (physician, nurse, midwife, or nursing assistant). However, 14% of women did not receive ANC. The timing and quality of ANC are also important. More than three in four (77%) women had four or more ANC visits, and 57% had their first ANC visit in the first trimester. Eighty-five percent of women take iron tablets or syrup during pregnancy. Nearly three-quarters (72%) of women's recent births were protected against neonatal tetanus. Among women who received ANC for most of their recent births, 90% had blood pressure measured, 62% had urine samples taken, and 56% had blood samples taken. Overall, 23% of women aged 15–49 years suffer from anemia; the majority suffer from mild anemia. Pregnant women are more likely to experience anemia (37%) than women who are breastfeeding (26%) or those who are not pregnant and not breastfeeding (21%) [5].

Based on reporting data from the Comoro health center in 2023, between January and December 2023, 250 pregnant women were recorded; 66.4% of these women had normal hemoglobin (Hb), and 33.6% had mild anemia [6]. The results of the 2018 Basic Health Research (Riskesdas) indicate that in Indonesia, the prevalence of anemia among pregnant women is 48.9%, a significant increase from the 2013 Riskesdas results of 37.1%. As many as 62.3% of anemia cases are due to iron deficiency, which can cause miscarriage, preterm labor, uterine inertia, prolonged labor, uterine atony, bleeding, and shock. The contribution of anemia to mortality in Indonesia is estimated to be 10–12%, and maternal deaths in Indonesia could be prevented if the incidence of anemia among pregnant women could be reduced to as low as possible [7]. The prevalence of anemia in pregnant women in Sleman Regency in 2021 was 10.54%, and it increased by 12.57% in 2022 [8]. These statistics highlight the preventable nature of anemia, providing hope and motivation for future interventions.

Several factors contribute to anemia in pregnant women. The primary cause of anemia is a deficiency in iron levels in the blood, which can also increase the body's susceptibility to disease. A lack of iron-containing food intake contributes to the body's iron deficiency. Worms and malaria are infectious diseases that can increase a person's risk of anemia. The second cause is an indirect one, resulting from low family attention, high activity levels, and a lack of precise food distribution patterns within the family. The third cause is the most fundamental one, comprising low education, low income, low social status, and a challenging geographical location of residence [9]. Anemia is also caused by behavioral and lifestyle factors as well as the environment, which include consumption of iron supplements and diet (consumption of protein, vegetables, fruit, coffee, and tea), as well as socio-economic and respondent characteristics including age, parity, gestational age, pregnancy spacing, and frequency of pregnancy checks [10].

Previous research has generally examined compliance with iron supplementation, pregnancy spacing, and ANC attendance in isolation. Nevertheless, analyses that explore their combined influence within primary health care settings in Timor Leste remain scarce. This study aims to determine the effect of compliance with Fe tablet consumption, pregnancy spacing, and frequency of ANC visits on hemoglobin in pregnant women at the Comoro Community Health Center, Dili, Timor Leste.

## METHODS

The Comoro Community Health Center, Dili District Health Service, Timor Leste, provided the data for this study in 2023. The data collected pertained to anemia in pregnant women, involving a total of 250 individuals. Of the 250 pregnant women studied, 84 were selected using systematic random sampling. The data related to anemia in pregnant women studied included compliance with iron tablet consumption, pregnancy spacing, frequency of ANC visits, and hemoglobin (Hb) levels in pregnant women with anemia. Data were analyzed using discriminant analysis, a method that categorizes factors such as adherence to iron tablet use, pregnancy spacing, and frequency of ANC visits into groups to identify which factors significantly affect hemoglobin (Hb) levels in pregnant women with anemia [11]. This research has been registered in the FKG UNAIR Ethics Review with number 1156/HRECC.FODM/XII/2024.

## RESULTS

Table 1 presents the results of a discriminant analysis examining compliance with Fe tablet consumption. The mean compliance score for the "Abnormal" group (coded as 0) was 84.31, while the "Normal" group (coded as 1) had a higher mean score of 93.29. These findings suggest that higher compliance with Fe tablet consumption is associated with a normal anemia status in pregnant women at the Comoro Health Center.

