

# Does measuring ferritin in the first or third trimester, optimise diagnosis of obstetric iron deficiency anaemia, thereby leading to prompt oral iron therapy and a reduction in blood transfusions?

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## 1. Introduction

Anaemia is a condition of **low circulating Haemoglobin (Hb)**, insufficient to meet the body's physiological needs. (1)

- In the UK, 1 in 4 women become anaemic during pregnancy and **iron deficiency anaemia (IDA)** accounts for 75% of all types of **obstetric anaemia**.
- IDA** is **asymptomatic** and develops slowly over time. (1)
- It can have serious **foetal and maternal consequences**.
- First line treatment for IDA is **oral iron therapy** however in the case of severe anaemia, **blood transfusion** is required. (2)

Test	Threshold	Information
Full blood count (FBC)	Hb: Defined as <110g/L at any trimester, on an international level, by World Health Organisation (3)	Hb is the main parameter used to determine the presence of obstetric anaemia. Measured in first trimester (7-12 weeks) and third trimester (28 weeks)
Ferritin	Defined as <30µg/l at any trimester by UK guidelines (2) Despite that, threshold varies internationally and nationally	Most sensitive and specific test for IDA diagnosis however only done as selective screening and not routine use.

Table 1. Table of tests used to diagnose IDA.

## 2. Aims and Hypothesis

- H<sub>1</sub>: Measuring plasma ferritin can optimise the diagnosis of **obstetric IDA**
- H<sub>0</sub>: Measuring plasma ferritin cannot optimise the diagnosis of **obstetric IDA**

This study aims to determine:

- If, when using a threshold of <30µg/l, **ferritin** is a more sensitive test than **Hb**, which can lead to a prompt **IDA diagnosis** within the first or third trimester.
- If this **prompt diagnosis** leads to early, proactive and targeted **oral iron treatment** and thereby reduces need for **blood transfusions**.
- If there is a correlation between **ferritin** and **Hb values**.

## 3. Method

Group	Measuring	Other Information
Test (n = 120) Iron treatment for those <30µg/l	<ul style="list-style-type: none"> <li>Ferritin (first and third trimester)</li> <li>Hb throughout pregnancy</li> <li>C-Reactive Protein (first and third trimester)</li> </ul>	<ul style="list-style-type: none"> <li>Transfusions</li> <li>Parity</li> <li>Date of birth</li> <li>Ethnicity</li> </ul>
Control (n = 100) No iron treatment	<ul style="list-style-type: none"> <li>Hb throughout pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>Transfusions</li> <li>Parity</li> <li>Date of birth</li> <li>Ethnicity</li> </ul>

Table 2. The two groups which were compared and what was measured.

## 6. References

- Sharma J.B., Shankar M. Anaemia in Pregnancy. All India Institute of Medical Science. [Internet] 2010 [cited 13 November 2018]; 23(4):253-6 Available from: <http://medind.nic.in/jav/t10/i4/jav10i4p253.pdf>
- Pavord S., Myers B., Robison S., Allard S., Strong J., Oppenheimer C., UK guidelines on the management of iron deficiency in pregnancy. British Committee for Standards in Haematology [Internet]. 2011 [cited 13 November 2018]; 2-17. Available from: [https://b-s-h.org.uk/media/2891/uk\\_guidelines\\_iron\\_deficiency\\_in\\_pregnancy.pdf](https://b-s-h.org.uk/media/2891/uk_guidelines_iron_deficiency_in_pregnancy.pdf)
- World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity [Internet]. 2011 [cited 14 November 2018]; 1-4. Available from: <https://www.who.int/vmnis/indicators/haemoglobin.pdf>

