

THESIS

**THE RELATIONSHIP BETWEEN ARTIFICIAL SWEETENED BEVERAGE
CONSUMPTION HABITS AND JUNKFOOD AGAINST THE RISK OF
HYPERGLICEMIA IN TEENAGER AT SENIOR HIGH SCHOOL 1
BENGKULU CITY**



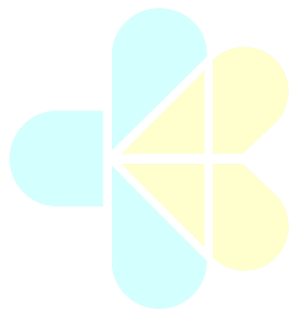
Compiled by:
IVO RISA PUTRI GANDARI
NIM: P01720322077

**MINISTRY OF HEALTH OF THE REPUBLIC OF INDONESIA
BENGKULU HEALTH POLYTECHNIC UNDERGRADUATE
APPLIED NURSING MAJORS
NURSING SCHOOL YEAR
2025/2026**

THESIS TITLE PAGE

**THE RELATIONSHIP BETWEEN ARTIFICIAL SWEETENED BEVERAGE
CONSUMPTION HABITS AND JUNKFOOD AGAINST THE RISK OF
HYPERGLICEMIA IN TEENAGER AT SENIOR HIGH SCHOOL 1
BENGKULU CITY**

**This thesis is submitted as one of the requirements
To obtain an Applied Bachelor's Degree in Nursing (S.Tr.Kep)**



Compiled by:
IVO RISA PUTRI GANDARI
NIM: P01720322077

**MINISTRY OF HEALTH OF THE REPUBLIC OF INDONESIA
BENGKULU HEALTH POLYTECHNIC UNDERGRADUATE
APPLIED NURSING MAJORS
NURSING SCHOOL YEAR
2025/2026**

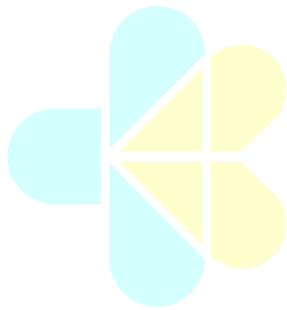
THESIS APPROVAL PAGE

**THE RELATIONSHIP BETWEEN ARTIFICIAL SWEETENED BEVERAGE
CONSUMPTION HABITS AND JUNKFOOD AGAINST THE RISK OF
HYPERGLICEMIA IN TEENAGER AT SENIOR HIGH SCHOOL 1
BENGKULU CITY**

Prepared and presented by:

Compiled by:
IVO RISA PUTRI GANDARI
NIM: P01720322077

Applied Bachelor of Nursing Study Program, Department of Nursing Polytechnics,
Ministry of Health, Bengkulu



Date: June 23, 2026

Thesis Supervisor

Supervisor 1

Supervisor 2

Ns. Hendri Heriyanto. S.Kep.,M.Kep
NIP. 198205152002121004

Ns. Sri Yuliana S.Kep, M.Sc
NIP. 199207172025062004

THESIS CONFIRMATION PAGE

**THE RELATIONSHIP BETWEEN ARTIFICIAL SWEETENED BEVERAGE
CONSUMPTION HABITS AND JUNKFOOD AGAINST THE RISK OF
HYPERGLICEMIA IN TEENAGER AT SENIOR HIGH SCHOOL 1
BENGKULU CITY**

Compiled by:
IVO RISA PUTRI GANDARI
NIM: P01720322077

Tested in Front of Thesis Examiners of Undergraduate Study Programs
Applied Nursing Department of Polytechnic Nursing
Bengkulu Health On : July 22, 2026

Chairman of the Board of Examiners

Tester 1

Ns. Husni, S.Kep.,M.Pd
NIP. 1974120619970320001

Supervisor 1

Ns. Erni Buston,SST,M.Kes
PIN:198707072010122003

Supervisor 2

Ns. Hendri Heriyanto. S.Kep.,M.Kep
NIP. 198205152002121004

Ns. Sri Yuliana S.Kep, M.Sc
NIP. 199207172025062004

This thesis has met one of the requirements to achieve a Bachelor of Applied Nursing
degree

Know:

Head of the Applied Nursing Undergraduate Study Program, Ministry of Health,
Bengkulu

Ns. Hendri Heriyanto. S.Kep.,M.Kep
NIP. 198205152002121004

BIODATA



Name : Ivo Risa Putri Gandari

Place, Date of Birth : Padang Tepong, July 30, 2004

Religion : Islam

Gender : Women

The Son of Man : 2 (Two)

Education History : Harapan Bunda Kindergarten, Padang Tepong Village
SD N 1 Ulu Musi
SMP N 1 Ulu Musi
SMA N 1 Bengkulu City

Address : Padang Tepong, Ulu Musi District, Empat Lawang
Regency, Prov. South Sumatra

E-mail : ivorisaputrigandari@gmail.com

STATEMENT OF ORIGINALITY

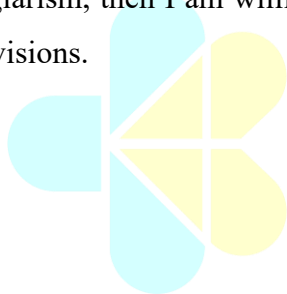
The undersigned :

Name : Ivo Risa Putri Gandari NIM : P0172032277

Research Title: The relationship between the consumption of artificially sweetened beverages and *junkfood* to the risk of hyperglycemia in adolescents.

Declare that this is my own work (ORIGINAL), and that the content herein does not contain any work that has ever been submitted by another person to obtain an academic degree in an educational institution, and to the best of my knowledge there are no works or opinions that have ever been written and/or published by others, except those that are referred to in writing in this manuscript and mentioned in the bibliography.

Thus this statement and if in the future it is proven that there is an element of plagiarism, then I am willing to take responsibility in accordance with the applicable provisions.



Kemenkes
Poltekkes Bengkulu

Bengkulu,
Which states,

Ivo Risa Putri Gandari
NIM P01720322077

MOTTO AND PRESENTATION

MOTTO

"Don't be afraid to walk slowly, be afraid to stop walking."

"Everything you lose is a step you take." -Taylor Swift

PRESENTATION

I present this thesis to:

- ❖ To my parents who I love the most, to my Dad my first love this part is the hardest part for me to write. Your departure leaves an empty space that is never truly filled. There are longings that cannot be conveyed through messages, cannot be treated with meetings, and can only be entrusted through prayer. Many days I pass hoping to hear your voice again, ask your advice once more, or just see you smile at me. If today I am able to stand this far, it is because of the love, life values and example that my father once instilled in my life. You remain alive in the prayers I pray, and in every success I have. To my beloved mother, thank you for every prayer you never forget to pray for me, every tear you secretly hide. Thank you for always believing in me, even when I myself doubt my abilities. This work may not be perfect. But with all humility, I dedicate this work to you, thank you for being my first home, my home, and my biggest reason not to give up.
- ❖ Thank you to my brother as my brother and the only brother of the writer, thank you for taking so many burdens to still be able to pursue my dreams. Thank you for all the sacrifices, support, and affection that never stops and is one of the reasons the author can continue to step forward and complete this education.
- ❖ To the only family friend in this lecture, the author would like to thank you for being part of this long journey, becoming a home in the midst of the fatigue of struggle. Thank you for every support, laughter, help, and togetherness created. Thank you for being the best friend that has always existed. You have proven that differences are not an obstacle to keep walking together, holding each other and strengthening each other in every step of life.
- ❖ To someone whose favorite food is fried rice that has accompanied him since white and gray until this thesis was written, thank you for accompanying so many versions of the author, understanding and support until finally to this point. The interaction and togetherness that exists provides valuable learning in the process of self-maturation.

All the support and kindness that has been given has contributed positively to the formation of the author's understanding attitude.

- ❖ The "don't do it" group, thank you for being part of this journey. With you, every challenge feels easier, and every step becomes stronger. Thank you for laughter in the midst of tiredness, enthusiasm when you almost give up, and so meaningful togetherness during difficult times.
- ❖ Ang Ang Group thank you for being a comforter in every tired struggle. Thank you for the laughter, stories, and togetherness that made college so much more colorful.
- ❖ My friends since the time of the blue and white, thank you for all the time you have spent, for your support, motivation, enthusiasm, and prayers that never stop. Thank you for being a part of an extraordinary journey in junior high school that was full of color, laughter, and unforgettable stories.
- ❖ To the supervisor, Mr. Hendri Heriyanto, S.Kep., M.Kep as supervisor I and Miss Ns. Sri Yuliana, S.Kep., M.Sc as supervisor II, the author would like to thank you for patiently guiding, directing, and providing knowledge, input, and motivation during the process of preparing this thesis. Thank you for the time, attention, and dedication that you have given so that this thesis can be completed properly.
- ❖ To my comrades in the class of 2022 Bachelor of Applied Nursing who pioneered the international class, thank you for the cooperation that we have gone through together to complete this lecture.
- ❖ Thank you to the research respondents who have participated and taken the time during the research.
- ❖ *Last but not least* for someone who learns to stand on his own, tread a path that is not always straight, and put the rest of his courage to survive; The author himself is Ivo Risa Putri Gandari. Thank you for arriving. Thank you for being done. Only this self knows how much fatigue he bears himself, how much burden is heaped, and even the economic situation that almost makes him give up. Strong determination was able to carry this self through so many difficult things to get to where we are now. Thank you for not choosing to stop. *Love your self as you are.*

FOREWORD

Praise be to Allah SWT who has given His grace and grace, so that the author can complete this thesis with the title The relationship between the habit of drinking artificially sweetened drinks and junkfood to the risk of hyperglycemia in adolescents — In completing this thesis, the author received a lot of material and moral assistance from various parties, for which the author would like to thank the:

1. Mrs. Linda, SST., M.Kes, as the Director of the Health Polytechnic of the Ministry of Health Bengkulu
2. Mrs. Ns. Erni Buston, SST., M.Kes as the Head of the Nursing Department of the Bengkulu Ministry of Health.
3. Mr. Ns. Hendri Heriyanto, S.Kep., M.Kep, as Supervisor I who provided a lot of support, input, direction, advice, time, and motivation to continue to be enthusiastic about working on this Thesis until it can be completed.
4. Mrs. Ns. Sri Yuliana S.Kep, M.Sc, as Supervisor II who provided a lot of support, input, direction, suggestions, time, and motivation to continue to be enthusiastic about working on this Thesis until it can be completed.
5. Mrs. Ns. Husni, S.Kep., M.Pd as the Chairman of the Board of Examiners who has provided criticism, suggestions and constructive input so that this thesis can be refined and compiled properly.
6. Mrs. Ns. Erni Buston, SST., M.Kes as examiner I who has provided criticism, suggestions, and constructive input so that this thesis can be refined and compiled properly.
7. As well as all Lecturers and Staff of the Department of Nursing of the Ministry of Health of the Ministry of Health, the learning experience and guidance I received from Mrs. and Mrs. are some of the most valuable things in my educational journey.

I realize that this thesis certainly still has many shortcomings and mistakes both in writing and preparation. hopefully it can have a positive impact both for the target, the research location, the Department of Nursing and for myself.

Bengkulu, 02 July 2025

Ivo Risa Putri Gandari



**THE RELATIONSHIP BETWEEN THE CONSUMPTION HABITS OF
ARTIFICIALLY SWEETENED BEVERAGES AND *JUNKFOOD* TO THE
RISK OF *HYPERGLYCEMIA* IN
TEENAGER AT SMA NEGERI 1 KOTA BENGKULU**

Ivo Risa Putri Gandari¹, Hendri Heriyanto², Sri Yuliana³

¹ Applied Bachelor of Nursing Study Program, Ministry of Health, Bengkulu

^{2,3} Lecturer of the Department of Nursing of the Ministry of Health of Bengkulu

E-mail: ivorisaputrigandari@gmail.com

ABSTRACT

Background: Hyperglycemia in adolescents is one of the conditions that can increase the risk of developing type 2 Diabetes Mellitus in the future. The habit of consuming artificially sweetened drinks and junk food is a factor that is suspected to play a role in increasing blood glucose levels in adolescents. **Objective:** This study aims to determine the relationship between the consumption habits of artificially sweetened drinks and junk food to the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City. **Methods:** This study used an analytical quantitative design with a cross sectional approach. The research sample amounted to 194 respondents who were selected using the Accidental sampling technique. Data was collected using the Beverage Intake Questionnaire (BEVQ), Food Frequency Questionnaire (FFQ), and blood glucose checks at any time. Data analysis used the Chi-Square test with a 95% confidence level ($\alpha = 0.05$). **Results:** The results showed that 92.3% of respondents had a habit of consuming high-category artificially sweetened beverages and 22.2% had a habit of consuming junk food in the frequent category. As many as 58.2% of respondents were included in the hyperglycemia risk group. The results of the Chi-Square test showed that there was no significant association between the consumption of artificially sweetened beverages and the risk of hyperglycemia ($p = 0.688$; OR = 1.242), while there was a significant association between junk food consumption and the risk of hyperglycemia ($p = 0.000$; OR = 4.942). **Conclusions:** Junk food consumption habits are associated with an increased risk of hyperglycemia in adolescents, whereas artificially sweetened beverage consumption habits do not show a significant association with hyperglycemia risk. **Tip:** Adolescents are expected to limit junk food consumption and implement a healthy and balanced diet as an effort to prevent hyperglycemia and Diabetes Mellitus from an early age.

Keywords: hyperglycemia, junk food, artificially sweetened drinks, adolescents.

THE RELATIONSHIP BETWEEN THE CONSUMPTION HABITS OF ARTIFICIALLY SWEETENED BEVERAGES AND JUNK FOOD AND THE RISK OF HYPERGLYCEMIA AMONG ADOLESCENTS AT SMA NEGERI 1 BENGKULU CITY

Ivo Risa Putri Gandari¹, Hendri Heriyanto², Sri Yuliana³

¹Bachelor of Applied Nursing Program, Bengkulu Health Polytechnic

^{2,3}Department of Nursing Lecturer, Bengkulu Health Polytechnic

E-mail: ivorisaputrigandari@gmail.com

ABSTRACT

Background: Hyperglycemia in adolescents may increase the risk of developing type 2 diabetes mellitus later in life. Consumption of sugar-sweetened beverages and junk food is suspected to contribute to elevated blood glucose levels. **Objective:** This study aimed to determine the association between sugar-sweetened beverage and junk food consumption habits and the risk of hyperglycemia among adolescents at SMA Negeri 1 Kota Bengkulu. **Methods:** A quantitative analytic study with a cross-sectional design was conducted among 194 respondents selected through Accidental sampling. Data were collected using the Beverage Intake Questionnaire (BEVQ), Food Frequency Questionnaire (FFQ), and random blood glucose measurements. Data were analyzed using the Chi-square test at a 95% confidence level ($\alpha = 0.05$). **Results:** High sugar-sweetened beverage consumption was found in 92.3% of respondents, while 22.2% frequently consumed junk food. Junk food consumption was significantly associated with hyperglycemia risk ($p < 0.001$; OR = 4.942). **Conclusion:** Junk food consumption increases the risk of hyperglycemia among adolescents. **Recommendation:** Adolescents are encouraged to reduce junk food intake and adopt healthier eating habits to prevent hyperglycemia and diabetes mellitus.

Keywords: hyperglycemia, junk food, artificially sweetened beverages, adolescents.

TABLE OF CONTENTS

THESIS TITLE PAGE	ERROR! BOOKMARK NOT DEFINED.
THESIS APPROVAL PAGE	II
RELATIONSHIP THESIS VERIFICATION PAGE	IV
BIODATA	V
STATEMENT OF ORIGINALITY	VI
MOTTO AND PRESENTATION	VII
FOREWORD	IX
ABSTRACT	XI
TABLE OF CONTENTS	XIII
TABLE LIST	XV
LIST	XVI
LIST OF ATTACHMENTS	XVII
ABBREVIATION LIST	XVIII
CHAPTER I INTRODUCTION	1
A. BACKGROUND	1
B. PROBLEM FORMULATION	4
C. RESEARCH OBJECTIVES	5
D. RESEARCH BENEFITS	5
E. RESEARCH BENEFITS	6
CHAPTER II THEORETICAL OVERVIEW	7
A. DIABETES MELITUS	7
B. CONSUMPTION OF ARTIFICIALLY SWEETENED DRINKS AND <i>JUNK FOOD</i>	15
C. THEORETICAL FRAMEWORK	20
CHAPTER III CONCEPTUAL FRAMEWORK, RESEARCH VARIABLES AND OPERATIONAL DEFINITION	22
A. CONCEPT FRAMEWORK	22
B. OPERATIONAL DEFINITION	23
C. RESEARCH HYPOTHESIS	25
CHAPTER IV RESEARCH METHODOLOGY	26
A. RESEARCH TYPE AND DESIGN	26
B. RESEARCH VARIABLES	27
C. RESEARCH LOCATION AND TIME	27
D. POPULATION AND SAMPLE	27
E. DATA COLLECTION	30
F. DATA PROCESSING	34
G. DATA ANALYSIS	36
H. RESEARCH FLOW	38
I. RESEARCH ETHICS	39
CHAPTER V RESEARCH RESULTS	41
A. THE COURSE OF RESEARCH	41
B. UNIVARIATE ANALYSIS	44

CHAPTER VI DISCUSSION	49
A. INTERPRETATION AND DISCUSSION OF RESULTS.....	49
B. RESEARCH LIMITATIONS.....	54
CHAPTER VII CONCLUSION	55
A. CONCLUSION	55
B. SUGGESTIONS	56
BIBLIOGRAPHY	57



TABLE LIST

Table 3. 1 Operational Definition	23
Table 5. 1 Characteristics of Respondents in High School	45
Table 5. 2 Frequency Distribution of Habits.....	46
Table 5. 3 Habit Relationship Analysis	47
Table 5. 4 Analysis of the Consumption Relationship.....	48



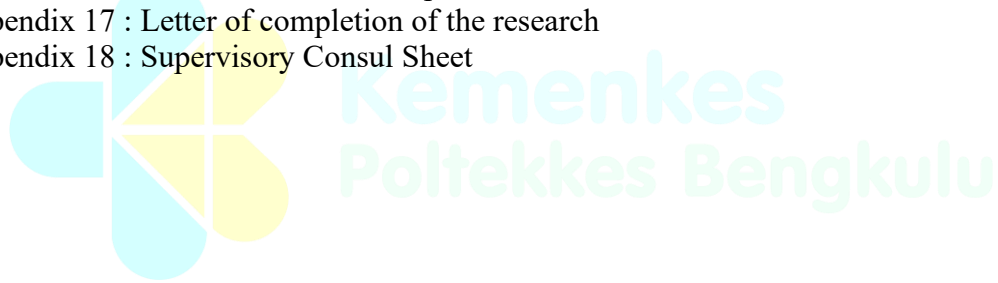
LIST

Chart 2. 1 Theoretical framework	20
Chart 3. 1 Concept Framework	22
Chart 4. 1 Research Design	26
Chart 4. 2 Research Flow	38