**Table 1. Group statistics on Hb of pregnant women**

| Hb pregnant mother | | Mean | Std. Dev. | Valid N (listwise) | |
|---|---|---|---|---|---|
| | | | | Unweighted | Weighted |
| Hb pregnant mother < 11 | Compliance with Fe Tablet Consumption | 84.31 | 3.639 | 42 | 42.000 |
| | The distance between pregnant women | 18.10 | 4.172 | 42 | 42.000 |
| | Frequency of ANC Visits | 4.62 | 0.661 | 42 | 42.000 |
| Hb pregnant mother ≥ 11 | Compliance with Fe Tablet Consumption | 93.29 | 3.133 | 42 | 42.000 |
| | The distance between pregnant women | 23.33 | 3.136 | 42 | 42.000 |
| | Frequency of ANC Visits | 4.21 | 0.470 | 42 | 42.000 |
| **Total** | Compliance with Fe Tablet Consumption | 88.80 | 5.637 | 84 | 84.000 |
| | The distance between pregnant women | 20.71 | 4.517 | 84 | 84.000 |
| | Frequency of ANC Visits | 4.42 | 0.605 | 84 | 84.000 |

On the effect of the maternal pregnancy distance variable with the abnormal group value (0), specifically the mean or average of 18.10. In contrast, the normal group value (1) is the mean of 23.33, so there is a decision on the distance between mothers' pregnancies with a higher value for the normal group compared to the value for the abnormal group, so there is a strong decision on the distance between mothers' pregnancies and maternal anemia, which demonstrates a correlation between compliance with Fe tablet consumption and anemia in pregnant women within the Comoro health center's working area.

Table 2 presents a test of equality of group means using discriminant analysis with a test of equality of variable group averages using Wilks' Lambda from the three variables above, showing that Fe tablet compliance (0.00), pregnancy distance (0.000), and the frequency of ANC visits (0.002) have a significant value of the three variables that have been tested with a value of <0.05 (alpha), so there is a difference in Hb decision-making in anemic pregnant women.

### Classification results

Table 3 shows the classification results for the discriminant model obtained, which includes a misclassification of 4.76% for the variable Hb levels of pregnant women in the Normal and Not Normal categories (4+0)/84. Therefore, the discriminant model used was valid due to its accuracy, classified as very good.

**Table 2. Test of equality of group means**

| | Wilks' Lambda | F | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Compliance with Fe tablet consumption | 0.358 | 146.735 | 1 | 82 | 0.000 |
| The distance between pregnant women | 0.660 | 42.300 | 1 | 82 | 0.000 |
| Frequency of ANC visits | 0.887 | 10.458 | 1 | 82 | 0.000 |

**Table 3. Classification results**

| | | Hb pregnant women | Predicted group membership | | Total |
|---|---|---|---|---|---|
| | | | Hb < 11 | Hb ≥ 11 | |
| **Original** | **count** | HB < 11 | 42 | 0 | 42 |
| | | HB ≥ 11 | 4 | 38 | 42 |
| | **%** | HB of pregnant women < 11 | 100 | 0 | 100 |
| | | HB of pregnant women ≥ 11 | 9.5 | 90.5 | 100 |

95.2% of original grouped cases correctly classified

## DISCUSSIONS

The results of this study indicate a correlation between compliance with Fe tablet consumption and anemia in pregnant women in the Comoro Health Center's working area. Likewise, the results of the same research, obtained by Kurniawati, Pasiriani, and Arsyawina (2023), indicated an influence between compliance with Fe tablet consumption and the incidence of anemia [12].

The results of a journal review by Nurdimayanthi, Hilmi, and Salman indicate a significant relationship between the level of compliance with anemia cases in pregnant women and respondent characteristics, including age, education, occupation, anemia status, compliance, knowledge, and attitudes [13]. To increase compliance in pregnant women, attention, counseling, and family support are needed to ensure the health of the mother and fetus. Health promotion, information communication, and education efforts are also required to increase pregnant women's awareness of the importance of taking Fe tablets. Other factors, besides compliance with Fe consumption, can also influence the incidence of anemia, so that not all research results yield the same results. This finding aligns with the results of research by Windari, Lisnawati, and Herutomo (2018), which indicate that there is no significant influence between adherence to Fe consumption (p = 0.0571, OR = 0.07) and the incidence of anemia in pregnant women in Jatiluhur

District, Purwakarta Regency. The research conclusion states that factors influencing the incidence of anemia in pregnant women include age, iron intake, education, knowledge, and ANC visits [14].