## 4. Results

Figure 1

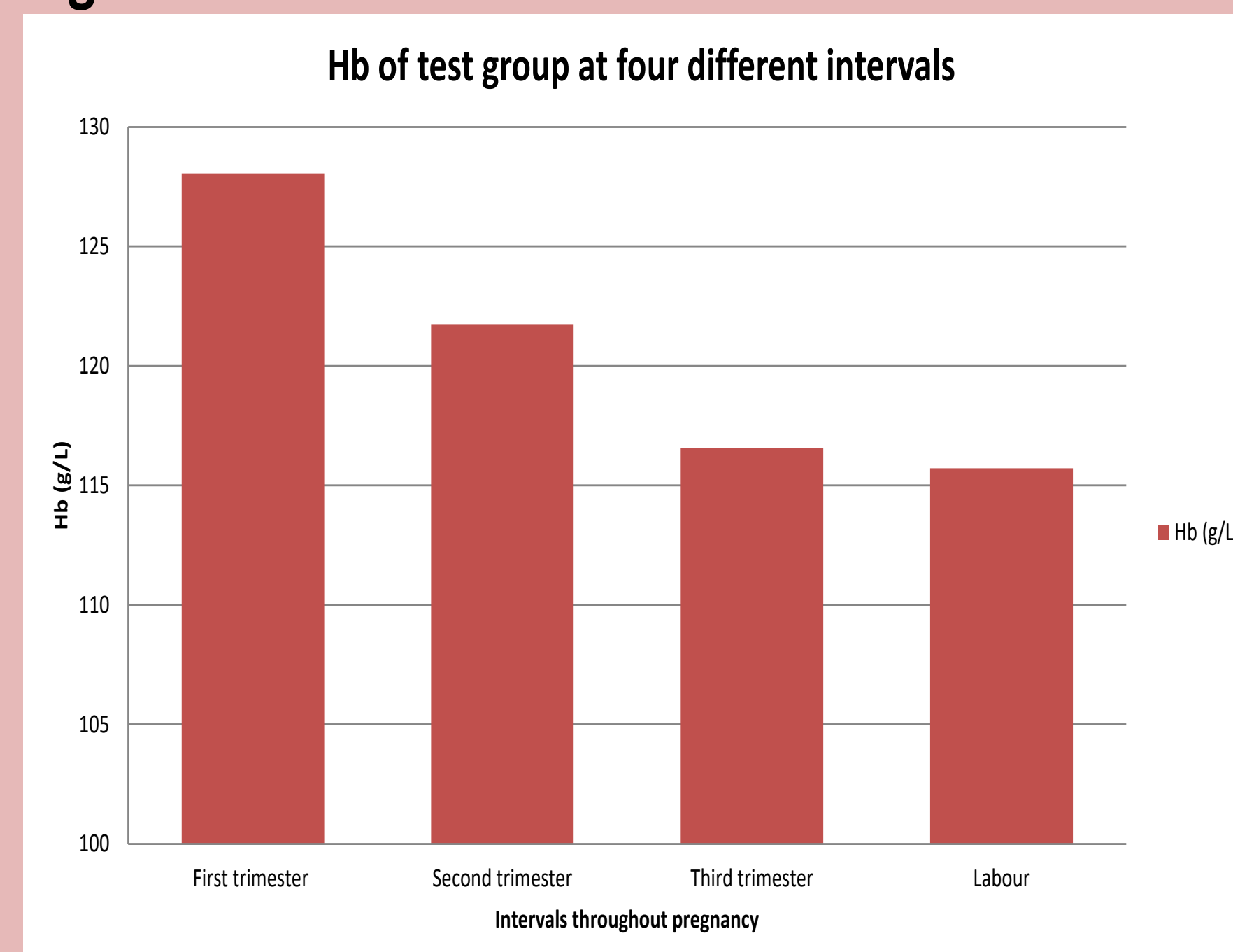


Figure 1. Chart showing average Hb of the test group at four points throughout pregnancy.