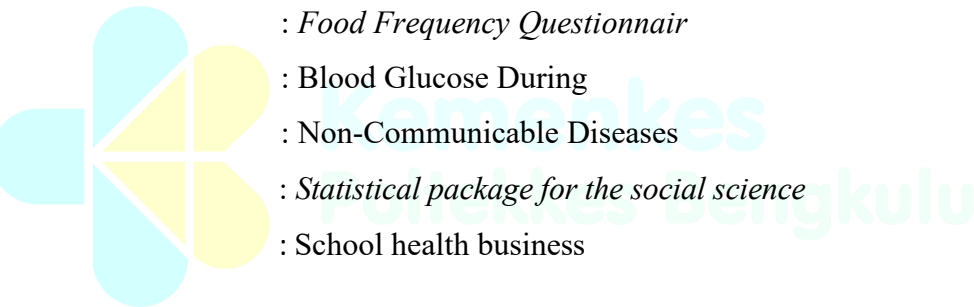
LIST OF ATTACHMENTS

- Appendix 1 : Master Table
- Appendix 2 : Spss output results
- Appendix 3 : Research documentation
- Appendix 4 : Research Information and Explainers
- Appendix 5 : Application Letter to Become a Respondent
- Appendix 6 : Respondent's Consent Letter
- Appendix 7 : BEVQ Questionnaire
- Appendix 8 : FFQ Questionnaire
- Appendix 9 : VR Test Sheet
- Appendix 10 :Pre-Research Permit
- Appendix 11 : Ethical Clearance
- Appendix 12 : Letter of introduction of the Principal
- Appendix 13 : Cover letter of DPMPTSP
- Appendix 14 : Cover Letter of the Education and Culture Department
- Appendix 15 : Principal's Research Permit
- Appendix 16 : DPTMPTSP research permit
- Appendix 17 : Letter of completion of the research
- Appendix 18 : Supervisory Consul Sheet



ABBREVIATION LIST

WHO	: <i>World Health Organization</i>
IDF	: <i>International Diabetes Federation</i>
SSBs	: <i>Sugar Sweetened Beverages</i>
SKI	: <i>Indonesian Health Survey</i>
DM	: <i>Diabetes Melitus</i>
IMT	: <i>Body Mass Index</i>
HDL	: <i>High Density Lipoprotein</i>
FFA	: <i>Free Faty Acids</i>
BEVQ	: <i>Beverage Intake Quiestionnair</i>
FFQ	: <i>Food Frequency Questionnair</i>
GDS	: <i>Blood Glucose During</i>
PTM	: <i>Non-Communicable Diseases</i>
SPSS	: <i>Statistical package for the social science</i>
UKS	: <i>School health business</i>



CHAPTER I INTRODUCTION

A. Background

The World Health Organization (WHO) defines Diabetes Mellitus (DM) as a chronic metabolic disease, which is characterized by high blood glucose levels (hyperglycemia). This condition occurs because the pancreas does not produce enough insulin, or the body cannot use insulin effectively, or both. Uncontrolled hyperglycemia over time can cause serious damage to various organs such as the heart, blood vessels, eyes, kidneys, and nerves. WHO data states that Indonesia is the fourth country ranked as the number of diabetics after the United States, China, and India. WHO estimates that in 2030 the number of people with diabetes will increase, now the world is inhabited by 171 million people with Diabetes Mellitus and will double in 2030 (WHO, 2023).

Data from *the International Diabetes Federation* (2025) (IDF) states that Indonesia has a prevalence of Diabetes of 12.4% in 2024, and is expected to increase to 14.7% in 2050, while data in Indonesia in 2024 DM sufferers have reached 20 million people, around 73.7% of Indonesians who suffer from diabetes are not aware that they suffer from diabetes and the death rate in Indonesia has reached 1.2 million people and this caused by DM disease. The Indonesian Health Survey (2023) (SKI) stated that diabetes prevalence data in Indonesia based on blood sugar checks of 2.2% of the population aged ≥ 15 years diagnosed with DM indicates that diabetes is still a health problem that needs serious attention.

Nuzula's research also explains that pre-diabetes is closely related to the risk of diabetes that arises in adulthood, prediabetes increases

globally in all age groups, including children and adolescents, and increases significantly with age. There are several factors that contribute to the increased risk of diabetes in adolescents, namely consumption of artificially sweetened beverages and fast food, and unhealthy lifestyles (Nuzula et al., 2025)

Adolescents are a group that is very vulnerable to unhealthy consumption patterns. Changes in modern lifestyles, easy access to fast food, and the rise of packaged sweet beverages make teenagers tend to consume *junk food* and sugar-sweetened beverages excessively. The increased consumption of sweetened beverages and fast food is related to obesity and an increase in diabetes cases at a young age. This habit is more risky if it occurs in adolescents who often consume sugary drinks and fast food, because genetic factors plus an unhealthy lifestyle can accelerate the occurrence of hyperglycemia as an early stage towards diabetes (Dini Labelo et al., 2025)

Artificially sweetened beverages are often perceived as a low-calorie alternative, but some studies have shown a link with increased insulin resistance and impaired glucose metabolism. Meanwhile, *junk foods* that are generally high in saturated fats, salt, and simple carbohydrates can trigger obesity and metabolic syndrome which are the main risk factors for hyperglycemia and DM (Dini Labelo et al., 2025)

One of the biggest contributors to this problem is changes in consumption patterns, especially the drastic increase in the consumption of artificially sweetened beverages or *Sugar-Sweetened Beverages (SSBs)*. These drinks, such as soda, packaged tea, energy drinks, and contemporary milk coffee, and drinks that have a very high added sugar content, high glycemic index, and low nutritional value (Ministry of Health of the Republic of Indonesia, 2022).

Physiologically, the consumption of simple sugar in liquid form is quickly absorbed by the body, causing a spike in blood glucose (*glucose spike*)

sharp. To cope with this, the pancreas releases large amounts of insulin. Repeated and excessive consumption will overload the pancreas and over time can lead to insulin resistance, in which the body's cells become less responsive to insulin. Insulin resistance is a key mechanism underlying the occurrence of hyperglycemia and DM (Lestari, 2021).

Regular consumption of *junk food* contributes to excess calorie intake (*caloric surplus*). This excess energy is stored as fatty tissue (adipose), especially visceral fat around the abdominal organs. This excess adipose tissue is pro-inflammatory, releasing cytokines that can interfere with insulin signaling and contribute directly to insulin resistance and hyperglycemia, even regardless of sugar consumption (Pratiwi & Wahyuningsih, 2023).

The problem becomes increasingly complex because the consumption of sweetened drinks and *junk food* often occur at the same time (Pramono & Hidayati, 2021). Teens who buy fast food packages almost always pair it with fizzy drinks or other sugary drinks. This combination of the "calorie bomb" of saturated fats and simple sugars creates a double metabolic load on the body, accelerating the rate towards metabolic dysfunction and hyperglycemia.

A survey conducted at SMA Negeri 1 Bengkulu City on January 20, 2026 among grade XI students with a population of 390 showed that the consumption of artificially sweetened beverages and *junk food* was quite high among adolescents. The results of interviews from UKS show that most students often consume artificially sweetened drinks such as packaged drinks, fizzy drinks, and boba drinks, as well as fast food.

Based on the initial screening of 13 students, it was found that several students with high blood sugar levels were included in the category of consumption of high-sweetened drinks and the category of frequent junk food consumption. The results

of this screening are one of the bases that show the need to conduct research on consumption habits and the risk of hyperglycemia in adolescents.

SMA Negeri 1 Bengkulu City was chosen as the location for the research because it is located in the Lempuing Village area which is a assisted village of the Bengkulu Ministry of Health Polytechnic. As part of the target area, this school is the target of various educational, research, and community service activities.

In addition, until now there have not been many studies that have examined the relationship between the consumption of artificially sweetened beverages and *junk food* with the risk of hyperglycemia in students of SMA Negeri 1 Bengkulu City. Therefore, this study is expected to provide an overview of the condition of adolescents in the school as well as be the basis for efforts to promote health and prevent non-communicable diseases from school age.

Excessive consumption of artificially sweetened beverages can increase daily sugar intake so that it has the potential to increase blood glucose levels and trigger hyperglycemia. Sugar-sweetened beverages are one of the main sources of added sugars that can increase the risk of metabolic diseases such as diabetes if consumed in excess.

Based on this phenomenon, the researcher is interested in conducting a study on the relationship between the consumption habits of artificially sweetened drinks and *junk food* to the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City, to find out whether there is a relationship between these consumption patterns and an increased risk of blood sugar levels in adolescents.

B. Problem Formulation

Based on the above background, the problems that can be formulated are:
Is there a relationship between the consumption habits of artificially sweetened drinks and *junkfood* to the risk of hyperglycemia in adolescents.

C. Research Objectives

The objectives of this study are:

1. General purpose

It is known that the relationship between the consumption of artificially sweetened beverages and *junk food* to the risk of hyperglycemia in adolescents.

2. Special Purpose

- a. It is known that the characteristics of the respondents include age, gender, BMI and smoking habits in adolescents at SMA Negeri 1 Bengkulu City.
- b. It is known that the frequency of artificially sweetened beverage consumption habits in adolescents at SMA Negeri 1 Bengkulu City.
- c. It is known that the frequency of *junkfood consumption* habits in adolescents at SMA Negeri 1 Bengkulu City.
- d. It is known that the relationship between the consumption of artificially sweetened beverages and the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City.
- e. It is known that the relationship between *junkfood consumption habits* and the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City.

D. Research Benefits

1. For Health Workers

Become a reference material in providing education and health promotion regarding the prevention of hyperglycemia and diabetes since adolescence.

2. For Teens

Providing insight into the adverse impact of artificially sweetened beverage consumption habits and *junk food* on metabolic health so that it can encourage behavior changes towards a healthier diet.

3. For Educational Institutions

It can add references to literature reading in improving the quality of education and learning materials regarding the relationship between the habit

of drinking artificially sweetened drinks and *junk food* to the risk of hyperglycemia in adolescents.

4. For Other Researchers

Furthermore, the results of this study are expected to be a motivation to conduct other useful studies related to overcoming the problem of hyperglycemia and diabetes mellitus in adolescents.

E. Research Benefits

1. For Health Workers

Become a reference material in providing education and health promotion regarding the prevention of hyperglycemia and diabetes since adolescence.

2. For Teens

Providing insight into the adverse impact of artificially sweetened beverage consumption habits and *junk food* on metabolic health so that it can encourage behavior changes towards a healthier diet.

3. For Educational Institutions

It can add references to literature reading in improving the quality of education and learning materials regarding the relationship between the habit of drinking artificially sweetened drinks and *junk food* to the risk of hyperglycemia in adolescents.

4. For Other Researchers

Furthermore, the results of this study are expected to be a motivation to conduct other useful studies related to overcoming the problem of hyperglycemia and diabetes mellitus in adolescents.

CHAPTER II

THEORETICAL OVERVIEW

A. Diabetes Melitus

1. Definition

Diabetes mellitus or diabetes is a chronic disease that can be suffered for a lifetime. Diabetes mellitus (DM) is caused by metabolic disorders that occur in the pancreas which is characterized by an increase in blood sugar or often referred to as a hyperglycemia condition caused by a decrease in the amount of insulin from the pancreas. DM disease can cause various complications, both macrovascular and microvascular. DM disease can cause cardiovascular disorders which is a fairly serious disease if not treated as soon as possible so that it can increase hypertension and heart infarction.

There is one study that shows that DM is a very important degenerative disease because it is included in the top four non-communicable diseases that are increasing every year and become a global health threat in modern times, DM is caused by a lack of eating vegetables and fruits, as well as consuming too much sweet and salty foods and drinks as well as fast food. This condition is increasingly worrying with the increase in DM cases in the young age group of approximately 15 years old (Kelas et al., 2025).

One of the previous researchers stated that Indonesia is the country that ranks fourth in the number of people with diabetes after the United States, China and India. In addition, DM sufferers in Indonesia are expected to increase rapidly by 2-3 times by 2030 compared to 2000. Added to the explanation of WHO data that, the world is currently inhabited by 171 million people with DM and will increase 2 times,

366 million by 2030. The Data and Information Center of the Ministry of Health of the Republic of Indonesia also states that the IDF's latest estimate that by 2035 there will be 592 million people living with diabetes in the world (Lestari et al., 2021)

2. Etiology

The habit of consuming artificially sweetened drinks and *junk food* in adolescents can have an impact on increasing blood glucose levels. The risk of hyperglycemia in adolescence is multifactorial and is influenced by various lifestyle factors, but the most dominant is the consumption pattern of foods and drinks high in sugar and high calories which can affect glucose metabolism in the body. High consumption of artificially sweetened beverages can lead to an increase in simple sugar intake so that it triggers a spike in blood glucose levels. In addition, the consumption of *junk food*, which is generally high in fat, sugar, and salt and low in fiber, can also disrupt the body's metabolic balance and increase the risk of insulin resistance. These factors, if they occur continuously, can increase the likelihood of hyperglycemia in adolescents.

The causes of diabetes mellitus can vary, which are as follows:

- a. Gender: The prevalence of Type 2 DM in women is higher than in men (Ministry of Health of the Republic of Indonesia BKPK, 2023). Women suffer more from diabetes because physically, women have a higher risk of experiencing an increase in body mass index. Premenstrual and postmenopausal syndrome, which causes the distribution of body fat to easily accumulate due to hormonal processes, makes women more susceptible to suffering from type 2 diabetes mellitus.
- b. Age: Age < 45 years is the group with a lower risk of developing Type 2 DM. The risk in this group was 72 percent lower than those aged 45. There are

significant association between age and the incidence of DM. The age group that suffers the most from DM is the 45-52 year old age group (47.5%). The increased risk of diabetes with age, especially after the age of 40, is caused by an increase in glucose intolerance at that age. The aging process leads to a decrease in the ability of cells β the inner pancreas to produce insulin. As we age, mitochondrial activity in muscle cells decreases by up to 35%. This has to do with a 30% increase in muscle fat content, which triggers insulin resistance.

- c. Body mass index (BMI): Obese individuals have a 2.7 times greater risk of developing diabetes mellitus. This is due to a lack of physical activity and high consumption of carbohydrates, proteins, and fats, which are risk factors for obesity. This leads to an increase in free fatty acids (FFA) in the cells. This increase in FFA will reduce the translocation of glucose transporters to the plasma membrane, leading to insulin resistance in muscles and adipose tissue. Individuals with a BMI of ≥ 23 kg/m² are at risk of developing type 2 DM.
- d. History of hypertension: There is a significant association between blood pressure and DM. The results showed that people with hypertension had a greater risk of developing diabetes, with a 6.85 times higher chance compared to those who did not have hypertension. Some literature links hypertension to insulin resistance. The effect of hypertension on the incidence of DM is caused by the thickening of the walls of arterial blood vessels, which narrows the diameter of the blood vessels. This interferes with the process of transporting glucose from the blood.

- e. Cholesterol levels: High cholesterol levels are at risk of developing type 2 DM. High cholesterol levels lead to an increase in free fatty acids, which results in apoptosis. This will damage the beta cells of the pancreas, leading to type 2 DM. Type 2 DM patients showed low HDL levels (37.3%) compared to high HDL levels (25.6%). High triglyceride levels (57.1%) significantly increase the risk of developing type 2 DM.
- f. Physical activity: An active body is beneficial for controlling blood sugar. This is important because when the body is active, sugar is burned and converted into energy, thereby reducing the amount of insulin. When a person does not get enough physical activity, nutrients that enter the body will accumulate and be stored as fat, thus increasing the risk of type 2 DM. There is a relationship between physical activity and the incidence of type 2 DM (Prasetyo, n.d.)

3. Pathophysiologists

According to (Maria, 2021) a person with type 2 DM, hyperglycemia persists throughout the night despite the presence of insulin produced naturally by the body. Insulin production can vary greatly in people with type 2 diabetes, and even if it is present, insulin usefulness is reduced due to insulin resistance in the peripheral nervous system. Insulin production can vary greatly in people with type 2 diabetes. As a consequence of abnormal carbohydrate metabolism of food, the pancreas secretes a very low amount of insulin, which in turn causes the liver to produce very high amounts of glucose.

The pathophysiology of type 2 diabetes is multifactorial and progressive, involving two main defects: insulin resistance and inadequate insulin secretion. Research shows that "for type 2 diabetes mellitus to occur, insulin resistance and inadequate insulin secretion must be present." Insulin resistance usually precedes the development of hyperglycemia. often years in advance. During this period, pancreatic beta cells compensate by increasing insular secretion, maintaining relatively normal glucose levels despite reduced tissue sensitivity.

However, this compensation mechanism eventually fails as the beta cells become dysfunctional and begin to experience a decrease in mass.

An important aspect of the pathophysiology of type 2 DM involves what has been described as "pancreatic islet paracryopathy" in which the reciprocal relationship between glucagon-secreting alpha cells and insulin-secreting beta cells is interrupted, leading to hyperglycemia, and consequently hyperglycemia". This disruption of alpha cell function results in improper glucagon secretion, which exacerbates hyperglycemia through increased liver glucose production. As the disease progresses, pancreatic atrophy can occur, which further interferes with the endocrine and exocrine function of the pancreas (Yameny, 2025)

4. Klasifikasi

According to the *American diabetes association 2020* , normal blood sugar in adolescents is classified as 100-140 mg/dL categorized as hyperglycemic risk, which means blood sugar levels are higher than normal so there is a risk of increased blood sugar (Yuliana Silvia et al., 2024)

Diabetes is conventionally classified into several clinical categories, although these categories are being reconsidered based on genetic, metabolomics and other characteristics as well as pathophysiology:

- a. Type 1 DM (caused by autoimmune b-cell damage, usually leading to absolute insulin deficiency, including latent autoimmune diabetes in adults).
- b. Type 2 DM (caused by a progressively non-autoimmune loss of adequate b-cell insulin secretion, often against the background of insulin resistance).
- c. Specific types of DM due to other causes, such as monogenic DM syndrome, exocrine pancreatic disease, and drug- or chemical-induced DM.

