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Research Article

Report of Hemoglobin Level for Children Aged 0-10 Years in the Pediatrics Room at Eduardo Ximenes Baucau Regional Hospital During April to September 2025

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ABSTRACT

Introduction: Hemoglobin is a protein in red blood cells responsible for transporting oxygen from the lungs to the rest of the body and returning carbon dioxide from the tissues to the lungs for excretion, where it is eliminated through respiration. In Timor-Leste, the prevalence of anemia in children aged 6–59 months is approximately 46.3% . This also shows that almost half of children under five years of age suffer from anemia, which can negatively impact their cognitive and physical development. According to data from the Eduardo Ximenes Baucau Regional Hospital in 2025, approximately 12,713 people underwent hemoglobin testing at the HoREX laboratory in Baucau . Research Objective: To describe the hemoglobin level for children aged 0–10 years and based on sex in the pediatric ward at HOREX-Baucau from April to May 2025. Research Methodology: The method was used. Quantitative Descriptive with Retrospective approach Study with sampling done by Non sampling method probability Sampling approaches with Purpose Sampling . Result Discussion: The required sample size is approximately 96 children, and the instrument used in this research is a checklist with descriptive statistics to describe hemoglobin levels. Based on the table I above, that the total mentioned in sample of this research is 96 with percentages of 100%. With is composed of the age group with a majority of 0-5 years old with a frequency of 64 with a 66% and age of 6-10 years with a frequency of 32 with a percentage of 31% according the result research. Conclusion: The data are based on age, showing that the majority are between 0 and 5 years old, with a frequency of 64 (66.7%), and while the minority are between 6 and 10 years old, with a frequency of 30 (33.3%) according to (Tilman CB., et al, 2025).

Keywords: Hemoglobin, Anemia in Children, Pediatrics Room at Eduardo Ximenes Baucau Regional Hospital.

Introduction

Hemoglobin is a protein in red blood cells responsible for transporting oxygen from the lungs to the rest of the body and for returning carbon dioxide from the tissues to the lungs for excretion , where it is eliminated through respiration . Hemoglobin is essential for the proper functioning of the body, and its concentration in the blood is an important indicator of overall health. In children aged 0 to 10 years, Hemoglobin levels are crucial for supporting growth and development, and for future physical development, according to WHO (2021). The age range from 0 to 10 years is a critical period during which children experience various physiological changes and increased nutritional needs. In pediatric settings, monitoring hemoglobin levels is important to detect potential health problems, such as anemia, which can affect a child's development. Anemia in children can be caused by a variety of factors, including iron deficiency, infections, or genetic conditions. (SCHMIDIT, 2024)**.**

In the pediatric ward, identifying and treating health problems, including anemia, is a top priority. Several factors, such as nutritional intake, infections, and other medical conditions, can affect hemoglobin levels. The prevalence of anemia in children in India reaches 58% and is closely related to iron deficiency. The study emphasizes the importance of regular monitoring of hemoglobin levels as a prevention strategy. *(* Kumar, et al., 2019*)*. A study in Indonesia shows that children with inadequate nutritional intake have lower hemoglobin levels. This study highlights the important role of nutrients

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in maintaining hemoglobin health. We need to be more accurate in its measurement scale and analyze it systematically *(* Bhalala et al, 2020*)* .

These studies demonstrate that nutritional, general health, and environmental factors play an important role in determining children's hemoglobin levels. This information is crucial for developing more effective health programs and preventing anemia in children. Globally, anemia is a significant public health problem, especially in developing countries. Anemia is more prevalent in low- and middle-income countries, especially in rural areas and among populations with limited access to education and adequate nutrition, according to **(** WHO, 2019 *).*

WHO data shows that the prevalence of anemia in children aged 6-59 months reaches around 40% worldwide according to **(** WHO, 2023 *)* . In Southeast Asia, the prevalence of anemia in this age group is even higher, reaching around 48.8 %. This shows that almost half of the children under five in this region suffer from anemia, which can have a negative impact on their cognitive and physical development according to (WHO, 2019)**.**

In Timor-Leste, the prevalence of anemia in children aged 6-59 months is about 46.3% . This also shows that almost half of children under the age of five suffer *from* anemia , which can have a negative impact on their cognitive and physical development . (WHO, 2019) According to data from Hospital Regional Eduardo Ximenes Baucau in 2024 , it is believed that approximately 12,713 people underwent hemoglobin testing at the HoREX laboratory in Baucau. Although this test can identify hemoglobin levels, Normal, Low , Lower , High. Among this number there are some children whose hemoglobin level decreases and can lead to severe anemia. (HoREX, 2024)**.**

Research Objective: To describe the hemoglobin level for children aged 0-10 years and based on sex in the pediatric ward at HOReX-Baucau during April to September, 2025.

