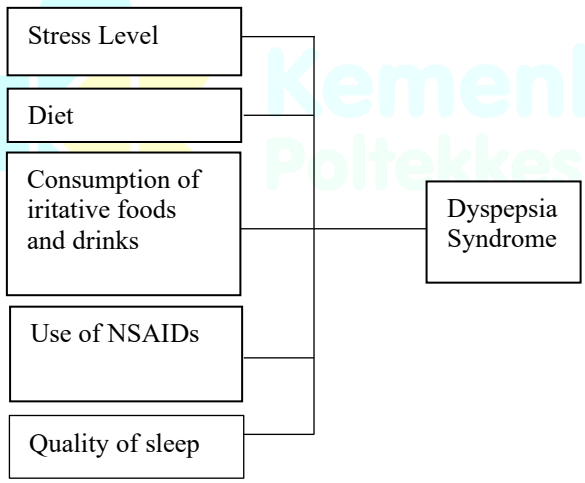
CHAPTER IV
RESEARCH METHODS

A. Research Type and Design

This study employs an analytical observational approach with a case-control design. This approach is conducted retrospectively, meaning the research begins by identifying nursing students who experience dyspepsia syndrome (the case group) and a group of students who do not experience dyspepsia syndrome (the control group), and then traces backward (backward-looking) to examine the history of exposure to risk factors (stress levels, dietary patterns, consumption of irritating foods and beverages, NSAID use, and sleep quality). Schematically, the research design can be illustrated in Figure 3 as follows:

sebagai berikut:



Charts 4.1 Research Design

B. Research Variables

This study consists of independent variables and a dependent variable. The independent variables in this study are stress levels, dietary patterns (meal regularity), consumption of irritating foods and beverages, the use of non-steroidal anti-inflammatory drugs (NSAIDs), and sleep quality. Meanwhile, the dependent variable in this study is the incidence of dyspepsia syndrome.

C. Research Location and Time

1. Research Location: This study was conducted within the campus environment of Poltekkes Kemenkes Bengkulu, focusing on students of the Nursing Department.
2. Research Time**:** Data collection was carried out in May, from May 1 to May 24, 2026, over a one-month period.

D. Population and Sample

1. Research Population

   The population consists of respondents who meet the predetermined criteria. The population in this study includes all active nursing students (Diploma III and Applied Bachelor/Diploma IV programs) at Poltekkes Kemenkes Bengkulu for the 2025/2026 Academic Year who met the inclusion criteria, totaling 716 students based on data from the Academic Administration Department (BAA) in 2024.

2. Research Sample

   A sample is a portion of the number of individuals with characteristics representing the population to be studied (Sugiyono, 2019). The sample in this study comprises nursing students at Poltekkes Kemenkes Bengkulu identified as experiencing dyspepsia syndrome symptoms (for the case group) and those not experiencing symptoms (for the control group) during the March-April 2026 period. The number of samples for the case group was obtained using a quota sampling technique, while the control sample was determined using a case-to-control ratio of 1:1. The sampling technique for the control group was also conducted using a quota sampling technique.

   The sample criteria in this study are as follows:

For the control group:

a. Inclusion Criteria:
    1. Active students of the Nursing Department at Poltekkes Kemenkes Bengkulu.
    2. Willing to become respondents by signing an informed consent form (Rafik et al., 2024).
    3. Possess a smartphone and internet access (for Google Form usage).
b. Exclusion Criteria:
    1. Students who are on academic leave or not actively studying during the research period.
    2. Students who have been diagnosed by healthcare professionals with organic gastrointestinal diseases (e.g., Peptic Ulcer, Gastric Cancer) (Ashari et al., 2022).

For the case group**:**

a. Inclusion Criteria:
    1. Active students of the Nursing Department at Poltekkes Kemenkes Bengkulu.
    2. Willing to become respondents by signing an informed consent form (Rafik et al., 2024).
    3. Possess a smartphone and internet access (for Google Form usage).
b. Exclusion Criteria:
    1. Students who are on academic leave or not actively studying during the research period.
    2. Students who have been diagnosed by healthcare professionals with organic gastrointestinal diseases (e.g., Peptic Ulcer, Gastric Cancer) (Ashari et al., 2022).