5. Clinical manifestations

The signs and symptoms that DM patients will experience are as follows:

- a. Polyuria (frequent urination): a condition when a person excretes excessive amounts of urine.
- b. Polyphagia (feeling hungry quickly): a condition in which hunger increases excessively so that a person eats more often or in larger quantities than usual.
- c. Weight loss especially in type 1 dm patients
- d. Polydipsia (excessive thirst): a condition of excessive thirst that causes a person to drink much more than usual.
- e. Vision becomes blurred due to changes in osmolarity in the eye
- f. Tingling/numbness especially in the hands and feet (peripheral neuropathy)
- g. Wounds that are difficult to heal
- h. Recurrent infections
- i. Dry/itchy skin due to dehydration and fungal infections (Lestari et al., 2021) (Ceriello & Colagiuri, 2025)

6. Risk Factors

a. Age

Age is a major risk factor for diabetes. Screening should begin no later than age 35 for everyone. Screening should be considered in adults of any age who are overweight or obese and one or more risk factors for diabetes (Care & Suppl, 2025)

b. Obesity and fat distribution

Overweight and obesity are the drivers of the global diabetes epidemic. This condition affects most adults in most developed countries and is increasing rapidly in developing countries. If current global trends continue, the number of overweight people (BMI ≥ 25 kg/m²) is projected to increase from 1.3 billion in 2005 to nearly 2.0 billion by 2030.

c. Diet

Excessive calorie intake is a major driving factor behind the rising epidemic of obesity and type 2 diabetes worldwide, but the quality of diet

also has independent effects. In the Nurse Health Study, we found that the quality of fats and carbohydrates plays an important role in the development of diabetes, regardless of BMI and other risk factors. In particular, a higher glycemic load of foods and trans fats was associated with an increased risk of diabetes, while greater consumption of cereal fiber and polyunsaturated fats was associated with a decreased risk. In a meta-analysis, we found that an increase in whole grain intake by 2 servings/day was associated with a 21% lower risk of diabetes.

d. Physical activity

A number of epidemiological studies show that increased physical activity reduces the risk of diabetes, while sedentary behaviors increase the risk. Every increase in time spent 2 hours/day increases the risk of diabetes by 14%. Every 2 hours/day increase in standing or walking at home was associated with a 12% reduction in risk. Every increase of 1 hour/day of brisk walking is associated with a 34% reduction in risk. These results suggest a continuum in the relationship between physical activity levels and diabetes risk. Among sedentary behaviors (watching TV, sitting at work, and other sedentary activities), watching TV for long periods of time was associated with the highest risk.

e. Smoking

Smoking is an independent risk factor for type 2 diabetes. A meta-analysis found that active smokers had a 45% higher risk of developing diabetes compared to non-smokers. In addition, there is a dose-response relationship between the number of cigarettes smoked and the risk of diabetes (overweight or obesity and one or more diabetes risk factors (Care & Suppl, 2025))

f. Obesity and fat distribution

Overweight and obesity are the drivers of the global diabetes epidemic. This condition affects most adults in most developed countries and is

increasing rapidly in developing countries. If current global trends continue, the number of overweight people (BMI ≥ 25 kg/m²) is projected to increase from 1.3 billion in 2005 to nearly 2.0 billion by 2030.

g. Diet

Excessive calorie intake is a major driving factor behind the rising epidemic of obesity and type 2 diabetes worldwide, but the quality of diet also has independent effects. In the Nurse Health Study, we found that the quality of fats and carbohydrates plays an important role in the development of diabetes, regardless of BMI and other risk factors. In particular, a higher glycemic load of foods and trans fats was associated with an increased risk of diabetes, while greater consumption of cereal fiber and polyunsaturated fats was associated with a decreased risk. In a meta-analysis, we found that an increase in whole grain intake by 2 servings/day was associated with a 21% lower risk of diabetes.

h. Physical activity

A number of epidemiological studies show that increased physical activity reduces the risk of diabetes, while sedentary behaviors increase the risk. Every increase in time spent 2 hours/day increases the risk of diabetes by 14%. Every 2 hours/day increase in standing or walking at home was associated with a 12% reduction in risk. Each 1 hour/day increase in brisk walking is associated with risk reduction by 34%. These results suggest a continuum in the relationship between physical activity levels and diabetes risk. Among sedentary behaviors (watching TV, sitting at work, and other sedentary activities), watching TV for long periods of time was associated with the highest risk.

i. Smoking

Smoking is an independent risk factor for type 2 diabetes. A meta-analysis found that active smokers had a 45% higher risk of developing diabetes compared to non-smokers. In addition, there is a dose-response

relationship between the number of cigarettes smoked and the risk of diabetes (Hu, 2011)

7. Complications

- a. Acute complications
- b. Diabetic ketoacidosis, and severe hypoglycemia occur if poor blood sugar control is sudden, can be life-threatening.
- c. Microvascular complications
diabetic retinopathy (eye disorders to blindness), nephropathy (kidney), neuropathy (nerves). Damage to small blood vessels due to chronic hyperglycemia.
- d. Macrovascular complications
Coronary heart disease, stroke, peripheral vascular disease. Complications of large blood vessels, increased risk of death.

8. Governance

The management of diabetes mellitus can be done by means of education and lifestyle modifications, such as education to understand diabetes, complications, and stable blood sugar targets, and for lifestyle, encourage patients to reduce their consumption of sugar and fast food and apply the principle of 3j (amount, type, hours), and encourage physical activity such as exercising at moderate intensity.

B. Consumption of artificial sweetened drinks and *junk food*

1. Definition of artificial sweeteners

It is a synthetic food additive that is used to give sweetness to food and drinks, generally does not provide nutritional or caloric value to the body. *The WHO* recommends limiting the consumption of free sugars to less than 5% of daily energy intake, Given that more than 23,000 products worldwide contain artificial sweeteners and their consumption is high and steadily increasing, the

potential health impacts of these sweeteners have become an important but controversial topic that has attracted attention from health authorities such as the European Food Safety Authority and *the WHO*. Chen et al., 2024)

Impact mechanism:

- a. Stimulation of *Sweet Taste Receptors*: Artificial sweeteners (aspartame, sucralose, saccharin, acesulfam-K) activate sweet taste receptors in the mouth and intestines. Activation of these receptors can trigger a *cephalic insulin response*, which is the initial release of insulin in the absence of real glucose, which can eventually interfere with insulin sensitivity.
- b. Changes in the Gut Microbiota (Gut Microbiota Dysbiosis): The consumption of artificial sweeteners chronically changes the composition of the gut microbiota, especially lowering bacteria that play a role in maintaining glucose metabolism. This results in glucose intolerance and insulin resistance, which are major factors in diabetes.
- c. Disruption of Glucose Metabolism Regulation: Some artificial sweeteners can affect the release of the hormone *incretin*, which plays a role in regulating insulin secretion and gastric emptying. As a result, the body's response to glucose becomes unstable.

Some of the ingredients that are generally found in artificially sweetened drinks include the following:

1) Artificial sweeteners

Artificial sweeteners are substances used to give sweetness to foods or drinks with a very low number of calories. Some types of artificial sweeteners that are often used include:

- a) Aspartame
- b) Saccharin
- c) Sucralose
- d) Acesulfame potassium

This sweetener has a much higher level of sweetness than regular sugar so it is only used in small amounts.

2) Simple sugar

Some sweetened drinks also still contain simple sugars that can increase blood glucose levels, such as:

- a) Glucose
- b) Fructose
- c) Sucrose

3) Preservatives

Preservatives are used to extend the shelf life of the beverage and prevent the growth of microorganisms. Examples of preservatives that are often used include:

- a) Sodium benzoate
- b) Potassium sorbate

4) Food coloring

Dyes are added to give the drink a more attractive look. Dyes can come from natural or synthetic materials.

5) Flavors or flavor enhancers

Flavors are used to give a drink a certain aroma and flavor, for example the flavor of fruit such as orange, strawberry, or grape.

6) Carbonation (carbon dioxide)

In some drinks such as fizzy drinks, carbon dioxide gas is added to produce a bubbly sensation.

2. Definition of *junkfood*

It is a fast food that in recent times has been in great demand among teenagers, *junk food* is also known as a food that contains high calories, fat, sugar, and salt but has a very low vitamin content and also contains various food additives such as sweeteners, flavorings and preservatives that can cause

health problems such as diabetes mellitus if consumed in excess (Junkfood, 2022)

Impact mechanism:

- a. Sugar and Moderate High Carb Content: Junk food is typically high in *refined carbohydrates* (sugar, white flour) and low in fiber. As a result, glucose is quickly absorbed causing a spike in blood glucose levels (hyperglycemia) and triggering excessive insulin secretion.
- b. High Saturated and Trans Fat Content: Saturated and trans fats cause oxidative stress and low-grade inflammation that interferes with insulin signaling which can lead to insulin resistance.
- c. High Calories & Large Energy Density: Excess energy intake from *junk food* increases the risk of obesity, which is a major risk factor for type 2 diabetes
- d. Low in Fiber and Micronutrients: Fiber helps slow down the absorption of glucose. *Junk food* that is low in fiber makes glucose rise quickly after eating (Chen et al., 2024)

Some of the ingredients that are generally found in *junk food* include the following:

1) Simple carbohydrates

Junk food often contains simple carbohydrates that are easily digested by the body so that they can increase blood glucose levels quickly. Simple carbohydrates that are often found in *junk food* include:

- a) Glucose
- b) Fructose
- c) Sucrose

2) Saturated fat

Saturated fat is widely found in fast food such as french fries, fried chicken, and burgers. Excessive consumption of saturated fat can increase the risk of obesity as well as metabolic disorders of the body.

3) Trans fats

Trans fats are usually formed during the food processing process, especially in foods that are fried using oil repeatedly. These fats can increase the risk of metabolic diseases and other health disorders.

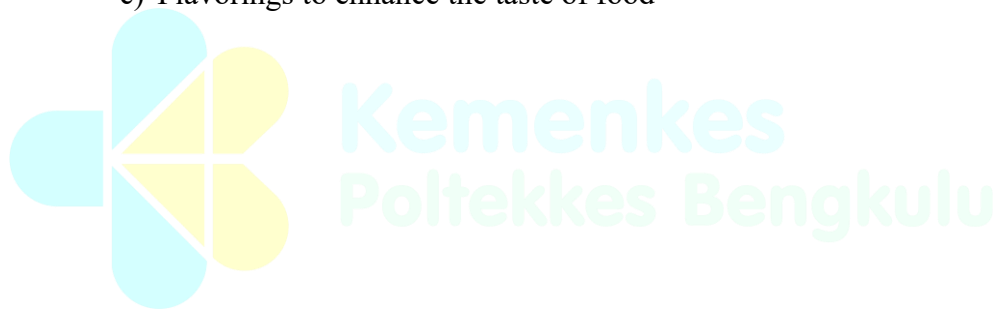
4) High salt or sodium

Junk food generally has a high salt content to enhance the flavor of food and extend shelf life. High sodium can affect the body's fluid balance as well as increase the risk of cardiovascular disease.

5) Food additives

Junk food also often contains various food additives, such as:

- a) Preservatives to extend the shelf life of food
- b) Food coloring to improve the appearance of food
- c) Flavorings to enhance the taste of food



C. Theoretical Framework

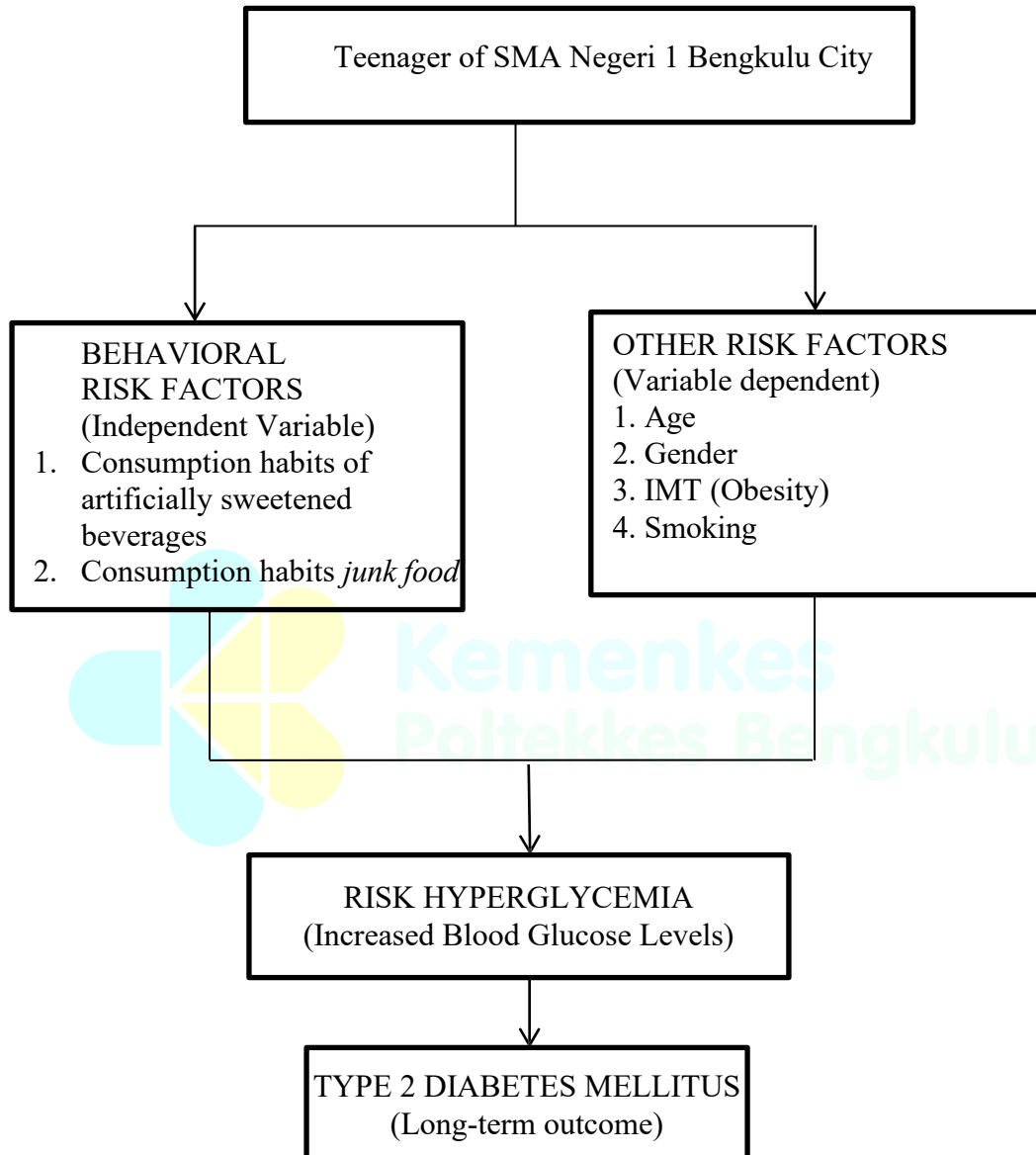


Chart 2. 1 Theoretical Framework

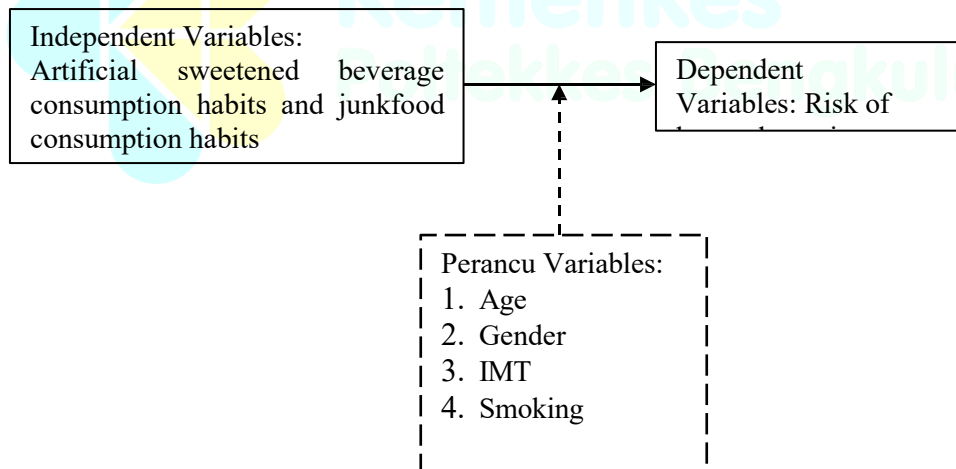
Source : (Han, 2023)

CHAPTER III

CONCEPTUAL FRAMEWORK, RESEARCH VARIABLES AND OPERATIONAL DEFINITION

A. Concept Framework

Conceptual frameworks are abstractions from a reality so that they can be communicated and form theories that explain the relationships between variables. The conceptual framework in this study was developed based on a theoretical review of risk factors for hyperglycemia in adolescents. The independent variables in this study were Consumption Habits of Artificially Sweetened Beverages and *Junk Food Consumption Habits*. The dependent variable is the Risk of Hyperglycemia. This study used questionnaires and blood sugar measurements to find out the results of the relationship between the above variables. Based on the description of these concepts, the conceptual framework in this study is:



Description :



: Yang area of teilites



: Yang area of teilites

Chart 3. 1 Concept Framework

B. Operational Definition

The operational definition describes how to measure research variables in a specific, measurable, and objective way.

Table 3. 1 Operational Definition

Variabel	Operational Definition	How to Measure	Measuring Instruments	Measurement Results	Scale
Independent: Consumption Habits of Artificially Sweetened Beverages	The frequency of respondents consuming drinks that contain added sugar or artificial sweeteners (such as soda, packaged tea, boba/coffee drinks).	Filling out the questionnaire	<i>Beverage Intake Questionnaire for Adults</i> (BEVQ)	0 = High, if the consumption of sugar from sweetened beverages >20x/month 1 = Low, if the consumption of sugar from sweetened beverages ≤20x/month (Rahayu et al., 2024)	Ordinal
Junk Food Consumption Habits	The frequency of respondents consuming fast food that is high in calories, saturated fat, and salt (such as burgers, pizza, flour fried chicken, instant noodles) in the past month.	Filling out the questionnaire	<i>Kuesioner Food Frequency Questionnaire</i> (FFQ)	0 = Frequent (Risky) Consumption Score = 18 >Median (Score) 1 = Rare (Not at Risk) Consumption Score $18 \leq$ Median Angeline & Wartiningsih, (2023)	Ordinal

Dependent: Risk of Hyperglycemia	The condition of the respondents' current blood glucose level (GDS) measured using a capillary blood test device, depicting a metabolic status glucose at that time.	Physiological Observation Measurement	Easy Touch / <i>Digital Glucometer</i> and Blood Sugar Strip	- 0 = Hyperglycemia (at risk) if GDS ≥ 140 mg/dL. 1 = Normal, if GDS < 140 mg/dL. (Dwi Yuliana Silvia, 2024)	Ordinal
Variables Perancu: Age	The length of life of the respondents calculated from the date of birth to the time the study was conducted (in years).	Filling out the questionnaire	Characteristics Questionnaire (Biodata)	0 = Late Teens (17-25 years old) 1 = Early Adolescence (12-16 years)	Ordinal
Gender	The biological identity of the respondent was carried from birth.	Filling out the questionnaire	Characteristic Questionnaire	- 0 = Women - 1 = Male	Nominal
Body Mass Index (BMI)	The nutritional status of the respondents was based on the comparison of body weight (kg) and height (m squared).	Anthropometer Measurements	Body Scales & Microtoise	0 = Obesitas/ Overweight ($\geq 25,0$) 1 = normal / which (< 25.0)	Ordinal

Smoking	Respondents' behavior in actively consuming or smoking tobacco products (conventional cigarettes) or e-cigarettes (vapes) in the last 30 days.	Interview / Filling out the questionnaire	Characteristic Questionnaire	0 = Smoker, If the respondent smokes daily or occasionally. 1 = Non-Smoker, If the respondent does not merokok. ((Pito et al., n.d.)
---------	--	---	------------------------------	---

C. Research Hypothesis

Ha: There is a relationship between the consumption of artificial sweetened drinks and *junkfood* with the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City.

