CHAPTER I
INTRODUCTION

A. Background

Pregnancy anemia is one of the global health issues. It is estimated that 35.5% of pregnant women worldwide suffer from anemia (World Health Organization, 2023). Anemia is a condition characterized by low levels of hemoglobin (Hb) in the blood below the norm, which is <11 g/dL (World Health Organization, 2021). On a national scale, the problem of anemia also shows a significant number. Data from the Indonesian Health Survey recorded that the prevalence of anemia in pregnant women reached 48.9% (SKI, 2023). Almost half of pregnant women in Indonesia suffer from anemia (Hermaliana et al., 2025). This figure exceeds the threshold set by the WHO as a public health problem, which is 20%. Indonesia sets target for 22% maternal anemia in 2020-2024 (Ministry of Health, 2023). This situation indicates that pregnancy anemia is still a substantial challenge for the health system that requires serious attention.

The prevalence of anemia in Bengkulu Province in 2022 was 7.8% and decreased to 5.87% in 2023 (Bengkulu Provincial Health Office, 2022). In Bengkulu City, anemia cases in pregnant women in 2023 were recorded at 202 cases (4.49%) and increased in 2024 to 207 cases (4.83%). The Beringin Raya Health Center recorded the highest cases, namely 178 cases (2.35%), followed by the Telaga Dewa Health Center with 57 cases (0.75%) and the Jembatan Kecil Health Center with 48 cases (0.63%) (Bengkulu City Health Office, 2024).

Pregnancy anemia is not only limited to a reduced number of erythrocytes in the blood but has significant risks that have negative implications for maternal health, including increased potential complications for postpartum bleeding and weakened immune system. Based on results *Systematic review* and *Meta-analysis* showed that mothers with severe anemia had a risk of postpartum bleeding about 3.5 times higher than mothers without anemia, with an increase in incidence from 3.8% to 11.2%

(Omotayo et al., 2021). There are studies that show that pregnant women with anemia, especially those who are <20 years old or >35 years old and have chronic energy deficiency, have a chance 8 to 10.8 times higher to experience pregnancy complications compared to mothers who are not anemic (Yuspita et al., 2025). The implications of anemia can also have an impact on the sustainability of the fetus because it can lead to premature delivery, or birth with low birth weight (BBLR), and even impaired children's cognitive development in the future (Mardiaturrahmah & Anjarwati, 2020). Anemia in pregnant women can also cause the fetus to experience intrauterine hypoxia, fetal growth retardation, low birth weight, premature birth, and perinatal death (Pasaribu et al., 2023).

Anemia during pregnancy can be caused by a variety of factors. The main causes are a deficiency of iron, folate, vitamin B12, as well as infections (e.g. malaria, worms) or red blood cell abnormalities (hemolytic anemia). A number of risk factors for pregnant women also play a role in pregnant women's anemia such as sociodemographic aspects, nutritional conditions, and exposure to harmful chemicals from the environment. Another source said that pregnant women with anemia in Indonesia are mostly exposed to environmental risk factors, one of which is exposure to cigarette smoke. Recent research shows that about 30-40% of pregnant women are still exposed to secondhand smoke, and this exposure has been shown to significantly increase the risk of anemia (Pasaribu et al., 2023).

Exposure to cigarette smoke in the household and social environment is one of the environmental risk factors that is not paid attention to but has a substantial influence. Given that Indonesia has a high prevalence of active smokers globally, this implicitly increases the number of individuals who are passively exposed to cigarette smoke, including pregnant women as passive smokers (Martini et al., 2023). The content of harmful substances in cigarette smoke such as nicotine, carbon monoxide, and carcinogenic substances can narrow blood flow to the placenta, reduce the supply of oxygen and nutrients to the fetus, and trigger inflammation of

the placenta. This condition has the potential to worsen anemia in the mother (Arulmohi et al., 2021).

Cigarette smoke contains more than seven thousand toxic chemical compounds, including carbon monoxide (CO) and hydrogen cyanide (Kinoshita et al., 2020). Carbon monoxide has a very high affinity for hemoglobin, which is about 200–250 times stronger than oxygen. When a pregnant woman is exposed to cigarette smoke, CO will bind to hemoglobin in the blood and form carboxyhemoglobin (COHb). Iron deficiency conditions during pregnancy further reduce the blood's ability to transport oxygen, thus causing hypoxia in both mother and fetus. As compensation, the body increases the production of erythrocytes, but disruption of iron metabolism often makes this mechanism not optimal. As a result, anemia persists and can inhibit fetal growth and metabolism (Igbinosa et al., 2022).