3. Sampling Technique

    The sampling technique used in this study is Quota Sampling. According to Sugiyono (2019), quota sampling is a technique to determine a sample from a population with specific characteristics until the desired number (quota) is met. This is done to ensure that the sample taken remains proportional and is able

to provide a representative overview of the risk factors for dyspepsia syndrome among students, with more optimal time and resource efficiency.

4. Sample Size

The application of the Quota Sampling technique in this study is conducted by setting a specific target sample size (quota) that must be fulfilled in the field. To ensure that the results of the statistical analysis have adequate power and are representative, the minimum limit of this quota is scientifically calculated using the Lemeshow formula for hypothesis testing of the difference between two proportions. The Lemeshow formula was chosen because the design of this study is a case-control, which aims to prove the relationship between risk factors in the case group (students with dyspepsia syndrome) and the control group (students without dyspepsia syndrome). The number generated from this formula will serve as the minimum quota that the researcher must achieve during data collection. The sample calculation is as follows:

Description:

$$n = \frac{\{Z_{1-\alpha/2}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$$

Description:

n = Sample size

β= 0,20 (20%)

P_2= Estimated proportion of exposure in the control group (healthy students). Assumed to be 20%

P_1= Estimated proportion of exposure in the case group. OR = 3.0 and P_2 = 0.20: 0.43.

$Z_{1-\alpha/2}$= Standard deviation value at a 95% confidence level (α = 0.05); value: 1.96

$Z_{1-\beta}$= Standard deviation value at 80% test power; value: 0.84

OR= Odds Ratio of at least 3.0

$\bar{P}$= Average proportion= $\frac{(P1+P2)}{2}$= 0,40

Calculation:

$$n = \frac{\left(1,96\sqrt{2 \times 0,40(1-0,40)} + 0,84\sqrt{0,50(1-0,50) + 0,30(1-0,30)}\right)^2}{(0,50-0,30)^2}$$

$$= \frac{(1,96 \,.\, 0,6928 + 0,84 \times 0,6782)^2}{0,04}$$

$$= \frac{(1,3579 + 0,5697)^2}{0,04}$$

$$\frac{(1,9276)^2}{0,04}$$

$$= \frac{3,7156}{0,04}$$

92,89 rounded to

93 respondents

Thus, the sample size for this study was 93 respondents, drawn from the entire nursing student body at the Bengkulu Ministry of Health Polytechnic (Poltekkes Kemenkes Bengkulu). Consequently, the target sample for this study was set at 93 respondents in the case group and 93 students in the control group, for a total target of 196 students. In accordance with the principle of quota sampling during the case selection stage, if during the study it is found that the number of students meeting the criteria for dyspepsia exceeds this minimum target (for example, if more than 95 students are identified), then all of them will still be included as study respondents.

Based on the Lemeshow formula calculation, the minimum required sample size was 93 respondents. To enhance the statistical power of the study and account for potential unusable or incomplete questionnaires during the initial field data screening, the researcher set a final quota of 98 respondents for the case group and 98 respondents for the control group.

No.	Study Program & Grade Level	Total Student Population (Ni)	Case Group Quota (n cases)	Control Group Quota (n controls)	Total Samples per Level (ni)
	Bachelor of Applied Nursing				

1	Level I (Semester 2)	132	18	18	36
2	Level II (Semester 4)	128	18	18	36
3	Level III (Semester 6)	96	13	13	26
4	Level IV / STR (Semester 8)	134	18	18	36
	Associate's Degree in Nursing				
5	Level I (Semester 2)	105	14	14	28
6	Level II (Semester 4)	65	9	9	18
7	Level III (Semester 6)	56	8	8	16
Total	**All Students**	716	98	98	196