H0: There was no relationship between the consumption of artificial sweetened drinks and *junkfood* with the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City.

Keimenes
Poltekkes Bengkulu

CHAPTER IV RESEARCH METHODOLOGY

A. Research Type and Design

The type of research used in this study is quantitative with an analytical observational design. The quantitative method was chosen because this study aims to test the hypothesis that has been determined using data in the form of numbers and statistical analysis (Sugiyono, 2020). The approach used is *Cross Sectional*, which is a research design in which measurements or observations of independent variables (consumption habits of artificially sweetened beverages and *junk food*) and dependent variables (risk of hyperglycemia) are carried out simultaneously or at the same time (Kadang et al., 2025).

The chart of this research design can be described as follows:

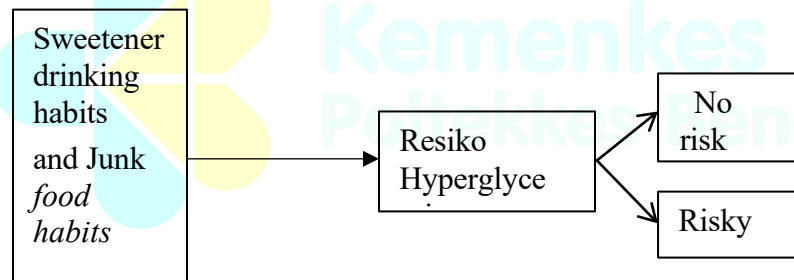


Chart 4. 1 Research Design

B. Research Variables

In this study, independent variables (independent variables) and dependent variables (bound variables) were used. The independent variables in this study were Artificial Sweetened Beverage Consumption Habits and *Junk Food Consumption* Habits. Meanwhile, the dependent variable in this study is the Risk of Hyperglycemia.

C. Research Location and Time

This research was conducted at SMA Negeri 1 Bengkulu City. This location was chosen because it is one of the high schools with a large enough number of adolescents to represent the adolescent population to research the consumption habits of artificially sweetened beverages and *junk food* that have the potential to affect the risk of hyperglycemia. This research was carried out in May 2026.

D. Population and Sample

1. Populasi

Population is a generalized area consisting of objects and subjects that have certain characteristics that are determined by the researcher to be studied and then drawn conclusions. The population in this study is grade 11 students who attend SMA Negeri 1 Bengkulu City.

2. Sample

A sample is a fraction of the number of individuals with characteristics that represent the population to be studied (Kadang et al., 2025). The sample in this study is adolescents who attend State High School 1 Bengkulu City. Sample selection was determined using *Non-Probability Sampling* with *Accidental Sampling Technique*. The calculation of the minimum sample size in this study uses a single proportion estimation formula, namely:

$$n = \frac{Z^2 \times D \times Q}{d^2}$$

as described in the guidelines for calculating sample sizes for prevalence studies (Naing et al., 2022).

Known:

- Z= Degree of confidence (e.g. 1.96 to 95%)
- P= proportion of the prevalence of the variable being studied (if unknown, use 0.5)
- Q=1-P=0.5
- d=margin of error or absolute precision level (e.g. 0.10)
- n = Minimum number of samples required

Based on data obtained from SMA Negeri 1 Bengkulu City, the total population in this study is 390 students who meet the research criteria. Therefore, the value N = 390 is used as the basis in the large calculation of the sample. Furthermore, the sample size was calculated using the Lemeshow formula with *finite population correction* so that a sample of 194 respondents was obtained to be used as the subject of the study.

$$\begin{aligned}
 n &= \frac{Z^2 \times P \times Q}{d^2} \\
 n &= \frac{1,96^2 \times 0,5 \times 0,5}{(0,05)^2} \\
 n &= \frac{38.416 \times 0,25}{0,0025} \\
 n &= \frac{0,9604}{0,0025} \\
 &= 384,16 = 385
 \end{aligned}$$

Limited population correction (due to N = 390)

$$n = \frac{n_0}{d_2}$$

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

$$n = \frac{385}{1 + \frac{385 - 1}{390}}$$

$$n = \frac{385}{1,9846} = 193,99 = 194$$

Based on the results of the calculation of the sample size using the proportion estimation formula, a minimum sample number of 194 respondents was obtained. This number was used as a total sample in this study which aimed to analyze the relationship between the consumption habits of artificially sweetened drinks and *junk food* to the risk of hyperglycemia in adolescents at State High School 1 Bengkulu City.

The inclusion and exclusion criteria in this study are as follows:

1. Criteria Inclusion

- a. Teenagers who are active students at SMA Negeri 1 Bengkulu City.
- b. Adolescents who are willing to become respondents and sign an *informed consent* form.
- c. Adolescents who are able to read, understand, and fill out questionnaires independently.

2. Exclusion Criteria

- a. Respondents who were not present at the time of data collection.
- b. Respondents who resigned during the research process.
- c. Respondents who fill out the questionnaire incomplete or inappropriately.
- d. Respondents who were experiencing severe illness at the time of data collection were unable to follow the research process.

E. Data Collection

1. Data Source

a. Data Primer

- 1) Blood glucose levels are measured while (GDS) using a digital glucometer to assess the risk of hyperglycemia.
- 2) Filling out a questionnaire of respondents' characteristics (age, gender, weight, height).
- 3) Filling out a questionnaire to assess the consumption habits of sweetened drinks and *junk food*:

a) For Consumption of Sweetened Drinks:

- b) Using a modified *Beverage Intake Questionnaire* (BEVQ). This questionnaire is used to measure the habits or frequency of consumption of sweetened drinks over the past month, including several types of drinks such as sweet or fruit-flavored juices, soft drinks, sports drinks, tea, coffee, and sweetened milk. The assessment was carried out based on the amount or frequency of consumption of sweetened beverages in the past month, then categorized based on the median consumption value, which was ≥ 20 times per month and < 20 times per month.

- c) For *Junk Food Consumption Habits*: Using the *Food Frequency Questionnaire* (FFQ). This questionnaire contains a list of fast food/junk food and is assessed based on median consumption scores to categorize habits of "Rare" (median $\leq$ score) or "Frequent" (median $>$ score).

d) Data Seconds

Secondary data was obtained from school administration data at SMA Negeri 1 Bengkulu City, in the form of data on the number of registered students and general information about student characteristics. The data is used to

assist researchers in determining the population and tracking potential research respondents in accordance with the established inclusion criteria.

2. Data Collection Tools and Research Instruments

a. Demographic Data Form

This sheet contains data on the identity and characteristics of the respondents, including initials of name, age, gender, weight, height (for the calculation of Body Mass Index/BMI), and smoking habits.

b. Blood Glucose Level Observation Sheet

This sheet is used to record the results of the respondents' Blood Glucose Levels (GDS) which are measured using a digital glucometer and test strip.

c. Questionnaire for Artificially Sweetened Beverages (BEVQ)

This instrument was used to assess the consumption habits of sweetened beverages in respondents. The tool used is a modified *Beverage Intake Questionnaire* (BEVQ). This questionnaire is used to measure the frequency or habit of consuming sweetened drinks in the past month. The types of drinks measured included several categories of sweetened drinks such as sweet juice or fruit-flavored drinks, soft *drinks*, sports *drinks*, tea, coffee, and sweetened milk.

d. Questionnaire for Junk Food Consumption Habits (FFQ)

This instrument was used to assess respondents' *junk food* consumption habits in the last one month period. The tool used is *the Food Frequency Questionnaire* (FFQ). This questionnaire contains a specific list of *fast food/junk food* and is used to categorize respondents' consumption habits into "Rare" or "Frequent" based on the total consumption score compared to the sample median value.

3. Data Collection Procedure

The data collection procedure is carried out with the following steps:

- a. The researcher takes care of the research permit from the educational institution and submits it to the Principal of SMA Negeri 1 Bengkulu City as the research location.
- b. The researcher approaches prospective respondents, providing explanations about the objectives, benefits, research procedures, and rights of respondents during the research.
- c. The researcher asked for the respondent's consent by providing an *Informed Consent* sheet. Respondents who agree are welcome to sign an agreement sheet before proceeding with the research process.
- d. The researcher conducted initial screening to ensure respondents met the inclusion and exclusion criteria.
- e. Anthropometric measurements (weight and height) were carried out to calculate the Body Mass Index (BMI) of each respondent.
- f. Blood Glucose Current (GDS) levels are measured using a digital glucometer to assess the risk status of hyperglycemia.
- g. Respondents were asked to fill out a *modified Beverage Intake Questionnaire* (BEVQ) with the assistance of researchers to ensure the accuracy of filling the frequency of beverage consumption. This questionnaire was used to assess the consumption habits of sweetened drinks in the past month, including several types of drinks such as sweet or fruit-flavored juices, soft drinks, sports drinks, tea, coffee, and sweetened milk. The data obtained was then calculated based on the frequency of consumption of sweetened beverages per month and then categorized based on the median value of consumption, which was ≥ 20 times per month and < 20 times per month.
- h. Respondents were asked to fill out the *Food Frequency Questionnaire* (FFQ) questionnaire with the assistance of researchers to ensure the accuracy

of filling in the frequency and type of junk food consumption over the past month. The results of filling out the FFQ were then assessed based on the total score, where the median $>$ score (median $>$ score) was categorized as Frequent consumption, and the median $\leq$ score (median $\leq$ score) was categorized as Frequent consumption.

- i. After all instruments are completed, the researcher conducts a data completeness check (*editing*) to ensure that there are no blank, inappropriate, or illogical parts before the data enters the processing and analysis stage using SPSS.

4. Test Data Collection Tools

a. Questionnaire for Artificially Sweetened Beverages (BEVQ)

The *Beverage Intake Questionnaire* (BEVQ) instrument was used to assess the consumption habits of sweetened beverages in respondents.

This questionnaire measures the frequency and amount of consumption of various types of sweetened beverages in the past month, such as sweet or fruit-flavored juices, soft drinks, sports drinks, tea, coffee, and sweetened milk. Respondents were asked to fill in the frequency of consumption (per day, per week, or per month), the amount of consumption per drink (ml), and the estimated sugar content consumed.

- 1) The validity test of the questionnaire was carried out on 30 respondents using the Pearson correlation test with a table r-value of 0.361 at a significance level of 5%. The results of the validity test show that most of

the question items have a calculated r value $> r$ table so that it is declared valid.

- 2) The reliability test of the instrument was carried out using Cronbach's Alpha, with a value of 0.694, which indicates that the questionnaire has a good level of reliability and can be used as a measuring tool in the study.
- b. Questionnaire for *Junk Food* Consumption Habits (FFQ)

The *Food Frequency Questionnaire* (FFQ) instrument was used to assess junk food consumption habits. Angeline & Wartiningsih Journal, (2023) using an FFQ questionnaire developed to measure the level of *junk food consumption* among college students.

- 1) Interpretation of Results: This questionnaire is assessed based on the total consumption score which is then compared to the median value. Respondents were categorized as "Frequent" consumption if their total score exceeded the median ($\text{median} > \text{score}$) and "Rare" if their score was less than or equal to the median ($\text{median} \leq \text{score}$). Although this journal does not report the primary validity and reliability tests of FFQ, the median score interpretation method used indicates that the instrument serves to segment consumption patterns based on habitual frequency.

F. Data Processing

According to Hardani et al., (2020), data processing is a series of activities to collect and organize data from each research variable so that the data is in a form that is ready to be analyzed and evaluated. The following are the stages of data processed in this study:

1. *Editing*

At this stage, the researchers re-examined all the data that had been collected, including the BEVQ questionnaire, the FFQ *Junk Food questionnaire*, and the blood glucose level observation sheet. The check is carried out to ensure that

each question item has been filled in completely, the data is unambiguous, and the respondent's identity code is written correctly.

2. Coding

The edited data is then coded so that it can be entered into the statistics program.

The coding is done as follows:

a. Sweetened Beverage Consumption Habits (BEVQ)

The coding was done based on the estimated sugar intake calculated from the BEVQ questionnaire (Total SSB in x/month):

- 1) 0 = High (For example, $>20x/\text{month}$)
- 2) 1 = Low (For example, $\leq 20x/\text{month}$)

b. Junk Food Consumption Habits (FFQ)

Coding is done based on the total FFQ consumption score compared to the median:

- 1) 0 = Frequent / Risky (median $>$ score)
- 2) 1 = Rare/Not At Risk (median $\leq$ score)

c. Risk of hyperglycemia (GDS)

- 1) 0 = Hyperglycemia (≥ 140 mg/dL)
- 2) 1 = Normal (< 140 mg/dL)

d. Gender

- 1) 0 = Female
- 2) 1 = Male

e. Other variables such as age, BMI, and smoking habits are also coded according to operational definitions.

3. Sorting (Tabulasi Data)

After coding, the data is organized and grouped based on independent and dependent variables. This process is carried out to facilitate classification, category checking, and preparing data for univariate and bivariate analysis.

4. *Entry and Processing*

The encoded data is entered into the SPSS statistical program, then converted into numerical form for analysis. This process includes input of BEVQ scores, FFQ *Junk Food* scores, and blood sugar test results, so that all data can be processed systematically.

5. *Cleaning*

The data cleanup stage is carried out by re-checking the data that has been entered to ensure that there are no typos, data duplication, code inconsistencies, or missing *data*. If an error is found, the researcher makes corrections before entering the analysis stage.

G. Data Analysis

1. Univariate Analysis

Univariate analysis is used to describe the characteristics of each variable studied. This analysis provides an overview of frequency and percentage distributions for categorical variables, such as sweetened beverage consumption habits, *junk food consumption*, hyperglycemia risk, gender, and BMI status. For numerical variables such as age (if not categorized), the results of the analysis are presented in the form of mean, median, standard deviation, and minimum and maximum values. The goal is to provide a general description of the characteristics of the respondents before the bivariate analysis is carried out. Then determine the categories according to the interpretation guidelines as follows: 0% = None of the respondents 1% - 25% = Very few of the respondents 26% - 49% = A small part / almost half of the respondents 50% = Half of the respondents 51% - 75% = Most of the respondents 76% - 99% = Almost all of the respondents 100% = All respondents (Arikunto, 2017).

2. Bivariate Analysis

Bivariate analysis is used to determine the relationship between independent variables and dependent variables. In this study, the analysis was carried out to test two main hypotheses:

- a. The relationship between the consumption of sweetened beverages (based on *the Beverage Intake Questionnaire* (BEVQ) questionnaire and the risk of hyperglycemia.
- b. The relationship between *junk food* consumption (based on *the Food Frequency Questionnaire* (FFQ) questionnaire and the risk of hyperglycemia.

Because all variables are categorical-scale (dicolon/ordinal), the statistical test used is the *Chi-Square Test* at a confidence level of 95% ($\alpha = 0.05$).

Interpretation of test results:

- 1) $p \leq 0.05 \rightarrow$ there was a significant relationship between independent variables and the risk of hyperglycemia.
- 2) $p > 0.05 \rightarrow$ there was no significant relationship.

In addition to the p-value, this study also uses *Odds Ratio* (OR) to determine the risk of consumption of sugary drinks/*junk food* to the incidence of hyperglycemia, in accordance with the *characteristics of the cross-sectional* design.

- 1) $OR > 1$: variables are risk factors.
- 2) $OR = 1$: there is no association.
- 3) $OR < 1$: protective factors.

H. Research Flow

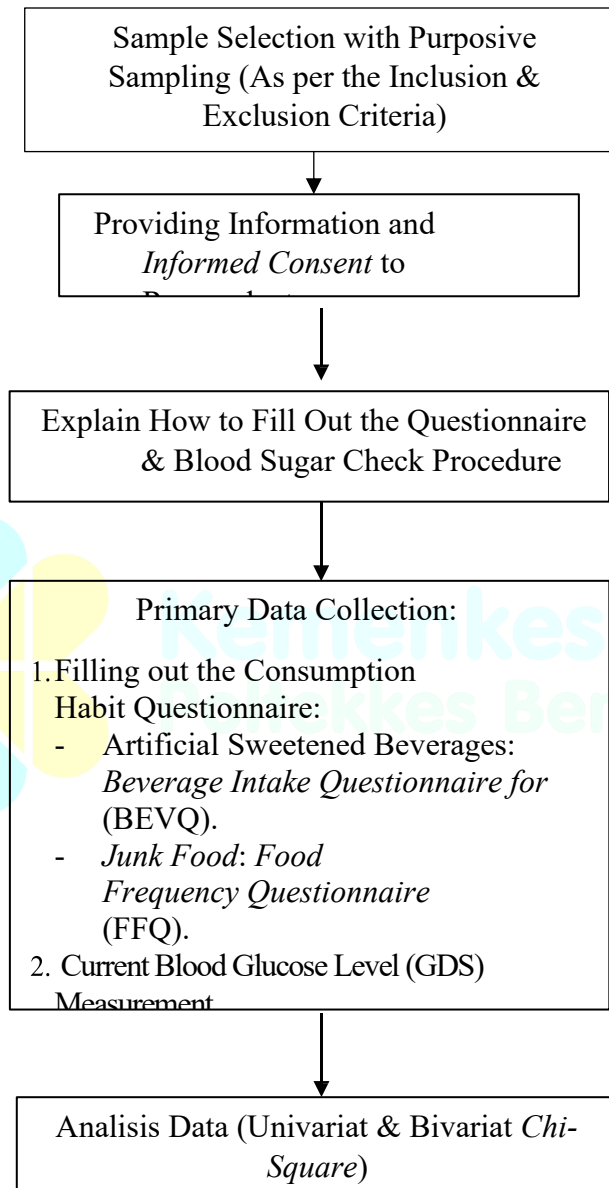


Chart 4. 2 Research Flow

I. Research Ethics

The researcher considers the ethics and legality of the research to protect respondents to avoid all physical and psychological dangers and inconveniences. By paying attention to the following ethical principles (Kadang et al., 2025):

1. *Self Determinant*

In this study, respondents were given freedom when choosing and deciding whether or not to participate without coercion. The researcher respected the decision of the adolescent who refused to have a blood sugar test.