Theoretical Framework

Hemoglobin has a structure composed of four polypeptide chains, each containing an iron-containing compound known as heme. Heme is formed from natural minerals found in red blood cells. Meanwhile, globin is a protein compound produced by the body . *(*Serafica Gisca , 2023**).** Hemoglobin's main function is to transport oxygen from the lungs to the body's tissues. When we breathe, oxygen enters the lungs and binds to hemoglobin molecules in red blood cells. These cells then circulate throughout the body, delivering oxygen to the tissues that need it to perform their metabolic functions. Hemoglobin also helps remove carbon dioxide from tissues and transport it back to the lungs, where it is eliminated through respiration. Some of hemoglobin's functions include:

a) Maintaining red blood cell shape . Maintaining normal hemoglobin levels helps maintain the shape of red blood cells in the body. Normally, red blood cells are round, like a donut, with a slight depression without a hole in the middle, making it easier for these cells to flow through blood vessels .
b) Carbon dioxide transport. In addition to transporting oxygen throughout the body, hemoglobin also functions to transport carbon dioxide from the body's tissues back to the lungs. If this function is disrupted, carbon dioxide levels in the body will increase, potentially causing health problems such as acidosis, according to (Team, 2024)***;***
c) Blood pH Regulation: acts as a buffer, helping to maintain the acid-base balance of the blood.

Several factors that cause hemoglobin level some factors include:

a. Blood loss (traumatic injury, surgery, bleeding, colon cancer or stomach ulcer) ;
b. Nutritional deficiency (iron, vitamin B12, folate) ;
c. Bone marrow problems (replacement of bone marrow by cancer) ;
d. Suppression of red blood cell synthesis by chemotherapy drugs ;
e. Renal failure ;
f. Abnormal hemoglobin structure (sickle cell anemia or thalassemia)

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g. Dehydration: Lack of fluid intake can lead to an increase in hemoglobin levels because blood plasma volume decreases, resulting in an increase in hemoglobin concentration according to (MARYADI, et.al, 2022).

Hemoglobin can be classified into several types according to its constituents:

a. **HbA1** : is formed by the heme group (Hb) with two alpha chains and two beta chains, being present in greater concentration in the blood;
b. **HbA2** : is formed by the heme group (Hb) with two alpha chains and two delta chains;
c. **HbF** : is formed by the heme group (Hb) with two alpha chains and two gamma chains. It is present in higher concentrations in newborns.

There are also types: Hb Gower I, Gower II and Portland, which are present during embryonic life, with a decrease in their concentration and an increase in HbF as birth approaches (Lemos, 2024).

Anemia is a condition in which the body has a deficiency of red blood cells or when red blood cells are not functioning properly in carrying oxygen. (Asmarinah, et al., 2023)**.** Anemia is a condition in which the number of red blood cells or the concentration of hemoglobin in them is lower than normal. Hemoglobin is necessary to carry oxygen, and if you have too few or abnormal red blood cells, or insufficient hemoglobin, then there will be a decrease in the blood's ability to carry oxygen to the body's tissues. This results in symptoms such as fatigue, weakness, dizziness, and shortness of breath, among others. The ideal hemoglobin concentration needed to meet physiological needs varies according to a woman's age, sex, height of residence, smoking habits, and pregnancy status. **(** WHO , 2023) . Anemia can be caused by several factors: nutritional deficiencies through inadequate diet or inadequate nutrient absorption, infections (e.g., malaria, parasitic infections, tuberculosis, HIV), inflammation, chronic diseases, gynecological and obstetric conditions, and inherited red blood cell disorders. The most common nutritional cause of anemia is iron deficiency, although deficiencies of folate, vitamins B12, and A are also important causes in clinical practice, according to (Tilman CB., 2024).

According to the World Health Organization (WHO, 2019***)*** , the classification of Hb content for anemia is important to know. The minimum Hb content in the body is only indicated by the symptoms, so it is necessary to know the continuous action for the highest Hb content we have, and according to the WHO, anemia is classified into four parts: - Normal Hb > 11 g/dl - Mild anemia Hb 9-10 g/dl - Moderate anemia Hb 7-8 g/dl - Severe anemia Hb < 6 g/dl.

