CHAPTER IV
RESEARCH METHODS

A. Research Type and Design

The type of research used is observational quantitative research using *a case-control* study design. The *case control* study compared the case group (pregnant women who had anemia) with the control group (pregnant women who did not have anemia). Schematically, the research design can be described as follows:

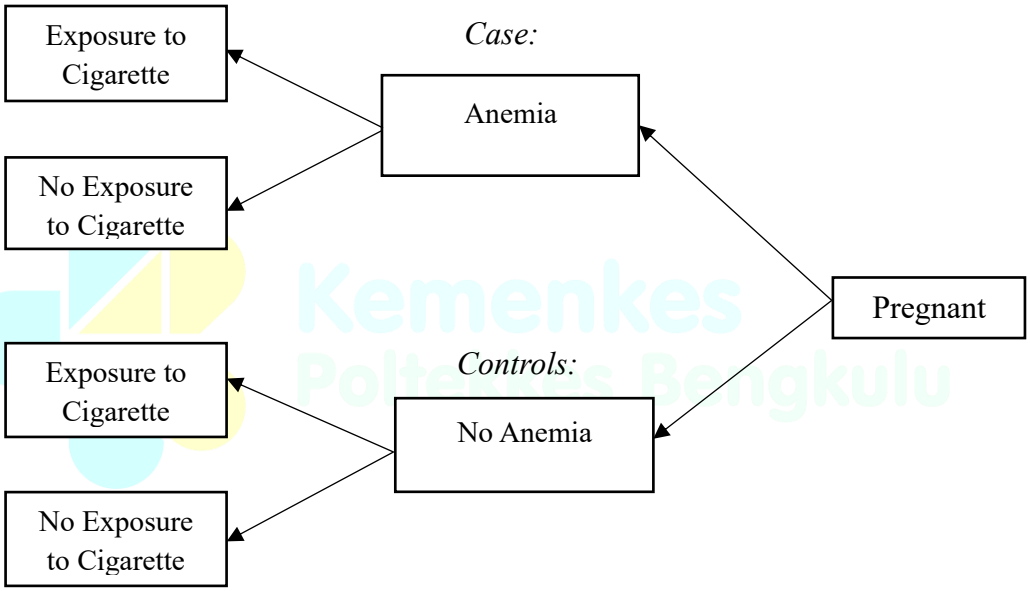

Chart 3 Research Design

B. Research Variables

1. Independent (Free) Variables:

   Exposure to secondhand smoke in the environment (home and social)

2. Dependent Variables:

   The incidence of anemia in pregnant women.

C. Research Location and Time

1. Research Location

This research was carried out at the Beringin Raya Health Center which is the Puskesmas with the highest number of anemia pregnant women in Bengkulu City.

2. Research Time

The research was carried out in April-May 2026, which included the preparation stage, data collection, data analysis, and report preparation.

D. Poplasty and Research Samples

1. Population

The population in this study is all pregnant women in the third trimester who carry out pregnancy examinations (*Antenatal Care / ANC*) at the Beringin Raya Health Center, Bengkulu City in 2026. Based on data from the 2026 pregnant women's visit register, the number of pregnant women who conducted pregnancy checks was 141 people, with 74 pregnant women in the third trimester as the research population.

2. Sample

The research sample is some of the 3rd trimester pregnant women who perform ANC at the Beringin Raya Health Center, Bengkulu City. The sample consisted of two groups, namely the case group (*Case*), namely pregnant women with anemia (Hb < 11 g/dL) and the control group (*Control*) with pregnant women who were not anemia (Hb ≥ 11 g/dL). The number of samples in the case group was taken using the total sampling technique, while the control sample was determined using the case ratio: control was 1:1. The control group sampling technique was carried out using *a simple random sampling* method (*spin wheel*).

The inclusion criteria in this study include:

a. Inclusion criteria:

1) Willing to become a research respondent by signing an *informed consent sheet*.

2) A third trimester pregnant woman who conducts a pregnancy examination at the Beringin Raya Health Center, Bengkulu City.
3) The results of the hemoglobin (Hb) level examination were recorded in the laboratory results of the Beringin Raya Health Center, Bengkulu City.

E. Data Collection

1. Data Type
   a. Primary Data

      Primary data was obtained directly from respondents through structured interviews and filling out questionnaires. The data collected included the characteristics of respondents and exposure to cigarette smoke.

   b. Data Seconds

      Secondary data was obtained from the register of pregnant women of the Beringin Raya Health Center of Bengkulu City in 2026 and the results of hemoglobin (Hb) levels examination recorded in the laboratory results of the Beringin Raya Health Center of Bengkulu City.