2. *Anonymity*

The respondents' names were not included in full on the results of the research and questionnaire. The researcher only used numerical codes (e.g.: R1, R2) to maintain the privacy of the respondents' identities.

3. *Kerahasiaan (Confidentiality)*

All information obtained from respondents (diet data and blood sugar test results) is guaranteed to be confidential and not disseminated to others. The researcher stores the data in the form of a *soft file* with a password on the researcher's laptop and is only used for the purpose of thesis.

4. *Keadilan (Justice)*

The researcher treats respondents fairly, without partiality or giving special treatment to certain respondents. All respondents received the same standard examination procedure (using new sterile needles and the same tools).

5. *The Principle of Beneficence*

Respondents who participated in this study benefited from knowledge about their blood sugar level status (early detection) and brief education about the dangers of sweetened drinks and *junk food* for adolescents' health

6. *Non-Maleficence*

This research ensures that it does not harm respondents. The capillary blood collection procedure (fingertips) is carried out with the principle of sterility (*safety*) to prevent infection and excessive pain, solely for the safety of the respondents.



CHAPTER V RESEARCH RESULTS

A. The Course of Research

This research was carried out at SMA Negeri 1 Bengkulu City. Data collection will be carried out in May 2026 using a *cross sectional research design*, namely the measurement of independent variables and dependent variables is carried out at the same time, this researcher has already taken care of a research cover letter from an educational institution. Furthermore, the researcher submitted an application for a research permit to the Bengkulu City Investment and One-Stop Integrated Services Office (DPMPTSP). Furthermore, the licensing process is to the Bengkulu Provincial Education Office Branch as the agency in charge of SMA Negeri 1 Bengkulu City. The researcher then submitted a permit to carry out the research to the Principal of SMA Negeri 1 Bengkulu City as the location of the research, This research has obtained ethical approval from the Health Research Ethics Commission (KEPK) with Number: KEPK. BKL/396/05/20.

In its implementation, the researcher was assisted by four research assistants to support the smooth collection of data. Before the research activity was carried out, the researcher gave a *briefing* to all assistants regarding the research objectives, implementation flow, techniques for delivering information to respondents, procedures for filling out questionnaires, blood sugar check procedures during and the division of their respective tasks. *This briefing* aims to equalize perceptions so that the entire data collection process is carried out in a standardized, consistent, and in accordance with the established research procedures.

The data collection process begins with the identification of prospective respondents who meet the research inclusion criteria. Respondents who met the criteria were given an explanation of the research objectives, research benefits, research procedures, potential risks and benefits of research, and respondents' rights during the study. The researcher also explained that all data obtained will be kept confidential and only used for research purposes. After receiving this explanation, respondents who were willing to take part in the study were asked to sign an *informed consent* sheet as proof of their willingness to participate voluntarily without any coercion from any party.

During the data collection process, the researcher obtained about 50 respondents daily who met the research criteria and were willing to become respondents. This number is adjusted to the availability of students who are present at the school at the time of the research and the schedule that has been set by the school.

After the respondents agreed to participate in the study and signed an *informed consent* sheet, the researcher measured their weight and height using a calibrated measuring device to obtain a Body Mass Index (BMI) value. Furthermore, respondents were asked to fill out a questionnaire that included demographic data, diet, and smoking habits according to the conditions experienced.

After the respondents agreed to participate in the study, the respondents were asked to fill out a *modified Beverage Intake Questionnaire* (BEVQ) to assess the consumption habits of artificially sweetened beverages. This questionnaire was used to measure the frequency of consumption of various types of sweetened drinks in the past month, including sweetened juices or fruit-flavored drinks, soft drinks, sports drinks, sweetened tea, sweetened coffee, and sweetened milk. The researcher accompanies the respondents during the filling out of the questionnaire to ensure that all questions are well understood and answered

according to the actual conditions. The results of filling are then calculated based on the frequency of consumption of sweetened drinks in the past month and are categorized into high consumption and low consumption based on the value that has been set.

After filling out the BEVQ questionnaire, respondents were asked to fill out the *Food Frequency Questionnaire* (FFQ) to assess *junk food consumption habits*. This questionnaire contains a list of different types of fast food and processed foods that are often consumed by teenagers. Respondents were asked to answer the frequency of consumption of each type of food in the past month. The results of filling out the FFQ are then calculated and categorized based on the median value of the consumption score. Respondents with scores above the median were categorized as having *frequent junk food consumption habits*, while respondents with scores equal to or below the median were categorized as having *infrequent junk food consumption habits*.

The next stage is to check Blood Glucose Current (GDS) levels using a digital glucometer. Before the examination was carried out, the researcher explained the examination procedure to the respondents. Blood sampling is carried out on the fingertips using a disposable sterile lancet while still paying attention to the principles of safety and infection prevention. The results of the examination are recorded on the observation sheet and used to determine the risk status of hyperglycemia. Respondents with blood glucose levels at ≥ 140 mg/dL were categorized as at risk of hyperglycemia, while respondents with blood glucose levels at < 140 mg/dL were categorized as not at risk of hyperglycemia.

During the data collection process, the researcher accompanied the respondents to ensure that there were no errors in filling out the questionnaire. Obstacles faced during the study included the limited time of the respondents due to teaching and learning activities, the possibility of incompleteness in filling out the questionnaire, and differences in the respondents' understanding of the questions given. To overcome these obstacles, the researcher provided a clear

explanation of the procedure for filling out the instrument, gave respondents the opportunity to ask questions if there were questions that were not understood, and edited all questionnaire sheets that had been filled.

After all the data is collected, the researcher processes the data through several stages, namely *editing*, *coding*, *sorting*, *data entry*, and *cleaning*. The *editing stage* is carried out to check the completeness and consistency of the data obtained. The *coding stage* is carried out by providing code for each research variable according to the predetermined category. Furthermore, the data is tabulated and entered into the IBM SPSS Statistics version 27 program to be re-checked for possible input errors, duplicate data, or missing data.

The data that has been declared complete and clean is then analyzed using the IBM SPSS Statistics program. Univariate analysis was carried out to describe the frequency and percentage distribution of each research variable. Furthermore, a bivariate analysis was carried out using *the Chi-Square test* with a confidence level of 95% ($\alpha = 0.05$) to determine the relationship between the consumption habits of artificially sweetened drinks and the risk of hyperglycemia as well as the relationship between *junk food consumption habits* and the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City. In addition, the *Odds Ratio* (OR) value is calculated to determine the amount of risk of consumption of artificially sweetened beverages and *junk food* to the occurrence of hyperglycemia.

B. Univariate Analysis

Univariate analysis was carried out to describe the frequency distribution of each research variable. This analysis aims to provide an overview of the condition of the respondents as well as the distribution of the data obtained as a basis for further analysis.

1. Overview of Frequency Distribution of Characteristics of Age, Gender, BMI, Smoking History and DM History of Respondents at SMA Negeri 1 Bengkulu

Table 5. 1 Characteristics of Respondents in High School

Yes	Variabel	Frequency (n)	Percentage (%)
1	Age		
	17 – 25 Years	78	40,2
	12 – 16 Years	116	59,8
2	Gender		
	Male	76	39,2
	Women	118	60,8
3	IMT		
	Normal	153	78,9
	Obesity	41	21,1
4	Smoking		
	Smokers	17	8,8
	Non-Smokers	177	91,2

Number of respondents = 194

Based on Table 5.1, In age characteristics, most of the respondents were in the age group of 12–16 years, while almost half of the respondents were 17–25 years old.

In terms of gender characteristics, most of the respondents were female, while almost half of the respondents were male.

Based on body mass index (BMI), a small percentage of respondents are obese. On the habit of smoking, a small percentage of respondents smoked.

2. Overview of the Distribution of Frequency of Consumption Habits of Artificially Sweetened Beverages and *Junk Food* Consumption Habits of Respondents at SMA Negeri 1 Bengkulu

An overview of the consumption habits of artificially sweetened beverages and *junk food consumption* habits in the respondents was obtained through filling out the *Beverage Intake Questionnaire* (BEVQ) and *Food Frequency Questionnaire* (FFQ). This data was used to determine the level of consumption of artificially sweetened beverages and the frequency of *junk food* consumption in respondents who were the research sample

Table 5. 2
Distribution of Frequency of Consumption Habits of Artificially Sweetened Beverages and *Junkfood* Consumption Habits of Respondents at SMA Negeri 1 Bengkulu City

Variabel	Frequency (N)	Percentage (%)
Artificial sweetened drinks		
Height	179	92,3
Low	15	7,7
<i>Junk food</i>		
Frequent	43	22,2
Rare	151	77,8
Number of respondents = 194		

Based on Table 5.2, almost all respondents have a habit of consuming high-category artificially sweetened beverages, while a small percentage of respondents have a habit of consuming low-category artificially sweetened beverages.

In addition, almost all respondents had a habit of consuming *junk food* in the non-risky category, while a small percentage of respondents had a habit of consuming *junk food* in the risky category.

C. Bivariate Analysis

Bivariate analysis was performed to determine the relationship between independent variables and the incidence of Type 2 DM. The statistical test used in this study is *the Chi-Square test*, with a significance level (α) of 0.05. If the value of p is <0.05 , then it can be concluded that there is a significant relationship between the independent variable and the dependent variable.

1. Analysis of the Relationship between Artificial Sweetened Beverage Consumption Habits and the Risk of Hyperglycemia at SMA Negeri 1 Bengkulu

Analysis of the relationship between the consumption habits of artificially sweetened beverages and the risk of hyperglycemia was carried out using *the Chi-Square test* to determine whether or not there is a significant relationship

between the consumption of artificially sweetened beverages (BEVQ) and the risk of hyperglycemia in respondents at SMA Negeri 1 Bengkulu.

Table 5.3
Analysis of the Relationship between Artificial Sweetened Beverage Consumption Habits and the Risk of Hyperglycemia at SMA Negeri 1 Bengkulu

Variabel	Risky		No Risk		Total	<i>p-value</i>
	(n)	(%)	(n)	(%)		
Artificial sweetened drinks						
Height	105	58,7	74	41,3	179	*0,688
Low	8	53,3	7	46,7	15	
Number of respondents = 194						

**Chi-Square test*

Based on Table 5.3, most of the respondents with the habit of consuming high-category artificially sweetened beverages were included in the group at risk of hyperglycemia, while almost half were not at risk. In the category of low consumption of artificially sweetened beverages, most of the respondents were at risk of hyperglycemia, while almost half were not at risk.

The results of the *Chi-Square* test showed a *p-value* of 0.688 ($p > 0.05$), so it can be concluded that there is no significant relationship between the consumption of artificially sweetened beverages (*BEVQ*) and the risk of hyperglycemia in SMA Negeri 1 Bengkulu students.

Thus, the consumption habit of artificially sweetened beverages based on the results of this study was not proven to be significantly related to the risk of hyperglycemia in respondents at SMA Negeri 1 Bengkulu.

2. Analysis of the Relationship between *Junk Food Consumption* and the Risk of Hyperglycemia at SMA Negeri 1 Bengkulu

Analysis of the relationship between the consumption habits of artificially sweetened beverages and the risk of hyperglycemia was carried out using the *Chi-Square* test to determine whether or not there is a significant relationship

between *junk food* consumption (FFQ) and the risk of hyperglycemia in respondents at SMA Negeri 1 Bengkulu.

Table 5. 4
Analysis of the Relationship between *Junkfood Consumption* and the Risk of Hyperglycemia at SMA Negeri 1 Bengkulu

Variabel	Risky		No Risk		Total	OR	<i>p-value</i>
	(n)	(%)	(n)	(%)			
<i>Junk food</i>							
Frequent	36	83,7	7	16,3	43	4,942	*0,000
Rare	77	51,0	74	49,0	151		
Number of respondents = 194							

**Chi-Square test*

Based on Table 5.4, almost all respondents with *junk food* consumption habits are often included in the group at risk of hyperglycemia, while a small percentage are not at risk. In the category of infrequent *junk food* consumption, most respondents were at risk of hyperglycemia, while almost half were not at risk.

The results of the *Chi-Square* test showed a *p-value* of 0.000 ($p < 0.05$), so it can be concluded that there is a significant relationship between *junk food consumption* habits (FFQ) and the risk of hyperglycemia in SMA Negeri 1 Bengkulu students. An Odds Ratio (OR) value of 4.942 showed that respondents with frequent *junk food* consumption habits had a 4.942 times greater risk of hyperglycemia than respondents with infrequent *junk food* consumption habits. Thus, the more often respondents consume *junk food*, the greater the risk of hyperglycemia.

CHAPTER VI DISCUSSION

A. Interpretation and Discussion of Results

1. Overview of Frequency Distribution of Respondent Characteristics

a. Overview of Age Frequency Distribution

The results showed that most of the respondents were in the age group of 12–16 years, a small percentage of respondents were 17–25 years old. Adolescence is a period of growth and development characterized by biological, psychological, and social changes that affect health behaviors including food and beverage consumption patterns. In adolescence, individuals tend to consume foods high in sugar, fat, and salt more often due to the influence of peers, the school environment, and social media exposure (WHO, 2024)

Research by Marino et al. (2024) shows that adolescents have a high tendency to consume ultra-processed foods and sweetened beverages that contribute to an increased risk of metabolic disorders. Therefore, adolescence is a group that is vulnerable to the formation of eating habits that can affect health in adulthood.

b. Overview of Gender Frequency Distribution

The results showed that most of the respondents were female, almost half of whom were male.

Gender differences can affect food consumption patterns and health behaviors. Adolescent girls are generally more concerned about their health and diet than boys. However, both men and women are still at risk of experiencing metabolic disorders if they have an unhealthy diet and lack of physical activity (CDC, 2024).

c. Overview of BMI Frequency Distribution

The results showed that almost all respondents had a BMI norm, a small

percentage of respondents were obese.

BMI is an indicator used to assess a person's nutritional status. Obesity is known to be closely related to increased insulin resistance due to the buildup of adipose tissue that produces various inflammatory mediators such as TNF- α and IL-6. This condition causes insulin sensitivity to decrease so that blood glucose levels increase (Moyce Gruber & Dolinsky, 2023).

Research by Zhang et al. (2022) also found that increased BMI was significantly associated with an increased risk of impaired glucose metabolism and type 2 DM in young age groups.

d. Overview of Smoking Distribution

The results showed that most of the respondents did not have a smoking habit, while a small percentage of others had a smoking habit. These results show that the majority of adolescents at SMA Negeri 1 Bengkulu City have not been actively exposed to the habit of smoking. These conditions can be influenced by various factors, such as parental supervision, school policies that prohibit smoking, knowledge about the dangers of smoking, and adolescents' awareness of the negative effects of smoking on health.

However, there are still some respondents who have a smoking habit. This habit needs to be considered because smoking is one of the risk factors that can increase the occurrence of metabolic disorders, including insulin resistance and increased blood glucose levels if accompanied by an unhealthy lifestyle, such as excessive consumption of artificially sweetened drinks and *junk food*.

2. Overview of the Frequency Distribution of Artificially Sweetened Beverage Consumption Habits (BEVQ)

The results showed that almost all respondents had a habit of consuming artificial sweetened drinks in the high category as many as 179 respondents (92.3%), while the low category was only 15 respondents (7.7%).

The high consumption of sweetened beverages in adolescents can be caused by ease of access, relatively affordable prices, peer influence, and wider exposure to advertisements through social media. Teenagers tend to choose drinks with a sweet taste because they are considered more attractive and in accordance with their preferences. This condition causes sweetened drinks to become one of the most commonly consumed types of drinks by the adolescent age group.

Sweetened drinks contain simple sugars that can be absorbed quickly by the body, potentially increasing blood glucose levels. Excessive and long-term consumption is known to be associated with weight gain, insulin resistance, and the risk of type 2 diabetes mellitus. The results of a systematic review conducted by Giovannucci et al. (2024) show that excessive consumption of sugar-sweetened beverages is associated with an increased risk of type 2 diabetes and metabolic disorders. In addition, Ambrosini et al. found that consumption of sweetened beverages in adolescents is associated with an increase in cardiometabolic risk factors that can affect blood glucose regulation.

3. Overview of Frequency Distribution of *Junk Food* Consumption Habits (FFQ)

The results showed that almost all respondents had a habit of consuming *junk food* in the rare category as many as 151 respondents (77.8%), while the frequent category was 43 respondents (22.2%).

Junk food is a food that generally contains high amounts of calories, sugar, saturated fat, and sodium, but is low in fiber and essential nutrients. Although most of the respondents were in the rare category, the existence of respondents who still often consumed *junk food* needs to be a concern because these diets can have an impact on adolescent metabolic health.

According to Monteiro et al. (2024), excessive consumption of ultra-processed *foods* is associated with an increased risk of obesity, type 2

diabetes, and various other metabolic disorders. Studies in adolescents have also shown that ultra-processed foods account for a large proportion of daily energy intake and may increase exposure to added sugars, saturated fats, and sodium. This condition can affect glucose metabolism and increase the risk of insulin resistance if it lasts for a long time.

4. The Relationship between Artificial Sweetened Beverage (BEVQ) Consumption Habits and the Risk of Hyperglycemia

The results showed that respondents with the consumption of artificially sweetened beverages in the high category were at risk of hyperglycemia as many as 105 respondents (58.7%), while in the low category as many as 8 respondents (53.3%). The results of the *Chi-Square* test showed a *p*-value of 0.688 ($p > 0.05$).

These results show that there is no significant relationship between the consumption of artificially sweetened beverages and the risk of hyperglycemia in SMA Negeri 1 Bengkulu students. Theoretically, sweetened drinks can increase blood glucose levels because they contain simple sugars that are easily absorbed by the body. However, blood glucose levels are not only influenced by the consumption of sweetened beverages, but also by physical activity, nutritional status, overall diet, genetic factors, and the body's ability to maintain a balance of glucose metabolism.

The OR value of 1.242 shows that respondents with the consumption of artificial sweetened drinks in the high category have a 1.242 times greater chance of developing hyperglycemia than the low category. However, because the *p-value* is greater than 0.05, the relationship is not statistically significant. The results of this study show that although there is a tendency to increase the risk of hyperglycemia in the high-consumption group, the effect is not strong enough to show a significant relationship.