The results of the chi-square test showed that the p-value was <0.05, meaning that there was a significant relationship between the distance between pregnancies and the incidence of anemia in pregnant women in the Comoro Health Center working area, Timor Leste. Several causal factors contribute to the significant gap of less than 2 years between pregnancies. One of the factors related to pregnancy spacing <2 years is education, whereas the education level of most respondents (59.3%) is limited to basic education, which may cause them to lack information about the importance of pregnancy management and family planning. Efforts that need to be made to reduce the incidence of pregnancy spacing <2 years include establishing beneficial cooperation between community health centers and private practice doctors or midwives in terms of providing information about the benefits and objectives of pregnancy spacing, providing information about family planning, various types of contraception, and the advantages and disadvantages of each contraceptive method. Several sources suggest that the ideal interval between pregnancies is at least 2 years. According to Rofiq (2008), the highest proportion of deaths occurred in mothers with a priority of 1-3 children. If we look at the pregnancy distance, it turns out that a distance of less than 2 years shows a higher proportion of maternal deaths. Pregnancies that are too close apart cause the mother to have a short time to recover from the condition of her uterus so that it can return to its previous condition. Pregnant women who are too close are at risk of developing anemia during pregnancy. The fetus's needs ultimately deplete the pregnant woman's restored iron reserves [15].

The frequency of ANC visits in this study influences the incidence of anemia in pregnant women in the Comoro Community Health Center working area, Timor Leste. This finding aligns with research by Lesilolo (2016), which suggests a significant relationship between ANC and hemoglobin levels in pregnant women [16]. According to Amartami (2007), as cited in Rizki (2017), ANC is a pregnancy check-up conducted by a midwife or doctor to optimize the mental and physical health of the mother. This ANC, which is monitored through new pregnancy visits (K1) and at least four visits (K4) in each quarter of this service, includes weight checks, blood pressure checks, and anemia checks [17]. A study in 2019 [18] shows a strong link between how regularly women attend ANC visits and how well they stick to taking Fe tablets, which together affect the chances of anemia in pregnant women in their third trimester in Maron District, Probolinggo, with p-values of 0.001 for both ANC visits (OR = 4) and Fe tablet adherence (OR = 3.46).

The findings of this study have broader social relevance, particularly in relation to maternal health education and service utilization. Anemia in pregnant women is not solely a clinical outcome but is also influenced by behavioral, informational, and service-related factors such as adherence to iron supplementation, pregnancy spacing, and the frequency of ANC visits. Strengthening adherence to Fe tablet supplementation, maintaining adequate spacing between pregnancies, and ensuring regular ANC visits can empower women and lower maternal risks [19]. Moreover, integrated approaches to maternal and child health such as combining nutritional education, access to supplements, and family support, have been shown to improve outcomes, particularly in underserved settings [20]. Community-driven health promotion through primary care facilities like the Comoro Health Center can raise awareness, improve health literacy, and support healthier pregnancies that yield long-term social benefits.

## CONCLUSION

Compliance with the consumption of Fe tablets yielded a value of 84.31 for the "Not Normal" group, while the "Normal" group had a mean value of 93.29. The distance between maternal pregnancy and anemia in pregnant women also obtained a mean value. The abnormal group had a mean value of 18.10. In contrast, the normal group had a mean value of 23.3, indicating that adherence to consuming Fe tablets and the interval between pregnancies may influence the incidence of anemia in pregnant women. The classification results for the discriminant model obtained were a misclassification rate of 4.76% (4/84) for the variable Hb levels of pregnant women, categorized as normal and abnormal. Therefore, the discriminant model used was valid, as the classification accuracy was excellent. By testing the equality of group averages of variables using Wilks' Lambda from the three variables above, it shows that compliance with Fe tablet consumption (0.00), pregnancy distance (0.000), and frequency of ANC visits (0.002) have significant values of the three variables that have been tested with a value of <0.05 (Alpha) so that the research results show that there are differences in Hb decision-making in anemia in pregnant women.

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