2. Data Collection Tools
   a. Cigarette Smoke Display Instruments

      Cigarette smoke exposure in pregnant women was measured using questionnaires adapted and modified from the *Global Adult Tobacco Survey* (GATS) developed by the *World Health Organization* (WHO) and *the Centers for Disease Control and Prevention* (CDC). Modifications were made by adjusting the question items to the research objective, namely measuring exposure to cigarette smoke in the household environment and social environment in pregnant women.

      The questionnaire consisted of 6 questions, which included 4 questions about exposure to cigarette smoke in the household

environment and 2 questions about exposure to cigarette smoke in the social environment. The question is used to describe:

Frequency of exposure to cigarette smoke

1) The existence of a source of exposure to cigarette smoke.
2) Frequency of exposure to cigarette smoke.
3) Long exposure to cigarette smoke in the household environment.
4) Location of exposure to cigarette smoke

3. Test Data Collection Tools

The instrument for measuring cigarette smoke exposure in this study was prepared by adapting questions from the *Global Adult Tobacco Survey (GATS)* developed by the *World Health Organization (WHO)* and *the Centers for Disease Control and Prevention (CDC)*. Furthermore, the researcher modified the redaction, the number of question items, and the indicators used to suit the purpose of the study, namely measuring exposure to cigarette smoke in the household and social environment in pregnant women in the work area of the Beringin Raya Health Center, Bengkulu City.

Because the instrument has undergone an adaptation and modification process, validity and reliability tests are carried out before being used as a data collection tool. The validity test was conducted using *the Corrected Item-Total Correlation* method, while the reliability test was conducted using *the Cronbach's Alpha* method with the help of *the IBM SPSS Statistics* ***program.***

The results of the validity test showed that all question items had a *Corrected Item-Total Correlation* value of ≥ 0.30, so that all items were declared valid. The results of the reliability test showed *a Cronbach's Alpha* value of 0.803, which indicates that the instrument has a good level of reliability and is suitable for use as a data collection tool in the study.

The variables of anemia incidence were not tested for validity and reliability because the data were obtained from the results of hemoglobin

(Hb) levels recorded in the laboratory results of the Beringin Raya Health Center, Bengkulu City**.** The data is the result of laboratory examinations using applicable examination procedures and standards, with the category of anemia in pregnant women referring to the *World Health Organization (WHO) criteria*, namely hemoglobin levels <11 g/dL, so that the data obtained are objective and have met the validity of clinical measurements.

4. Data Collection Procedure

The data collection steps are as follows:

a. Apply for a research permit from an educational institution to the Beringin Raya Health Center.
b. Coordinate with the coordinating midwives and KIA officers regarding the ANC schedule.
c. Establish a data collection schedule during *Antenatal Care* (ANC) visits at the Puskesmas and through the door to door visit.
d. Explain the purpose and flow of the research to pregnant women who are prospective respondents (cases and controls)
e. Provide *an informed consent* sheet.
f. Distribute cigarette smoke exposure questionnaires to respondents (self-filled out or assisted by researchers).
g. Taking Hb data from the results of the puskesmas laboratory examination.
h. Check the completeness of the questionnaire and Hb data.
i. Perform data input, coding, and analysis according to the research objectives.

F. Data Processing

The data that has been obtained from the data collection process is then processed using a computer program. In data processing, there are several steps as follows:

1. *Editing*

The editing process is carried out by reviewing all questionnaires that have been filled out by respondents to assess the completeness of the answers, the clarity of the responses, and the relevance of each question item in accordance with the research objectives. At this stage, the completeness of the respondent characteristics data and the results of the hemoglobin (Hb) examination were also checked to ensure the accuracy of the grouping of respondents into the anemia and non-anemia categories.

2. *Coding* (Data Coding)

The coding process is carried out to classify each respondent's answer into the form of numbers so as to facilitate the process of input, processing, and analysis of data using statistical software.

In this study, variable scoring was carried out as follows:

c. Cigarette Smoke Exposure Variable (GATS)

Cigarette smoke exposure measurements were carried out using a questionnaire adapted from the *Global Adult Tobacco Survey (GATS) Section E: Secondhand Smoke* developed by WHO and CDC which consisted of several questions regarding the source of exposure, location of exposure, duration of exposure, and frequency of exposure at home, workplace, and public places.

Each questionnaire item is coded as follows:

1) Answer Yes = 1 , No = 0
2) Duration of exposure to cigarette smoke per day: ≥ 15 minutes = 1, < 15 minutes/never = 0
3) Frequency of exposure in the last 1 week: ≥ 3 days/week = 1, < 3 days/week / never = 0

b. Anemia Incidence Variables

Coding of anemia incidence variables based on examination results Hb:

Code 1 → Anemia (Hb < 11 g/dL)

Code 0 → Not anemic (Hb ≥ 11 g/dL)

1. *Sorting*

The data that has gone through the coding process is then grouped based on the type and use of the variables using the computer. At this stage, the researcher ensures the compatibility between the data entered and the respondent's answers so that there are no data input errors.