These findings are in line with several studies that state that the relationship between the consumption of sweetened beverages and blood

glucose levels can be influenced by various confounding factors such as physical activity, body mass index, and other food consumption patterns. Therefore, consumption of sweetened beverages does not necessarily show a direct relationship with increased blood glucose in adolescents.

5. The Relationship between *Junk Food Consumption Habits (FFQ)* and the Risk of Hyperglycemia

The results showed that respondents with *junk food consumption habits* were often at risk of hyperglycemia as many as 36 respondents (83.7%), while the infrequent category was 77 respondents (51.0%). The results of the *Chi-Square* test showed a *p-value* of 0.000 ($p < 0.05$) with an OR value of 4.942.

These results show that there is a significant relationship between *junk food consumption habits* and the risk of hyperglycemia in SMA Negeri 1 Bengkulu students. *Junk food* generally contains sugar, saturated fat, and high energy so that if consumed in excess it can cause weight gain and insulin resistance. Insulin resistance causes glucose to not be used optimally by body cells so that blood glucose levels increase.

According to Monteiro et al. (2024), high consumption of ultra-processed foods is associated with an increased risk of metabolic diseases including type 2 DM. Various studies show that ultra-processed foods contain added sugars, saturated fats, and additives that can affect the regulation of glucose metabolism. In addition, an increased proportion of ultra-processed food consumption is also associated with an increased risk of type 2 diabetes in the general population.

The OR value of 4.942 shows that respondents who often consume junk food have a risk of hyperglycemia about five times greater than respondents who rarely consume *junk food*. These findings show that junk food consumption habits are one of the factors that play a role in increasing the risk of hyperglycemia in adolescents. Therefore, nutrition education and healthy eating from school age need to be implemented to prevent future

disruption of glucose metabolism.

B. Research Limitations

This research has been carried out in accordance with the established procedures, but it still has several limitations that need to be considered in interpreting the research results, including:

1. The collection of data on the consumption habits of artificially sweetened beverages and *junk food* using the *Beverage Intake Questionnaire* (BEVQ) and *Food Frequency Questionnaire* (FFQ) questionnaires depends on the respondents' ability to remember the frequency of consumption of food and beverages that have been consumed, thus allowing for recall *bias*.
2. Data on the consumption of artificially sweetened beverages and *junk food* was obtained based on the respondents' *self-reports*, so there is a possibility that respondents give answers that are not in accordance with the actual conditions due to misperceptions or the desire to give answers that are considered good (*social desirability bias*).

CHAPTER VII CONCLUSION

A. Conclusion

Based on the results of research and data analysis regarding the relationship between the consumption habits of artificially sweetened drinks and junk food to the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City, it can be concluded as follows:

1. The characteristics of the respondents showed that most of the respondents were in the age group of 12–16 years (59.8%), female (60.8%), and almost all respondents had normal nutritional status (BMI) as much as (78.9%), while did not have a smoking habit (91.2%).
2. Most of the respondents have a habit of consuming artificially sweetened beverages in the high category based on the results of measurements using *the Beverage Intake Questionnaire* (BEVQ), which is as many as 105 respondents (58.7%).
3. Almost all respondents had a habit of consuming junk food in the rare category based on the results of measurements using *the Food Frequency Questionnaire* (FFQ), which was as many as 77 respondents (83.7%).
4. There was no significant relationship between the consumption of artificially sweetened beverages (BEVQ) and the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City ($p\text{-value} = 0.688$).
5. There was a significant relationship between *junk food* consumption (FFQ) habits and the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City ($p\text{-value} = 0.000$). Adolescents who have a habit of consuming junk food categories often have a risk of hyperglycemia of 4.942 times greater than adolescents who have a habit of consuming *junk food* in the infrequent category.

B. Suggestions

1. For Educational Institutions

The school is expected to improve health education programs, especially regarding healthy diets, the dangers of *excessive junk food* consumption , and the importance of choosing balanced nutritious foods and drinks. Education can be carried out through UKS activities, health counseling, and health promotion programs in the school environment.

2. For Health Workers

Health workers, especially nurses and health promotion workers, are advised to increase educational activities for adolescents about the importance of maintaining a healthy diet, limiting *junk food* consumption, and conducting regular health monitoring as an effort to prevent hyperglycemia and other metabolic diseases from adolescence.

3. For Parents

Parents are expected to play an active role in supervising children's food consumption patterns, especially in limiting *junk food consumption* and encouraging the implementation of a healthy diet at home. Family support is very important in forming healthy living habits in adolescents.

4. For the Next Researcher

Researchers are further advised to develop this study using a more robust research design, such as cohort or longitudinal, as well as adding other variables that have the potential to affect the risk of hyperglycemia, such as physical activity, sleep patterns, family history of diabetes, stress levels, and daily energy intake so as to obtain a more comprehensive picture of the factors that influence the incidence of hyperglycemia in adolescents.

BIBLIOGRAPHY

- Angeline, P., & Wartiningsih, M. (2023). *The Relationship between Junk Food Consumption and the Incidence of Depression in Students, Faculty of Medicine, Ciputra University Surabaya. 1*, 318–323.
- Care, D., & Suppl, S. S. (2025). 2. Diagnosis And Classification Of Diabetes: Standards Of Care In Diabetes—2025. *Diabetes Care*, 48(January), S27–S49. <https://doi.org/10.2337/Dc25-S002>
- Ceriello, A., & Colagiuri, S. (2025). Idf Global Clinical Practice Recommendations For Managing Type 2 Diabetes – 2025. In *Diabetes Research And Clinical Practice* (Vol. 222). <https://doi.org/10.1016/J.Diabres.2025.112152>
- Chen, Z., Wei, C., Lamballais, S., Wang, K., Mou, Y., Xiao, Y., Luo, F., Bramer, W. M., Voortman, T., & Zhou, S. (2024). Artificially Sweetened Beverage Consumption And All-Cause And Cause-Specific Mortality: An Updated Systematic Review And Dose-Response Meta-Analysis Of Prospective Cohort Studies. *Nutrition Journal*, 23(1), 1–13. <https://doi.org/10.1186/S12937-024-00985-7>
- Dini Labelo, N. I., Wahyu, S., Iskandar, D., Wiriansya, E. P., & Arifuddin Karim, A. M. A. (2025). The Relationship of Risk Factors for Junk Food Diet in Patients with Type 2 Diabetes Mellitus at the Pampang Makassar Health Center. *Domain Research: Journal Of Multidisciplinary Research And Development*, 7(4), 2888–2897. <https://doi.org/10.38035/Rj.V7i4.1573>
- Dwi Yuliana Silvia, A. F. (2024). *The relationship between sugar-sweetened beverage consumption and physical activity and blood sugar levels in high school students. 3*(3), 60–66.
- Edward, G., Chris A, T., Andrea L, D., Ha, R., Dm, H., Cam, A., Sl, B., Tt, F., Cd, G., Fc, S., Sa, T., Dk, T., Nc, C., Bj, K., A, W., M, H., G, B., N, T., & J, O. (2024). Sugar-Sweetened Beverages And Risk Of Type 2 Diabetes: A Systematic Review . *Allexandria (Va): Usda Nutrition Evidence Systematic Review*.
- Elsayed, N. A., Aleppo, G., Aroda, V. R., Bannuru, R. R., Brown, F. M., Bruemmer, D., Collins, B. S., Hilliard, M. E., Isaacs, D., Johnson, E. L., Kahan, S., Khunti, K., Kosiborod, M., Leon, J., Lyons, S. K., Murdock, L., Perry, M. Lou, Prahalad, P., Pratley, R. E., ... Gabbay, R.A.(2023).2. Classificationan diagnosis of

- diabetes: Standards Of Care In Diabetes—2023. *Diabetes Care*, 46(January), S19–S40. <https://doi.org/10.2337/Dc23-S002>
- Han, Y. (2023). Analysis Of The Effects Of Artificial Sweeteners On Diabetes And Obesity. *Theoretical And Natural Science*, 4(1), 32–38. <https://doi.org/10.54254/2753-8818/4/20220508>
- Hardani, Andriani, H., Ustiawaty, J., Utami, E. F., Istiqomah, R. R., Fardani, R. A., Sukmana, D. J., & Auliya, N. H. (2020). *Qualitative & Quantitative Research Methods*. Cv. Science Library.
- Hu, F. B. (2011). Globalization Of Diabetes: The Role Of Diet, Lifestyle, And Genes. *Diabetes Care*, 34(6), 1249–1257. <https://doi.org/10.2337/Dc11-0442>
- Junkfood. (2022). *Junkfood*. 2022.
- Sometimes, Y., Sucipto, A., Hermanto, Dr. Fika Tri Anggraini, M.Sc, P. ., Decy Erni Nasution, M. K., Ns. Fajar Susanti, M.Kep., S. K. K., Hamdani, Skm, M. K., Ns. Sri Marnianti Irnawan, S.Kep, M. K., Yuyun Tafwidhah, Skm, M. K., Deden Iwan Setiawan, S. Kep., Ns., M. K., Ns. Afni Yan Syah, S.Kep., M. K., Ns. Elin Hidayat, S.Kep., M. K., Dr. Fika Tri Anggraini, M.Sc, P. ., & Ns. Fauzi Ashra, M.Kep., P. . (2025). Research Methodology. In *Cv.Eureka Media Aksara*.
- Klaas, R., Di, I. P. A., & Year, K. A. B. T. (2025). *The relationship between the level of knowledge of diabetes mellitus prevention on*. 14(2), 240–252. <https://doi.org/10.37048/Kesehatan.V14i2.656>
- Lestari, Zulkarnain, Sijid, & Aisyah, S. (2021). Diabetes Mellitus: Review of Etiology, Pathophysiology, Symptoms, Causes, Methods of Examination, Treatment and Prevention. *Uin Alauddin Makassar*, 1(2), 237–241. <http://journal.uin-alauddin.ac.id/index.php/psb>
- Naing, L., Nordin, R. Bin, Rahman, H. A., & Naing, Y. T. (2022). Sample Size Calculation For Prevalence Studies Using Scalex And Scalar Calculators. *Bmc Medical Research Methodology*, 1–8. <https://doi.org/10.1186/S12874-022-01694-7>
- Nuzula, F., Oktaviana, M. N., & Abbas, H. H. (2025). *Prevalence Of Prediabetes In Adolescents*. 8(4), 391–401.
- Pitoy, F. F., Mandias, R. J., Firma, A., Senduk, S., & Research, B. (N.D.). *Smoking behavior and blood sugar levels of people with diabetes mellitus*. pp. 171–178.
- Prasetyo, B. (N.D.). *Type 2 Diabetes Mellitus: A Review Of Determinants, Pathophysiology, Diagnostics, Management, And Complications*. 4(3), 1347–1354.
- Rahayu, V., Putri, S. A., Amir, Y., Tampubolon, N. R., Nursing, P. S., Nursing, F., Riau, U., Health, D., & Riau, P. (2024). *Consumption Behaviour Of Sugar-Sweetened Beverages In Nursing Faculty Students , University Of Riau*. 5, 9–17. <https://doi.org/10.36082/Jmswh.V5i1.1704>
- Sugiyono. (2020). *Quantitative Research Methodology*.
- Yameny, A. A. (2025). Diabetes Mellitus: A Comprehensive Review Of Types, Pathophysiology, Complications, And Standards Of Care In Diabetes 2025.

Journal Of Medical And Life Science, 7(1), 134–141.
<https://doi.org/10.21608/jmals.2025.424001>



L

A

M

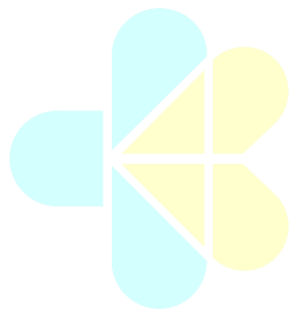
P

I

R

A

N



Kemenkes
Poltekkes Bengkulu

No	BEVQ		FFQ		Up to Hyperglykemia		GDS
	Coding	Measurement results	Coding	Measurement results	Coding	Measurement results	
1	0	Height	1	No risk	0	Hyperglycemia	144
2	0	Height	1	No risk	0	Hyperglycemia	144
3	0	Height	1	No risk	0	Hyperglycemia	141
4	0	Height	1	No risk	1	Normal	118
5	1	Low	1	No risk	0	Hyperglycemia	155
6	0	Height	1	No risk	0	Hyperglycemia	140
7	0	Height	1	No risk	0	Hyperglycemia	143
8	0	Height	1	No risk	0	Hyperglycemia	140
9	0	Height	1	No risk	0	Hyperglycemia	156
10	1	Low	1	No risk	0	Hyperglycemia	162
11	0	Height	1	No risk	0	Hyperglycemia	140
12	0	Height	1	No risk	0	Hyperglycemia	141
13	0	Height	1	No risk	1	Normal	134
14	0	Height	1	No risk	1	Normal	128
15	0	Height	0	Risky	1	Normal	100
16	1	Low	1	No risk	1	Normal	120
17	0	Height	1	No risk	1	Normal	132
18	0	Height	1	No risk	0	Hyperglycemia	149
19	0	Height	1	No risk	1	Normal	110
20	0	Height	1	No risk	0	Hyperglycemia	150
21	0	Height	1	No risk	1	Normal	135
22	0	Height	0	Risky	0	Hyperglycemia	159
23	1	Low	1	No risk	1	Normal	125

24	0	Height	1	No risk	1	Normal	120
25	0	Height	1	No risk	1	Normal	85
26	0	Height	0	Risky	1	Normal	138
27	1	Low	1	No risk	0	Hyperglycemia	143
28	0	Height	1	No risk	1	Normal	108
29	0	Height	1	No risk	0	Hyperglycemia	145
30	0	Height	1	No risk	0	Hyperglycemia	147
31	0	Height	1	No risk	1	Normal	119
32	0	Height	1	No risk	0	Hyperglycemia	158
33	0	Height	1	No risk	1	Normal	118
34	0	Height	1	No risk	0	Hyperglycemia	146
35	0	Height	0	Risky	1	Normal	126
36	0	Height	1	No risk	1	Normal	133
37	0	Height	1	No risk	1	Normal	134
38	0	Height	0	Risky	0	Hyperglycemia	166
39	0	Height	0	Risky	0	Hyperglycemia	141
40	0	Height	1	No risk	1	Normal	119
41	0	Height	0	Risky	1	Normal	102
42	0	Height	0	Risky	0	Hyperglycemia	144
43	0	Height	0	Risky	1	Normal	107
44	0	Height	0	Risky	0	Hyperglycemia	159
45	0	Height	1	No risk	0	Hyperglycemia	144
46	0	Height	1	No risk	0	Hyperglycemia	146
47	0	Height	1	No risk	1	Normal	128
48	0	Height	1	No risk	1	Normal	122
49	1	Low	1	No risk	1	Normal	138
50	0	Height	1	No risk	0	Hyperglycemia	141
51	1	Low	1	No risk	0	Hyperglycemia	143

52	1	Low	1	No risk	1	Normal	120
53	0	Height	1	No risk	0	Hyperglycemia	144
54	0	Height	1	No risk	0	Hyperglycemia	144
55	0	Height	1	No risk	1	Normal	98
56	0	Height	1	No risk	0	Hyperglycemia	146
57	1	Low	1	No risk	0	Hyperglycemia	145
58	1	Low	1	No risk	0	Hyperglycemia	147
59	0	Height	0	Risky	0	Hyperglycemia	166
60	0	Height	0	Risky	0	Hyperglycemia	148
61	0	Height	1	No risk	1	Normal	137
62	0	Height	1	No risk	0	Hyperglycemia	145
63	0	Height	1	No risk	0	Hyperglycemia	182
64	0	Height	1	No risk	0	Hyperglycemia	159
65	1	Low	1	No risk	0	Hyperglycemia	140
66	1	Low	1	No risk	0	Hyperglycemia	98
67	0	Height	1	No risk	1	Normal	133
68	0	Height	1	No risk	1	Normal	128
69	0	Low	0	Risky	1	Normal	138
70	0	Low	1	No risk	0	Hyperglycemia	144
71	1	Low	1	No risk	0	Hyperglycemia	180
72	1	Low	1	No risk	0	Hyperglycemia	162
73	1	Low	1	Risky	0	Hyperglycemia	149
74	0	Height	0	Risky	0	Hyperglycemia	140
75	0	Height	1	No risk	0	Hyperglycemia	140
76	0	Height	1	No risk	1	Normal	139
77	0	Height	1	No risk	0	Hyperglycemia	165
78	0	Height	1	No risk	0	Hyperglycemia	143
79	0	Height	0	Risky	1	Normal	136

80	0	Height	1	No risk	1	Normal	123
81	0	Height	1	No risk	1	Normal	133
82	0	Height	1	No risk	1	Normal	112
83	0	Height	1	No risk	0	Hyperglycemia	143
84	0	Height	1	No risk	1	Normal	110
85	0	Height	0	Risky	0	Hyperglycemia	176
86	0	Height	1	No risk	0	Hyperglycemia	140
87	0	Height	0	Risky	1	Normal	112
88	0	Height	1	No risk	0	Hyperglycemia	151
89	0	Height	0	Risky	1	Normal	95
90	0	Height	0	Risky	1	Normal	123
91	0	Height	1	Risky	0	Hyperglycemia	141
92	0	Height	1	No risk	1	Normal	119
93	0	Height	1	No Risk	0	Hyperglycemia	164
94	0	Height	0	Risky	1	Normal	122
95	0	Height	1	No Risk	0	Hyperglycemia	160
96	0	Height	0	Risky	0	Hyperglycemia	155
97	0	Height	1	No risk	1	Normal	114
98	0	Height	1	No risk	0	Hyperglycemia	150
99	0	Height	0	Risky	0	Hyperglycemia	141
100	0	Height	1	No Risk	0	Hyperglycemia	151
101	0	Height	0	Risky	1	Normal	110
102	0	Height	0	Risky	0	Hyperglycemia	140
103	0	Height	1	No risk	1	Normal	122
104	0	Height	0	Risky	0	Hyperglycemia	143
105	0	Height	1	No risk	1	Normal	129
106	0	Height	0	Risky	0	Hyperglycemia	142
107	0	Height	0	Risky	0	Hyperglycemia	140