Normal hemoglobin (Hb) levels in children are in the range of 11–13 g/dL. However, this often depends on gender, age, and general health. Newborns tend to have higher Hb levels compared to adults. This occurs because, while in the womb, the fetus requires more oxygen to transport red blood cells. However, there's no need to worry because this condition usually doesn't last long, and hemoglobin levels will begin to drop after a few weeks. Hemoglobin levels can vary depending on the child's gender and overall health. It's important to have regular checkups to ensure your child's hemoglobin levels are within the normal range, as very low or high levels can indicate more serious health problems (Adhenda Madarina, 2024).

Regular monitoring of hemoglobin levels in the pediatric ward is essential for the early detection and management of anemia (WHO, 2020). Monitoring hemoglobin levels can help medical staff identify children at high risk of anemia and provide appropriate interventions. Thus, a better understanding of hemoglobin levels can support efforts to improve a child's overall health. Regular monitoring of hemoglobin levels is important for the early detection of anemia. By knowing hemoglobin levels, medical staff can provide appropriate interventions to prevent the long-term impact of anemia on child development. (Alavi, S. et al, 2020)**.**

Research Methodology

Used method Quantitative Descriptive with *Retrospective* approach *Study* to recollect patient documents on Hemoglobin Level Description for Children aged 0-10 years in the Pediatric ward at HoREX in Baucau. Sampling can be done by *Non- Medical Sampling method. probability Sampling* approaches with *Purpose Sampling*. This is a criterion that must be met by the sample population. The

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inclusion criteria for this study were: Children admitted to the HoREX Baucau pediatric ward aged 0-10 years who underwent a hemoglobin test. The technique used in this research is descriptive, describing the children's hemoglobin test results. The data sources in this research are secondary data. The instrument used by the researcher in this research is a checklist. The data analysis technique for this research uses descriptive statistics to describe hemoglobin levels, including mean, median, and range of values to describe the study data.

Result

The total demographic characteristics of children are based on age and sex, which are shown in the table below as the following:

Table 1. Distribution of data based on the age of children

No.	Age	Frequency	Percentage
1.	0 -5	64	66.7%
2.	6-10	32	33.3%
Total		96	100.0%

Based on the table above, it shows that the total sample of this research is 96 with a percentage of 100%, which is composed of an age group with a majority of 0-5 years old with a frequency of 64 with a percentage of 66.7%, and age of 6-10 years old with a frequency of 32 with a percentage of 31%.

Table 2 . Distribution of data based on sex

No.	Sex	Frequency	Percentage
1.	Masculine	45	46.9%
2.	Feminine	51	53.1%
Total		96	100.0%

Based on the table above on distribution by sex, it shows that males are 45 with a percentage of 46.9% and females are 51 with a percentage of 53.1%, with the total male and female ratio being 96 with a percentage of 100%.

Table 3. Data distribution by hemoglobin level **and** age category

No.	Age	Hemoglobin Level Result								Total	
		Normal		Low		Lower		High			
		F	%	F	%	F	%	F	%	F	%
1.	0 -5	39	40.6%	15	15.6%	4	4.2%	6	6.3%	64	66.7%
2.	6-10	22	22.9%	7	7.3%	1	1.0%	2	2.1%	32	33.3%
Total		61	63.5%	22	22.9%	5	5.2%	8	8.4%	96	100.0%

Based on the table above, it shows that the majority of this age group has a normal Hb level, with a total of 61 and a percentage of 63.5%. Age 0-5 years with a frequency of 15 with a percentage of 15.6% and age 6-10 years with a frequency of 7 with a percentage of 7.3% and a total of 22 with a percentage of 22.9% with a low hemoglobin level. Age between 0-5 years with a frequency of 4 with a percentage of 4.2% and age 6-10 years with a frequency of 1 with a percentage of 1.0% and a total frequency of 5 with a percentage of 5.2% with the lowest Hb level. Age 0-5 years with a frequency of 6 with a percentage of 6.3% and age 6-10 years with a frequency of 2 with a percentage of 2.1% and a total frequency of 8 with a percentage of 8.3% who have a high hemoglobin level. This age group with a total of 96 with a percentage of 100%.

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Table . 4: Data distribution based on hemoglobin level, category by sex

No de	Sex	Hemoglobin Level Result								Total	
		Normal		Low		Lower		High			
		F	%	F	%	F	%	F	%	F	%
1.	Masculine	29	30.2%	8	8.3%	3	3.1%	5	5.3%	45	46.9%
2.	Female	32	33.3%	14	14.6%	2	2.1%	3	3.1%	51	53.1%
Total		61	63.5%	22	22.9%	5	5.2%	8	8.4%	96	100%

Based on the table above, the majority of females and males have normal hemoglobin levels, with a total frequency of 61 and a total percentage of 63.5%. Fourteen females had a percentage of 14.6%, and eight males had a percentage of 17.8%. The total frequency of 22 and a percentage of 22.9% had low hemoglobin levels. Three males had a percentage of 3.1%, and two females had a percentage of 2.1%. The total frequency of 5 and a percentage of 5.2% had lower hemoglobin levels. Five males had a percentage of 5.3%, and three females had a percentage of 5.9%, with a total frequency of 8 and a total percentage of 8.3%, indicating a high hemoglobin level. This age group had a total of 96, with a percentage of 100%, in the study results.