Figure 2

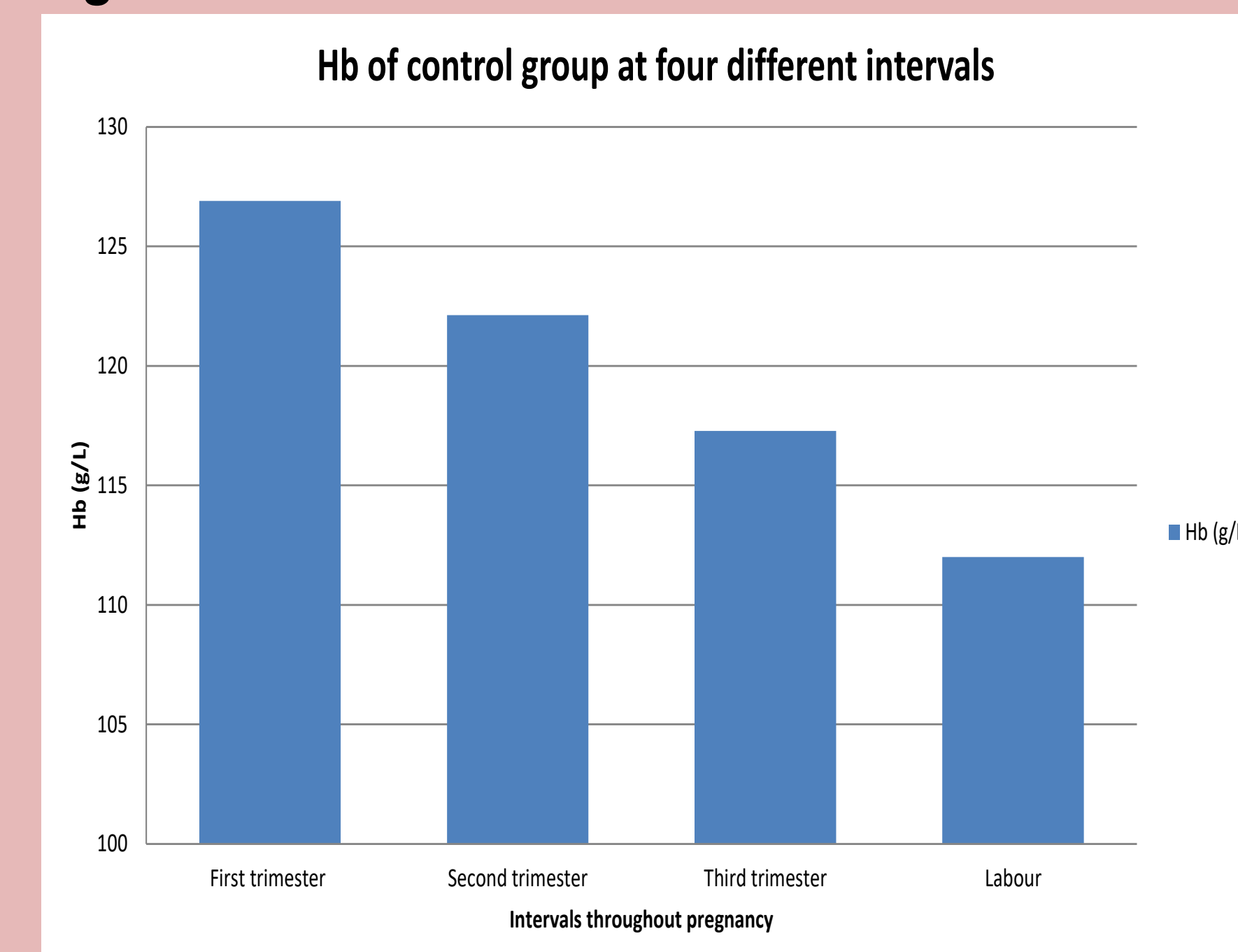


Figure 2. Chart showing average Hb of the control group at four points throughout pregnancy.