108	0	Height	1	No risk	0	Hyperglycemia	154
109	0	Height	0	Risky	1	Normal	132
110	0	Height	1	No risk	0	Hyperglycemia	155
111	0	Height	1	No risk	0	Hyperglycemia	141
112	0	Height	1	No risk	0	Hyperglycemia	148
113	0	Height	1	No risk	1	Normal	121
114	0	Height	1	No risk	0	Hyperglycemia	141
115	0	Height	1	No risk	0	Hyperglycemia	142
116	0	Height	1	No risk	0	Hyperglycemia	145
117	0	Height	1	No risk	1	Normal	121
118	0	Height	0	Risky	0	Hyperglycemia	140
119	0	Height	1	No risk	1	Normal	112
120	0	Height	1	No risk	0	Hyperglycemia	149
121	0	Height	0	Risky	0	Hyperglycemia	153
122	0	Height	1	No risk	0	Hyperglycemia	144
123	0	Height	1	No risk	1	Normal	112
124	0	Height	1	No risk	0	Hyperglycemia	166
125	0	Height	0	Risky	1	Normal	117
126	0	Height	1	No risk	1	Normal	112
127	0	Height	1	No risk	0	Hyperglycemia	148
128	0	Height	1	No risk	0	Hyperglycemia	151
129	0	Height	1	No risk	0	Hyperglycemia	142
130	0	Height	1	No risk	1	Normal	99
131	0	Height	0	Risky	0	Hyperglycemia	166
132	0	Height	1	No risk	1	Normal	111
133	0	Height	1	No risk	0	Hyperglycemia	142
134	0	Height	1	No risk	0	Hyperglycemia	140
135	0	Height	1	No risk	1	Normal	112

136	0	Height	0	Risky	1	Normal	99
137	0	Height	1	No risk	0	Hyperglycemia	160
138	0	Height	1	No risk	1	Normal	110
139	0	Height	1	No risk	0	Hyperglycemia	152
140	0	Height	1	No risk	0	Hyperglycemia	142
141	0	Height	1	No risk	0	Hyperglycemia	150
142	0	Height	1	No risk	0	Hyperglycemia	147
143	0	Height	1	No risk	1	Normal	99
144	0	Height	0	Risky	0	Hyperglycemia	154
145	0	Height	1	No risk	0	Hyperglycemia	161
146	0	Height	1	No risk	0	Hyperglycemia	140
147	0	Height	1	No risk	0	Hyperglycemia	162
148	0	Height	1	No risk	0	Hyperglycemia	141
149	0	Height	1	No risk	1	Normal	106
150	0	Height	1	No risk	0	Hyperglycemia	144
151	0	Height	1	No risk	1	Normal	110
152	0	Height	0	Risky	0	Hyperglycemia	142
153	0	Height	1	No risk	0	Hyperglycemia	155
154	0	Height	1	No risk	1	Normal	107
155	0	Height	1	No risk	0	Hyperglycemia	149
156	0	Height	1	No risk	1	Normal	93
157	0	Height	1	No risk	0	Hyperglycemia	152
158	0	Height	1	No risk	0	Hyperglycemia	166
159	0	Height	1	No risk	1	Normal	110
160	0	Height	1	No risk	0	Hyperglycemia	140
161	0	Height	1	No risk	0	Hyperglycemia	148
162	0	Height	1	No risk	1	Normal	107
163	0	Height	0	Risky	0	Hyperglycemia	143

164	0	Height	1	No risk	0	Hyperglycemia	159
165	0	Height	1	No risk	0	Hyperglycemia	140
166	0	Height	0	Risky	0	Hyperglycemia	156
167	0	Height	1	No risk	1	Normal	112
168	0	Height	1	No risk	1	Normal	99
169	0	Height	0	Risky	0	Hyperglycemia	144
170	0	Height	1	No risk	1	Normal	98
171	0	Height	1	No risk	1	Normal	96
172	0	Height	1	No risk	0	Hyperglycemia	151
173	0	Height	1	No risk	0	Hyperglycemia	140
174	0	Height	1	No risk	1	Normal	102
175	0	Height	1	No risk	0	Hyperglycemia	160
176	0	Height	0	Risky	1	Normal	122
177	0	Height	1	No risk	0	Hyperglycemia	140
178	0	Height	1	No risk	1	Normal	95
179	0	Height	1	No risk	0	Hyperglycemia	158
180	0	Height	0	Risky	0	Hyperglycemia	140
181	0	Height	1	No risk	1	Normal	114
182	0	Height	1	No risk	0	Hyperglycemia	142
183	0	Height	1	No risk	1	Normal	123
184	0	Height	1	No risk	1	Normal	115
185	0	Height	1	No risk	1	Normal	118
186	0	Height	1	No risk	0	Hyperglycemia	142
187	0	Height	0	Risky	1	Normal	92
188	0	Height	0	Risky	1	Normal	117
189	0	Height	1	No risk	0	Hyperglycemia	140
190	0	Height	1	No risk	0	Hyperglycemia	147
191	0	Height	0	Risky	1	Normal	117

192	0	Height	1	No risk	1	Normal	114
193	0	Height	1	No risk	0	Hyperglycemia	159
194	0	Height	1	No risk	0	Hyperglycemia	151



Explore

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
The Mean	194	100.0%	0	0.0%	194	100.0%
Age						
GDS Mean	194	100.0%	0	0.0%	194	100.0%
IMT Mean	194	100.0%	0	0.0%	194	100.0%

Descriptives

		Statistic	Std. Error
The Mean	Mean	16.34	.053
Age	95% Confidence Interval for	Lower Bound	16.23
	Mean	Upper Bound	16.44
	5% Trimmed Mean		16.32
	Median		16.00
	Variance		.545
	Std. Deviation		.738
	Minimum		15
	Maximum		19
	Range		4
	Interquartile Range		1
	Skewness	.311	.175
	Kurtosis	.362	.347
GDS Mean	Mean	117.79	1.060
	95% Confidence Interval for	Lower Bound	115.70
	Mean	Upper Bound	119.88
	5% Trimmed Mean		117.28
	Median		117.50
	Variance	217.877	
	Std. Deviation	14.761	
	Minimum	85	

	Maximum	180	
	Range	95	
	Interquartile Range	17	
	Skewness	.650	.175
	Kurtosis	.993	.347
IMT Mean	Mean	21.96	.356
	95% Confidence Interval for	Lower Bound	21.26
	Mean	Upper Bound	22.67
	5% Trimmed Mean	21.60	
	Median	21.00	
	Variance	24.522	
	Std. Deviation	4.952	
	Minimum	15	
	Maximum	64	
	Range	49	
	Interquartile Range	5	
	Skewness	3.455	.175
	Kurtosis	25.911	.347

Frequencies

		Statistics			
		Respondent Age	Respondent Gender	IMT Responden	Smoking Respondents
N	Valid	194	194	194	194
	Missing	0	0	0	0

Frequency Table

		Respondent Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Late Teens (17-25 years old)	78	40.2	40.2	40.2
	Early Teens (12-16 years old)	116	59.8	59.8	100.0

Total	194	100.0	100.0
-------	-----	-------	-------

Respondent Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Women	118	60.8	60.8	60.8
	Male	76	39.2	39.2	100.0
	Total	194	100.0	100.0	

IMT Responden

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Obesitas/ Overweight (≥ 25.0)	41	21.1	21.1	21.1
	Normal / Which (< 25.0)	153	78.9	78.9	100.0
	Total	194	100.0	100.0	

Smoking Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Smokers	17	8.8	8.8	8.8
	Non-smokers	177	91.2	91.2	100.0
	Total	194	100.0	100.0	

Consumption Habits of Artificially Sweetened Beverages * Risk of Hyperglycemia

Crosstab

Count

Risk of hyperglycemia

Total

		Hyperglycemia GDS ≥140 mg/dL	Normal, if GDS < 140 mg/dL.	
Consumption Habits of	height	105	74	179
Artificially Sweetened Drinks	Low	8	7	15
Total		113	81	194

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	.161 ^a	1	.688		
Continuity Correction ^b	.017	1	.897		
Likelihood Ratio	.160	1	.689		
Fisher's Exact Test				.787	.444
Linear-by-Linear Association	.161	1	.689		
N of Valid Cases	194				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.26.

b. Computed only for a 2x2 table

Junk Food Consumption Habits * Risk of Hyperglycemia

Crosstab

Count

		Risk of hyperglycemia		
		Hyperglycemia GDS ≥140 mg/dL	Normal, if GDS < 140 mg/dL.	Total
Junk Food Consumption	often	36	7	43
Habits	Rarely	77	74	151
Total		113	81	194

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)	Exact Sig. (2- sided)	Exact Sig. (1- sided)
Pearson Chi-Square	14.740a	1	.000		
Continuity Correctionb	13.425	1	.000		
Likelihood Ratio	16.161	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	14.664	1	.000		
N of Valid Cases	194				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.95.

b. Computed only for a 2x2 table

Risk Estimate

	Value	95% Confidence Interval	
		Lower	Upper
Odds Ratio for Junk Food Consumption Habits (frequent / rare)	4.942	2.070	11.800
For cohort Risk Hiperglikemia = Hiperglikemia GDS $\geq$ 140 mg/dL	1.642	1.338	2.014
For cohort Hyperglycemia Risk = Normal, If GDS < 140 mg/dL.	.332	.165	.667
N of Valid Cases	194		











INFORM CONSENT

THE RELATIONSHIP BETWEEN THE CONSUMPTION HABITS OF ARTIFICIALLY SWEETENED BEVERAGES AND *JUNKFOOD* TO THE RISK OF *HYPERGLYCEMIA* IN TEENAGER AT SMA NEGERI 1 KOTA BENGKULU

Assalamualaikum,

Introduce my name is Ivo Risa Putri Gandari. My home address is Padang Tepong village, Ulu Musi District, Empat Lawang Regency, I am currently studying at one of the universities with the DIV Bachelor of Applied Nursing study program at the Bengkulu Ministry of Health Polytechnic, I intend to conduct research on — the relationship between the consumption habits of artificially sweetened drinks and junkfood to the risk of hyperglycemia in adolescents. Purpose and objectives This study aims to analyze whether the relationship between consuming artificially sweetened drinks and junkfood is expected to increase the risk of hyperglycemia in adolescents. Respondents were asked to fill out a questionnaire $\pm$ 20–30 minutes. The benefits of this study are for whether there is a relationship between consuming artificially sweetened drinks and junk food in adolescents. The study did not pose any serious risks, only mild discomfort when filling out the questionnaire. Identities are kept confidential and for research purposes only. Respondents are free to refuse or terminate participation at any time without sanction. Respondents will receive compensation in the form of souvenirs during the filling out of the questionnaire and consumption.

I hope that you are willing to be a respondent in this study. All the information you provide is guaranteed confidentiality. However, if you feel objectional, you have the right to refuse. After you read the purpose of the research above, then I ask you to fill in your name and signature below if you are willing.

I am hereby willing to participate in this research and am willing to fill in the complete data that has been provided

They respond

Wassalamualaikum

RESPONDENT'S APPLICATION LETTER

Respectfully,

I am a student of the Applied Bachelor of Nursing Study Program of the Ministry of Health of the Ministry of Health of Bengkulu:

Name : Ivo Risa Putri Gandari

NIM: P01720322077

I will conduct a study entitled "**The relationship between the consumption habits of artificially sweetened beverages and *junkfood* to the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City**".

In connection with this purpose, I humbly ask for your participation to become a respondent in this research. The data obtained from this study can be beneficial for the community, health workers, and educational institutions. Information about the data obtained will be guaranteed confidentiality and will only be used for research data. Thus this request, I thank you for your attention and participation.

Sincerely, Ivo Risa Putri Gandari

RESEARCH QUESTIONNAIRE SHEET

The relationship between the consumption of artificially sweetened beverages and *junk food* on the risk of hyperglycemia in adolescents at SMA Negeri 1 Bengkulu City

Name :

Age :

Gender:

Weight :

Height :

Smoking :

Sugary Beverage Consumption Habits (BEVQ) Instructions for filling out the questionnaire:

1. Over the past month, please indicate each drink by filling in the fields —how often—, marking the *checklist* in the column —how much—
2. Show an estimate of the number of drinks you drink each time, starting from the first type of drink to the last. If you have never consumed the choice of drink, you can continue to fill in the next drink choice or if there is no choice of type or brand of drink on the questionnaire you can write in the other section of each category of sweet drink or the end of the questionnaire.

[illegible]

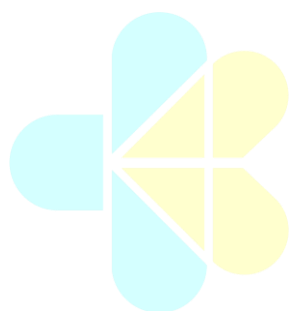
[illegible]

25. Thai tea; thai milk green tea										
--	--	--	--	--	--	--	--	--	--	--

26. Starbucks Green Tea Latte grande										
--	--	--	--	--	--	--	--	--	--	--

Indicator	Never	2x/month	1– 2x/week	3– 6x/week	1x/day	>3x/day
Ayam goreng						
French fries						
Bakso/Sosis/Chicken Nugget						
Squirt						
Hamburgers						
Sandwich						
Pizza						
Pasta (Spaghetti, Fusilli, Lasagna, DSB)						
Fried (banana) fried, milled, cimol, etc.)						
Instant noodles						
Es krim						
Donat						
Kue (Cake, cupcake, snack cakes, etc.)						
Pastries (nastar, Cupboard, chocolate cookies, etc.)						
Sweet Market Cake (Bika Ambon, Cake						

layers, cleons, etc.)						
Sweet cereal						
Boba/Bubble Tea						
Soft drink						
Sugary drinks (with sugar additional)						



Kemenkes
Poltekkes Bengkulu

HALAMAN PERSETUJUAN JUDUL
SKRIPSI MAHASISWA PRODI SARJANA TERAPAN KEPERAWATAN JURUSAN
KEPERAWATAN POLTEKKES KEMENKES BENGKULU

Nama : Ivo Risa Putri Gandari
Tempat, Tanggal Lahir : Padang Tepong, 30 Juli 2004
Nomor Induk Mahasiswa : P01720322077
Judul Skripsi yang Diajukan : Hubungan kebiasaan minum minuman pemanis buatan Dan
Junkfood terhadap risiko Hiperglikemia pada remaja dengan
riwayat keluarga Diabetes Melitus
Disetujui Pada Tanggal :

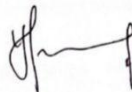
Bengkulu, 30 Juli 2025

Pembimbing I



(Ns. Hendri Heriyanto, M.Kep)
NIP. 1982055152002121004

Pembimbing II



(Ns. Sri Yuliana S.Kep,M.Sc)
NIP. 199207112025062009

Mengetahui

Ketua Program Studi Sarjana Terapan Keperawatan
Jurusan Keperawatan Poltekkes Kemenkes Bengkulu



(Ns. Hendri Heriyanto, M.Kep)
NIP. 198205152002121004



Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan
Politeknik Kesehatan Bengkulu
Jalan Indragiri No.3 Padang Harapan
Bengkulu 38225
(0736) 341212
<https://www.poltekkesbengkulu.ac.id>

01 Maret 2026

Nomor : PP.06.02/F.XXIII.1/ 2026 /2026
Perihal : Izin Pra Penelitian

Yth.
Kepala Sekolah SMA Negeri 1 Kota Bengkulu
di
Tempat

Sehubungan penyusunan tugas akhir dalam bentuk Skripsi Mahasiswa Program Studi Keperawatan Program Sarjana Terapan Jurusan Keperawatan Politeknik Kesehatan Kemenkes Bengkulu Tahun Akademik 2025/2026, dengan ini mohon Bapak/Ibu dapat memberikan izin pengambilan data, Pra Penelitian pada mahasiswa dibawah ini :

Nama : Ivo Risa Putri Gandari
Mahasiswa
Nim : P01720322077
Tempat : SMA Negeri 1 Kota Bengkulu
Judul : Hubungan Kebiasaan Konsumsi Minuman Pemanis Buatan Dan Junkfood Terhadap Resiko Hiperglikemia Pada Remaja
No Handphone : 085788048470

Demikianlah, atas perhatian dan kerjasamanya kami mengucapkan terimakasih.