Discussion

Based on Table 3, the majority of children in this age group have a normal hemoglobin level, with a percentage of 63.5%. Children aged 0-5 years have a low hemoglobin level with a frequency of 15, with a percentage of 15.6%. Children aged 6-10 years have a low hemoglobin level with a percentage of 7.3%. The total frequency of children aged 0-5 years is 22.9%. Children aged 0-5 years have the lowest hemoglobin level with a frequency of 4.2%, and children aged 6-10 years have a frequency of 1.0%, with a total frequency of 5, with a percentage of 5.2%. Age 0-5 years with high hemoglobin level with frequencies 6 with its percentage 6.3% and children with 6-10 years with frequency 2 with percentage 2.1% with total frequencies are 8 with percentage 8.3%, according to the result of the study (Tilman CB., et al, 2025).

Based on Table 4.4, it is shown that the majority of females and males have normal hemoglobin levels, with a total frequency of 61 and a total percentage of 63.5%. Females have a frequency of 14 and a percentage of 14.6%, and males have a frequency of 8 and a percentage of 8.3%. The total frequency is 22 and a percentage of 22.9%, with low hemoglobin levels. Therefore, the majority of females have low hemoglobin levels. Males have a frequency of 3 and a percentage of 3.1%, and females have a frequency of 2 and a percentage of 2.1%, with a total frequency of 5 and a total percentage of 5.2%, which have a lower hemoglobin level. Males have a frequency of 5 and a percentage of 5.3%, and females have a frequency of 3 and a percentage of 3.1%, with a total frequency of 8 and a total percentage of 8.3%, which have a high hemoglobin level.

Sometimes hemoglobin levels in this age group decrease because of nutritional deficiency, infection, genetic conditions. A survey conducted by **(** (Desiani Ariza, et al, 2024)results obtained from the evaluation of 21 children indicate that, regarding the sex category, there are more girls, with a total of 15 children (71.43%), compared to boys, who total 6 children (28.57%). The results of the Hb analysis show that, for the category of 6 to 59 months, the Hb rate below 11 g/dl was observed in 3 children (14.3%) and the Hb rate above 11 g/dl also in 3 children (14.3%). For the category of children from 5 to 11 years, those with Hb levels below 11.5 g/dl totaled 12 children (57.1%), while those with levels above 11.5 g/dl totaled 3 children (14.3%). These results indicate that there are still many children with Hb levels below the reference value.

Through this research, we see that many children have hemoglobin levels below normal values, which can be categorized as anemia. According to (Adhenda Madarina, 2024), hemoglobin levels

depend on sex, age, and general health conditions. Newborns tend to have higher hemoglobin levels compared to adults. This is because, while in the womb, the fetus needs more oxygen to transport red blood cells. However, you don't need to worry because this condition usually doesn't last long and hemoglobin levels will start to drop after a few weeks .

These studies demonstrate the importance of regularly monitoring a child's hemoglobin level, which can help medical professionals identify children at high risk of anemia and provide appropriate interventions. Thus, a better understanding of hemoglobin levels can support efforts to improve a child's overall health.

Conclusion

1. The data is based on age, showing that the majority are between 0-5 years old, with a frequency of 64 and a percentage of 66.7%, and while the minority are between 6-10 years old, with a frequency of 30 and a percentage of 33.3%. The total frequency is 96, with a percentage of 100%.

2. The data is based on gender in this research female classification is majority with frequency 51 with percentage 53.1% and while male classifications decrease with their frequency 45 with a percentage of 46.9%.
3. The data is based on the hemoglobin level and shows that the majority of people aged between 0-5 years have a low hemoglobin level with a frequency of 15 with a percentage of 15.6% and this age group also has a lower hemoglobin level with a frequency of 4 with a percentage of 4.2%.
4. The data is based on the hemoglobin level, which shows that the majority of females have a low hemoglobin level with a frequency of 14 with a percentage of 27.5% and a minority of males with a frequency of 8 with a percentage of 17.8% in the study (Tilman CB., et al, 2025).

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