Figure 3

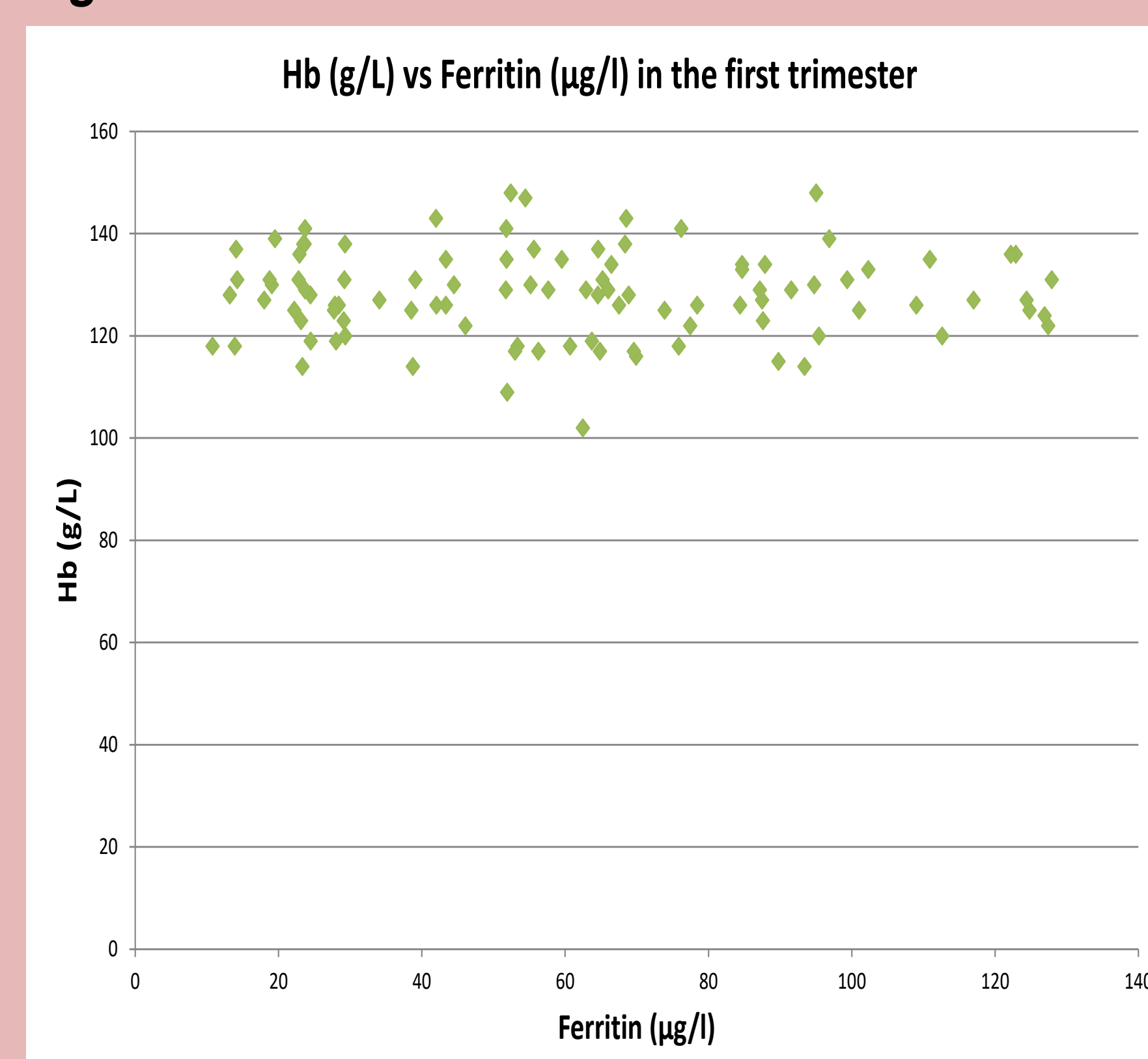


Figure 3. Plot of ferritin values against Hb values in first trimester

Figure 4

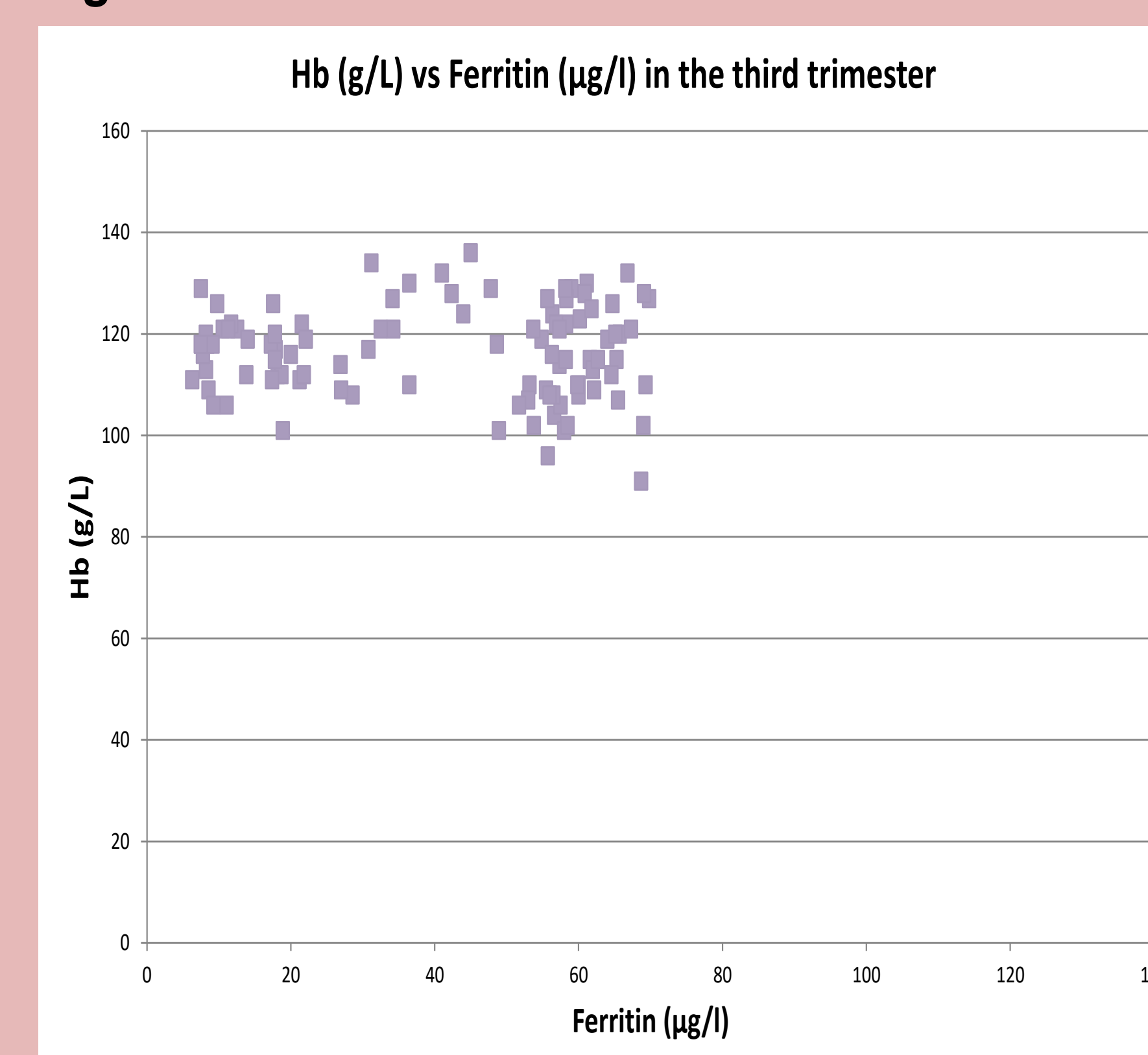


Figure 4. Plot of ferritin values against Hb values in third trimester

Figure 5

Group	Patients who have been transfused		Ferritin results and iron treatment
Test	TEST1109187-2 units	TEST18091810-3 units	Only patient 'TEST18091810' had ferritin readings <30µg/l, along with iron treatment, in both first and third trimester.
	TEST1609182-3 units	TEST2109187-4 units	
Control	CONT29031911-1 unit	CONT29031914-2 units	N/A
	CONT29031913-1 unit	CONT29031943-3 units	
	CONT29031915-1 unit	CONT29031922-4 units	
	CONT29031912-2 units	CONT29031931-4 units	

Table 3. Patients who were transfused from both groups. Unique barcodes were used to maintain patient confidentiality.

## 5. Conclusions

- Labour Hb** in the test group stabilised at a higher value than in the control group where the value dropped.
- Blood transfusions** still occurred within test group as **traumatic births** cannot be prevented. With **four more people** being transfused within the **control group** than the test group, the costs of blood transfusions and extra tests requested lead to a **surplus of £94.84** for the control group.
- Due to **no standardised protocol on giving oral iron therapy** by the general practitioners, it is hard to tell how much the treatment influenced the results.
- Current literature shows variation in defining the **ferritin threshold** thereby leading to **uncertainty in obstetric IDA diagnosis and the optimal treatment for it**.
- Further studies could look into the **sensitivity and ability of other iron studies tests** to diagnose IDA as opposed to **Hb and ferritin**, as well as having a larger group of patients and a **standardised protocol on oral iron therapy**.