Several studies have corroborated the correlation between exposure to environmental cigarette smoke and an increased risk of anemia in pregnant women. A study conducted in Ethiopia indicated that pregnant women who were not smokers who were exposed to secondhand smoke were 2.3 times more likely to develop anemia than those who were not exposed to secondhand smoke (Beressa 1 et al., 2024). One study found a statistically significant relationship between the conditions of exposure to cigarette smoke in the environment and the level of hemoglobin in pregnant women in the third trimester. Pregnant women who are passive smokers tend to have lower Hb levels (Hermaliana et al., 2025). Similar results also explain that exposure to secondhand smoke during pregnancy increases the risk of fetal growth disorders and perinatal complications (Arulmohi et al., 2021).

However, there have not been many studies that have specifically examined the impact of cigarette smoke exposure on hemoglobin status and incidence of anemia in pregnant women. Existing studies Most still focus on individual nutritional and behavioral factors, such as adherence to blood supplement tablet consumption, iron intake, chronic nutritional status, and worm or malaria infections (Annisa Mudrika et al., 2023; Appiah-Dwomoh

et al., 2024; Pasaribu et al., 2023). Several international studies state that exposure to cigarette smoke (*Environmental tobacco smoke*/ETS) has a significant association with decreased hemoglobin levels and an increased risk of anemia in pregnant women (Deng et al., 2024; Zhang et al., 2022). Meanwhile, environmental factors, especially exposure to cigarette smoke in households and the social environment, are still rarely studied as potential determinants of anemia, especially in areas where there is still a lack of empirical studies.

Therefore, the researcher is interested in researching about: "The relationship between exposure to cigarette smoke in the environment and the incidence of anemia in pregnant women at the Beringin Raya Health Center, Bengkulu City".

B. Problem Formulation

The problem in this study is that pregnant women who are exposed to cigarette smoke are at risk of developing health problems such as anemia**.** Exposure to cigarette smoke containing toxic substances such as carbon monoxide, nicotine, and tar can inhibit the process of oxygen binding in the blood, thereby lowering hemoglobin levels. This condition can worsen the health status of pregnant women and have an impact on the growth and development of the fetus.

In Bengkulu City, especially the Beringin Raya Health Center, anemia cases in pregnant women are still quite high and exposure to cigarette smoke in the environment is suspected to be one of the contributing factors. This condition raises the need to research the extent to which exposure to cigarette smoke is related to the incidence of anemia in pregnant women. "Is there a relationship between exposure to cigarette smoke in the environment and the incidence of anemia in pregnant women at the Beringin Raya Health Center, Bengkulu City?".

C. Research Objectives

1. General Purpose

   The relationship between exposure to cigarette smoke in the environment and the incidence of anemia in pregnant women was identified.

2. Special Purpose

   a. It is known that the characteristics of pregnant women include the age, parity, occupation and education level of pregnant women at the Beringin Raya Health Center, Bengkulu City.

   b. It is known that exposure to cigarette smoke in the household environment and social environment in pregnant women at the Beringin Raya Health Center, Bengkulu City.

   c. It is known that there is a relationship between exposure to cigarette smoke in the household environment and the incidence of anemia in pregnant women at the Beringin Raya Health Center, Bengkulu City.

   d. It is known that there is a relationship between exposure to cigarette smoke in the social environment and the incidence of anemia in pregnant women at the Beringin Raya Health Center, Bengkulu City.

D. Research Benefits

1. Theoretical Benefits

a. For Educational Institutions

The results of this study are expected to be a source of reference for learning and scientific development materials in the field of maternal and child health, especially related to risk factors for anemia in pregnant women due to exposure to cigarette smoke in the environment. This research can also be used as an additional reference for students in the preparation of scientific papers and subsequent research.

b. For the Next Researcher

This research can be a basic data and scientific reference for future researchers in developing research related to the variables of

exposure to cigarette smoke, the incidence of anemia, and other health variables of pregnant women using different methods, instruments, or research designs.

2. Practical Benefits

a. For Health Services / Health Centers

The results of this research are expected to be considered for health centers in designing, strengthening, and implementing promotive and preventive programs, especially education about the dangers of exposure to cigarette smoke on the health of pregnant women and efforts to prevent anemia. This research can also support the implementation of more comprehensive *Antenatal Care* (ANC) services based on evidence-based practice.

b. For the Community

This research is expected to provide information and increase public awareness, especially the families of pregnant women, about the dangers of exposure to cigarette smoke as one of the risk factors for anemia. Thus, the community can be encouraged to create a smoke-free home environment to protect the health of pregnant women and fetuses.