Wakil Direktur I Bidang Akademik



Septiyanti, S.Kep, Ners, M.Pd





Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan
Politeknik Kesehatan Bengkulu
Jalan Indragiri No.3 Padang Harapan
Bengkulu 36225
(0736) 341212
<https://www.poltekkesbengkulu.ac.id>

21 April 2026

Nomor : PP. 01.01/F.XXIII.1/ 5511/2026
Perihal : Izin Penelitian

Yth,
Kepala dinas penanaman modal dan pelayanan terpadu satu pintu provinsi Bengkulu
di
Tempat

Sehubungan penyusunan tugas akhir mahasiswa dalam bentuk Skripsi Program Studi Keperawatan Program Sarjana Terapan Jurusan Keperawatan Politeknik Kesehatan Kemenkes Bengkulu Tahun Akademik 2025/2026, dengan ini kami mohon Bapak/Ibu dapat memberikan izin pengambilan data untuk penelitian kepada:

Nama : Ivo Risa Putri Gandari
NIM : P01720322077
Tempat Penelitian : SMAN 1 Kota Bengkulu
Waktu Penelitian : 1 bulan
Judul : Hubungan kebiasaan konsumsi minuman pemanis buatan dan junkfood terhadap resiko hiperglikemia pada remaja
No Handphone : 085788048470

Demikianlah, atas perhatian dan kesediaan Bapak/Ibu diucapkan terimakasih.

a.n. Direktur Poltekkes Kemenkes Bengkulu
Wakil Direktur I Bidang Akademik

Septiyanti, S.Kep, Ners, M.Pd





Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan
Politeknik Kesehatan Bengkulu
Jalan Indragiri No.3 Padang Harapan
Bengkulu 38225
☎ (0736) 341212
🌐 <https://www.poltekkesbengkulu.ac.id>

21 April 2026

Nomor : PP. 01.01/F.XXIII.1/ 3312 /2026
Perihal : Izin Penelitian

Yth,
Kepala dinas pendidikan dan kebudayaan provinsi Bengkulu
di
Tempat

Sehubungan penyusunan tugas akhir mahasiswa dalam bentuk Skripsi Progam Studi Keperawatan Program Sarjana Terapan Jurusan Keperawatan Politeknik Kesehatan Kemenkes Bengkulu Tahun Akademik 2025/2026 , dengan ini kami mohon Bapak/Ibu dapat memberikan izin pengambilan data untuk penelitian kepada:

Nama : Ivo Risa Putri Gandari
NIM : P01720322077
Tempat Penelitian : SMAN 1 Kota Bengkulu
Waktu Penelitian : 1 bulan
Judul : Hubungan kebiasaan konsumsi minuman pemanis buatan dan junkfood terhadap resiko hiperglikemia pada remaja
No Handphone : 085788048470

Demikianlah, atas perhatian dan kesediaan Bapak/Ibu diucapkan terimakasih.

a.n. Direktur Poltekkes Komenkes Bengkulu

Wakil Direktur I Bidang Akademik

Septiyanti, S.Kep, Ners, M.Pd





Kementerian Kesehatan
Direktorat Jenderal
Sumber Daya Manusia Kesehatan

Politeknik Kesehatan Bengkulu
Jl. Jendral Sudirman No. 3 Padang Harapan
Bengkulu 38225
Telp. (0736) 341212
Email: info@poltekkesbengkulu.ac.id

21 April 2026

Nomor : PP. 01.01/F.XXIII.1/ 3512 /2026
Perihal : Izin Penelitian

Yth,
Kepala dinas pendidikan dan kebudayaan provinsi Bengkulu
di
Tempat

Sehubungan penyusunan tugas akhir mahasiswa dalam bentuk Skripsi Program Studi Keperawatan Program Sarjana Terapan Jurusan Keperawatan Politeknik Kesehatan Kemenkes Bengkulu Tahun Akademik 2025/2026, dengan ini kami mohon Bapak/Ibu dapat memberikan izin pengambilan data untuk penelitian kepada:

Nama : Ivo Risa Putri Gandari
NIM : P01720322077
Tempat Penelitian : SMAN 1 Kota Bengkulu
Waktu Penelitian : 1 bulan
Judul : Hubungan kebiasaan konsumsi minuman pemanis buatan dan junkfood terhadap resiko hiperglikemia pada remaja
No Handphone : 085788048470

Demikianlah, atas perhatian dan kesediaan Bapak/Ibu diucapkan terimakasih.

a.n. Direktur Poltekkes Kemenkes Bengkulu

Wakil Direktur I Bidang Akademik

Septiyanti, S.Kep, Ners, M.Pd





PEMERINTAH PROVINSI BENGKULU
DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU SATU PINTU

Jalan Batang Hari No.108, Kelurahan Tanah Patah, Kecamatan Ratu Agung, Kota Bengkulu
Website: <https://dpmtsp.bengkuluprov.go.id> | Email: dpmtsp@bengkuluprov.go.id

BENGKULU 38224

REKOMENDASI

Nomor : 503/82.650/499/DPMTSP-P.4/2026

TENTANG PENELITIAN

- Dasar :
1. Peraturan Gubernur Bengkulu Nomor 13 Tahun 2022 Tentang Pendelegasian Wewenang Penyelenggaraan Pelayanan Perizinan Berusaha Berbasis Resiko dan Non perizinan Kepada Kepala Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu.
 2. Surat Wakil Direktur I Bidang Akademik Poltekkes Kemenkes Bengkulu
Nomor : PP. 01.01/F.XXIII.1/3311/2026, Tanggal 21 April 2026 Perihal Rekomendasi Penelitian.
Permohonan diterima tanggal 24 April 2026.

Nama / NPM : IVO RISA PUTRI GANDARI/P01720322077
Pekerjaan : Mahasiswa
Maksud : Melakukan Penelitian
Judul Proposal Penelitian : Hubungan Kebiasaan Konsumsi Minuman Pemanis Buatan dan *Junkfood* terhadap Resiko Hiperglikemia pada Remaja
Daerah Penelitian : SMA Negeri 1 Kota Bengkulu
Waktu Penelitian/Kegiatan : 27 April 2026 s.d 27 Mei 2026
Penanggung Jawab : Wakil Direktur I Bidang Akademik Poltekkes Kemenkes Bengkulu

Dengan ini merekomendasikan penelitian yang akan diadakan dengan ketentuan :

- a. Sebelum melakukan penelitian harus melapor kepada Gubernur/Bupati/Walikota Cq.Kepala Badan Kesatuan Bangsa dan Politik atau sebutan lain setempat.
- b. Harus mentaati semua ketentuan Perundang-undangan yang berlaku.
- c. Selesai melakukan penelitian agar melaporkan/menampaikan hasil penelitian kepada Kepala Badan Kesatuan Bangsa dan Politik Provinsi Bengkulu.
- d. Apabila masa berlaku Rekomendasi ini sudah berakhir, sedangkan pelaksanaan penelitian belum selesai, perpanjangan Rekomendasi Penelitian harus diajukan kembali kepada instansi pemohon.
- e. Rekomendasi ini akan dicabut kembali dan dinyatakan tidak berlaku, apabila ternyata pemegang surat rekomendasi ini tidak mentaati/mengindahkan ketentuan-ketentuan seperti tersebut di atas.

Demikian Rekomendasi ini dikeluarkan untuk dapat dipergunakan sebagaimana mestinya



Ditetapkan di : Bengkulu
Pada tanggal : 24 April 2026

KEPALA DINAS PENANAMAN MODAL DAN
PELAYANAN TERPADU SATU PINTU
PROVINSI BENGKULU



KHIRDES LAPENDO PASJU, S.STP.,M.Si
Pemimpin Utama Muda (IV/c)
NIP. 198112282000121001

Tembusan disampaikan kepada Yth.:

1. Kepala Badan Kesatuan Bangsa dan Politik Provinsi Bengkulu
2. Kepala Dinas Pendidikan dan Kebudayaan Provinsi Bengkulu
3. Wakil Direktur I Bidang Akademik Poltekkes Kemenkes Bengkulu
4. Yang Bersangkutan



PEMERINTAH PROVINSI BENGKULU
SMA NEGERI 1 KOTA BENGKULU
AKREDITASI A



Jalan Kuala Lempung Kec. Ratu Agung Kota Bengkulu 38225 Telepon (0736) 22906
Pos el: smansakotabengkulu@gmail.com

SURAT KETERANGAN SELESAI PENELITIAN
Nomor : B.000.9.2/230/SMAN1KB/2026

Yang bertanda tangan di bawah ini :

Nama : Syahroni, M.Pd.
NIP : 197307201996061001
Pangkat/Gol : Pembina Utama Muda/IV.c
Jabatan : Kepala SMA Negeri 1 Kota Bengkulu
NPSN : 10702416

Berdasarkan Surat Rekomendasi Tentang Penelitian dari Dinas Pendidikan dan Kebudayaan Pemerintah Provinsi Bengkulu Nomor : B.000.9/347.S/Dikbud/2026 tanggal 20 April 2026, dengan ini menerangkan bahwa :

Nama : Ivo Risa Putri Gandari
NIM : P01720322077
Program Studi : Sarjana Terapan Keperawatan
Jurusan : Keperawatan
Universitas : Politeknik Kesehatan Kemenkes Bengkulu

Yang bersangkutan telah selesai melaksanakan penelitian di SMA Negeri 1 Kota Bengkulu terhitung pada tanggal 27 Mei 2026 sampai dengan tanggal 27 Juni 2026.

Dengan judul : *"Hubungan Kebiasaan Konsumsi Minuman Pemanis Buatan dan Junk Food terhadap Risiko Hiperglikemia pada Remaja di SMA Negeri 1 Kota Bengkulu"*

Demikian surat keterangan ini dibuat untuk dapat dipergunakan seperlunya.

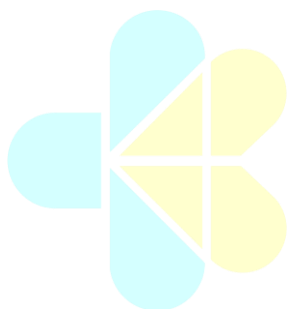
Bengkulu, 27 Juni 2026
Kepala SMA Negeri 1 Kota Bengkulu,



Syahroni, M.Pd.
Pembina Utama Muda (IV/c)
NIP 197307201996061001

Tabel 2. Deskripsi Konsumsi Junkfood

Indikator	Tidak Pernah	2x /bulan	1-2x /minggu	3-6x /minggu	1x /hari	>3x /hari
Ayam goreng	4 (5,5)	18 (24,7)	21 (28,8)	19 (26)	10 (13,7)	1 (1,4)
Kentang Goreng	7 (9,6)	33 (45,2)	25 (34,2)	6 (8,2)	2 (2,7)	0 (0)
Bakso/Sosis/Chicken Nugget	9 (12,3)	26 (35,6)	22 (30,1)	14 (19,2)	2 (2,7)	0 (0)
Siomay	18 (24,7)	33 (45,2)	16 (21,9)	5 (6,8)	1 (1,4)	0 (0)
Hamburger	20 (27,4)	36 (49,3)	12 (16,4)	4 (5,5)	1 (1,4)	0 (0)
Sandwich	28 (38,4)	31 (42,5)	10 (13,7)	4 (5,5)	0 (0)	0 (0)
Pizza	13 (17,8)	47 (64,4)	9 (12,3)	4 (5,5)	0 (0)	0 (0)
Pasta (Spaghetti, fusilli, lasagna, dsb)	16 (21,9)	38 (52,1)	15 (20,5)	4 (5,5)	0 (0)	0 (0)
Gorengan (pisang goreng, molen, cimol, dsb)	8 (11)	30 (41,1)	21 (28,8)	10 (13,7)	2 (2,7)	2 (2,7)
Mie Instan	2 (2,7)	33 (45,2)	27 (37)	10 (13,7)	1 (1,4)	0 (0)
Es Krim	8 (11)	30 (41,1)	25 (34,2)	7 (9,6)	1 (1,4)	2 (2,7)
Donat	13 (17,8)	47 (64,4)	8 (11)	5 (6,8)	0 (0)	0 (0)
Kue (Cake, cupcake, snack cakes, dsb)	11 (15,1)	41 (56,2)	14 (19,2)	5 (6,8)	2 (2,7)	0 (0)
Kue kering (nastar, kastengel, kukis cokelat, dsb)	18 (24,7)	35 (47,9)	12 (16,4)	6 (8,2)	1 (1,4)	1 (1,4)
Jajan pasar manis (bika ambon, kue lapis, klepon, dll)	20 (27,4)	37 (50,7)	11 (15,1)	5 (6,8)	0 (0)	0 (0)
Sereal manis	21 (28,8)	35 (47,9)	11 (15,1)	5 (6,8)	1 (1,4)	0 (0)
Boba/Bubble Tea	20 (27,4)	32 (43,8)	16 (21,9)	4 (5,5)	1 (1,4)	0 (0)
Soft drink	16 (21,9)	38 (52,1)	13 (17,8)	5 (6,8)	1 (1,4)	0 (0)
Minuman manis (dengan gula tambahan)	10 (13,7)	23 (31,5)	25 (34,2)	9 (12,3)	5 (6,8)	1 (1,4)
Total Skor (Mean = 129,25; Min = 15; Max = 380; Median = 125; SD = 68,60); n = 73						



Kemenkes
Poltekkes Bengkulu

Lampiran 4

Hasil Pengolahan Data Uji Validitas Kuesioner BEVQ
(n=30)

Pernyataan	Pearson Correlation r hitung	r tabel5 %	Nilai Signifikan	Keterangan
J1	0,446	0,361	0,014	Valid
J2	0,586	0,361	0,001	Valid
J3	0,556	0,361	0,001	Valid
J4	0,000	0,361	0,000	Tidak Valid
J5	0,634	0,361	0,000	Valid
J6	0,681	0,361	0,000	Valid
J7	0,504	0,361	0,005	Valid
J8	0,000	0,361	0,000	Tidak Valid
M1	0,638	0,361	0,000	Valid
M2	0,629	0,361	0,000	Valid
M3	0,465	0,361	0,010	Valid
M4	0,492	0,361	0,006	Valid
M5	0,493	0,361	0,006	Valid
M6	0,532	0,361	0,002	Valid
M7	0,709	0,361	0,000	Valid
M8	0,628	0,361	0,000	Valid
M9	0,651	0,361	0,000	Valid
M10	0,789	0,361	0,000	Valid
M11	0,555	0,361	0,001	Valid
M12	0,409	0,361	0,025	Valid
M13	0,627	0,361	0,000	Valid
M14	0,000	0,361	0,000	Tidak Valid
M15	0,000	0,361	0,000	Tidak Valid
M16	0,000	0,361	0,000	Tidak Valid
M17	0,000	0,361	0,000	Tidak Valid
M18	0,429	0,361	0,018	Valid
M19	0,805	0,361	0,000	Valid
M20	0,000	0,361	0,000	Tidak Valid
M21	0,051	0,361	0,791	Tidak Valid

M22	0,503	0,361	0,005	Valid
M23	0,544	0,361	0,002	Valid
M24	0,000	0,361	0,000	Tidak Valid
M25	0,511	0,361	0,004	Valid
M26	0,000	0,361	0,000	Tidak Valid
M27	0,000	0,361	0,000	Tidak Valid
M28	0,511	0,361	0,004	Valid
M29	0,000	0,361	0,001	Tidak Valid
M30	0,555	0,361	0,000	Valid
M31	0,000	0,361	0,000	Tidak Valid
M32	0,000	0,361	0,000	Tidak Valid
M33	0,000	0,361	0,003	Tidak Valid
M34	0,522	0,361	0,000	Valid
M35	0,614	0,361	0,000	Valid
M36	0,000	0,361	0,000	Tidak Valid
M37	0,379	0,361	0,039	Valid
M38	0,538	0,361	0,002	Valid
M39	0,628	0,361	0,000	Valid
M40	0,789	0,361	0,000	Valid
M41	0,000	0,361	0,000	Tidak Valid
M42	0,789	0,361	0,000	Valid
F1	0,719	0,361	0,000	Valid
F2	0,706	0,361	0,000	Valid
F3	0,943	0,361	0,000	Valid

Hasil Pengolahan Data Uji Reliabilitas Kuesioner
BEVQ (n=30)

Variabel	Cronbach's Alpha	r tabel	Keterangan
BEVQ	0,694	0,361	Reliabel

LEMBAR BIMBINGAN PROPOSAL

PEMBIMBING I : Ns. Hendri Heriyanto,S.Kep.,M.Kep

MAHASISWA : Ivo Risa Putri Gandari

NIM : P01720322077

JUDUL SKRIPSI : Hubungan kebiasaan konsumsi minuman pemanis buatan dan *junkfood* terhadap risiko hiperglikemia pada remaja di sma negeri 1 kota bengkulu

NO	HARI / TANGGAL	TOPIK	SARAN	PARAF PEMBIMBING
1.	Senin, 28 Juli 2025	Konsultasi pengajuan judul	- Cari masalah terkait penelitian yang diminati - Alasan mengenai pengambilan judul	
2.	Jumat, 01 Agustus 2025	Konsultasi pengajuan judul	- ACC judul - Perbanyak referensi terkait judul - Lanjutkan ke BAB I	
3.	Senin, 22 September 2025	Konsultasi BAB I	- Perbaiki penulisan - Tambahkan data dan materi - Perbaiki tujuan dan manfaat penelitian	
4.	Selasa,04 November 2025	Konsultasi perbaikan BAB I dan konsul BAB II- BAB IV	- Perbaiki Definisi Operasional - Perbaiki rumus perhitungan sampel - Perbaiki kerangka teori dan konsep - Membahas kuisisioner	
5.	Senin 17 November 2025	Konsultasi perbaikan BAB I- IV	- Perbaiki penulisan - Perbaiki pada bagian analisis bivariat - Lengkapi Lampiran	
6.	Selasa, 27 November 2025	Konsultasi perbaikan BAB I- IV	- Perbaiki kalimat dan penulisan - Lengkapi lampiran	
7.	Selasa, 4 Desember 2025	Konsultasi perbaikan BAB I- IV	ACC proposal dan lanjut ujian proposal	
8.	Rabu, 17 Juni 2026	Konsultasi perbaikan BAB 5- V	- Perbaikan pada penulisan - Perbaikan pada Gambaran responden - Perbaikan interpretasi karakteristik responden - Perbaikan tabel distribusi frekuensi karakteristik responden	

9.	Kamis 18 Juni 2026	Konsultasi BAB 6-VI	• Perbaikan penulisan • Menambah pembahasan pada gambaran karakteristik responden	
10.	Jumat 19 Juni 2026	Konsultasi BAB 7-VII	• Perbaikan penulisan	
11.	Senin 22 Juni 2026	Konsultasi BAB I dan V	• Perbaikann tujuan peneliti • Tambahkan jurnal	
12.	Selasa 23 Juni 2026	Konsultasi BAB 7-VII	• Perbaikan pada daftar pustaka	

LEMBAR BIMBINGAN PROPOSAL

PEMBIMBING II : Ns. Sri Yuliana S.Kep, M.Sc

MAHASISWA : Ivo Risa Putri Gandari

NIM : P01720322077

JUDUL SKRIPSI : Hubungan kebiasaan konsumsi minuman pemanis buatan dan *junkfood* terhadap risiko hiperglikemia pada remaja di sma negeri 1 kota Bengkulu

NO	HARI / TANGGAL	TOPIK	SARAN	PARAF PEMBIMBING
1.	Jumat, 01 Agustus 2025	Konsul pengajuan judul	- Cari masalah terkait penelitian yang diminati - Alasan mengenai pengambilan judul - Cari jurnal terkait penelitian	
2.	Senin, 17 November 2025	Konsul BAB I	- Perbaiki urutan di latar belakang - Perbaiki penulisan	
3.	Rabu, 26 November 2025	Konsultasi BAB I, II, III dan IV	- Perbaiki urutan di latar belakang - Perbaiki penulisan - Perbaiki Definisi Operasional - Perbaiki Kerangka Konsep	
4.	Sabtu, 29 November 2025	Konsultasi BAB, II, III dan IV	- Tambahkan tujuan pada setiap Variabel pada Definisi Operasional - Tambahkan jurnal pada Definisi Operasional - Membahas kuisiomer	
5.	Rabu 03 Desember 2025	Konsultasi BAB II, III dan IV	- Membahas kuisiomer - Perbaikan cara ukur Definisi Operasional - Perbaiki kalimat dan penulisan	
6.	Jumat, 05 Desember 2025	Konsultasi BAB III dan IV	- Membahas kuisiomer - Perbaikan Data Operasional - Lengkapi lampiran	
7.	Rabu, 10 Desember 2025	Konsultasi BAB III dan IV	ACC proposal dan lanjut ujian proposal	
8.	Kamis 18 Juni 2026	Konsultasi BAB 5-V	- Perbaikan jalan penelitian - Perbaikan pada bagian Bivariat	

9.	Jumat 19 Juni 2026	Konsultasi BAB 6-VI	• Perbaikan pembahasan	H
10.	Senin 22 Juni 2026	Konsultasi BAB 7-VII	• Perbaikan kesimpulan dan saran	H
11.	Selasa 23 Juni 2026	Konsultasi BAB 4-IV	• Perbaikan bagan desain penelitian	H
12.	Rabu 24 Juni 2026	Konsultasi BAB 7-VII	• Perbaikan pada penulisan daftar pustaka	H