2. *Tabulating* (tabulation data)

Data tabulation was carried out using *IBM Statistical Package for the Social Sciences* (SPSS) version 25 through a computerized device. Data were presented in the form of frequency distribution tables and cross-tables as the basis for the implementation of univariate and bivariate analyses to determine the relationship between exposure to cigarette smoke and the incidence of anemia in pregnant women.

G. Data Analysis

1. Univariate Analysis

Univariate analysis was carried out to describe the characteristics of respondents and the distribution of each research variable. In this study, all variables used categorical **data,** so that univariate analysis was carried out using frequency and percentage distributions**.**

The results of univariate analysis are presented in the form of a frequency distribution table.

2. Bivariate Analysis

Bivariate analysis was carried out to determine the relationship between independent variables and dependent variables, and was used to test the research hypothesis.

Since all variables are categorical, bivariate analysis is carried out using *a Chi-Square* (χ^2) statistical test with the help of a crosstab. This test is used to determine whether or not there is a statistically significant relationship between exposure to secondhand smoke in the environment and the incidence of anemia in pregnant women. The degree of meaning used is $\alpha = 0.05$**.**

In this study, the analysis of the relationship between exposure to cigarette smoke in the social environment and the incidence of anemia did not meet the requirements *of the Chi-Square* test because more than 20% of cells had *an expected count* value of <5. Furthermore, the analysis was carried out using *Fisher's Exact Test* as an alternative test.

The criteria for decision-making are as follows:

a. If the p-value on the *Pearson Chi-Square test* ≤ 0.05, then Ha is accepted and H0 is rejected**,** which means that there is a statistically significant relationship between exposure to secondhand smoke in the environment and the incidence of anemia in pregnant women**.**
b. If the p-value on the *Pearson Chi-Square test* > 0.05, then Ha is rejected and H0 is accepted**,** which means that there is no statistically significant relationship between exposure to secondhand smoke in the environment and the incidence of anemia in pregnant women**.**

H. Research Flow

The data collection process in this study was carried out systematically to obtain valid and reliable information related to 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.

The stages of this research flow include:

1. Apply for a research permit to the Bengkulu City Health Office**.**
2. Continuing licensing and coordination with the Beringin Raya Health Center of Bengkulu City as a research location.
3. Conducting an initial survey and collecting secondary data on the number of pregnant women and the prevalence of anemia in the last 3 months.
4. Determine and sort pregnant women who meet the criteria according to the researcher's guidelines.
5. Identify pregnant women who are exposed and not exposed to cigarette smoke in the home environment and social environment based on the results of filling out the cigarette smoke exposure questionnaire (GATS).

6. Conducting research contracts, providing informed consent**,** and explaining the objectives, benefits, and procedures of research to respondents.
7. The first meeting: conducting structured interviews and filling out questionnaires regarding exposure to cigarette smoke and other supporting factors; then recording the results of the Hb (Hemoglobin) examination from medical records or health center examinations.
8. Conducting data processing (*editing, coding, entry, cleaning*) and analyzing the results of the study to see the relationship between exposure to cigarette smoke and the incidence of anemia in pregnant women.

I. Research Ethics

1. *Self-determination*

   In the implementation of this study, respondents (pregnant women) were given the full right to determine their participation, without any pressure or coercion of any kind.

2. *Anonymity*

   The identity of the respondents in the research results was only displayed using initials. To maintain confidentiality, special codes are used to disguise identities. The respondents' addresses are recorded on the observation sheet, and their signatures are listed on the participation consent sheet.

3. Confidentiality

   All information obtained from respondents will be kept confidential and will not be leaked to any party. The data is stored in digital format on the researcher's laptop device and can only be accessed through the researcher's personal storage.

4. Justice (*Justice*)

   The principle of justice includes honesty, transparency, and prudence. All respondents were treated equally throughout the research process without discrimination. If there are respondents who are not

willing to participate, then they will not be involved in the study. As a form of appreciation, the researcher gave the same gift to each respondent who had participated well.

5. Beneficiency

   The principle of usefulness must have three principles, namely, free of suffering, free of exploitation and free of risk. Suffering-free when there is suffering in the respondents. Free exploitation if the provision of information and knowledge is useless so that it is detrimental to the respondents. The intended risk is that the researcher avoids the respondent from danger.

6. *Non-Malafficiency*

   The researcher guarantees that the conduct of the study will not cause discomfort, injury, or physical risk to the respondents.