E. Data Collection

1. Data Source

   a. Primary Data

   Primary data is data collected directly by researchers regarding the characteristics of respondents, including initials, age, gender, educational level, occupation, weight, and height. Data collection was conducted using face-to-face interviews and questionnaires designed to determine the respondents' identities, stress levels, eating patterns, consumption of irritating foods and beverages, use of NSAIDs, and sleep quality.

   b. Secondary Data

   Secondary data is data obtained indirectly from previously available documents or records. In this study, secondary data consisted of the total number of active students per level/semester, obtained from the Academic Administration Office (BAA) of the Nursing Department at the Bengkulu Public Health Polytechnic under the Ministry of Health.

2. Data Collection Instrumen

   a) Appendix 1 : Informed consent

b) Appendix 2 : Respondents request letter
c) Appendix 3 : Declaration of consent to participate as a respondent
d) Appendix 4: Declaration of consent to participate as a respondent
e) Appendix 5: Respondent Demographics
f) Appendix 6: Rome iv questionnaire
g) Appendix 7: : Stress Level questionnaire (DASS-42 Subscale)
h) Appendix 8: Dietary habits questionnaire
i) Appendix 9: Irritant questionnaire (FFQ)
j) Appendix 10 : Questionnaire on History of NSAID Use
k) Appendix 11: Quality Sleep questionnaire (PSQI)
l) Appendix 12 : Questionnaire Evaluation Sheet

3. Validation of the data collection tool

The research instruments used in this study included the Depression Anxiety Stress Scales 42 (DASS-42 subscales), a dietary habits questionnaire, a Food Frequency Questionnaire (FFQ), a questionnaire on the history of nonsteroidal anti-inflammatory drug (NSAID) use, and the Pittsburgh Sleep Quality Index (PSQI). All instruments underwent validity and reliability testing to ensure their suitability for use in this study.

a. *Rome IV*

A diagnosis of dyspepsia syndrome is made by completing a questionnaire based on the Rome IV Criteria. This instrument is an objective diagnostic tool that has been internationally standardized by a consensus of global gastroenterology experts (the Rome Foundation) and is used in global studies (Sperber et al., 2021).

b. Depression Anxiety Stress Scales 42 (sub-skala *DASS-42*)

The instrument used to measure stress levels was adapted from the DASS-42 (Depression Anxiety Stress Scales), which consists of 42 items, 14 of which are specifically designed to measure stress levels. The DASS-42 is an internationally standardized instrument whose validity and reliability have been tested in various countries. According to the literature, this instrument has a very high internal consistency (Cronbach's

Alpha) of 0.90, well above the minimum threshold of 0.60, and is therefore considered highly reliable for measuring respondents' psychological stress levels.

c. *Dietary habits*

This instrument, adapted from the study by Putra et al. (2025), was used to measure the regularity of respondents' meal schedules. It consists of questions regarding the frequency of main meals and breakfast habits. Based on the validity test results from the referenced study, all questionnaire items were deemed valid, with calculated r-values greater than the table r-values. The reliability test showed a Cronbach's Alpha value of 0.812 (an example of an estimated value from a similar study), which is greater than 0.60; therefore, the Dietary Habits questionnaire was deemed reliable and suitable for measuring students' eating patterns.

d. Food Frequency Questionnaire (FFQ)

This instrument consists of questions regarding the frequency of consumption of irritating foods (spicy, sour, coconut milk-based, and caffeinated). This questionnaire adopts the instrument from the study by Suhesti et al. (2025). Based on that reference study, the validity test results showed that the questionnaire items had an r-calculated value greater than the r-table value, and were therefore deemed valid. The reliability test using Cronbach's Alpha in that study yielded a value > 0.60; therefore, this FFQ questionnaire was deemed reliable and suitable for measuring students' eating habits.

e. Kuesioner Riwayat penggunaan OAINS (NSAID)

Data on the use of medications (NSAIDs) were obtained through a checklist of drug names available on the market. This instrument was developed based on medical and pharmacological facts. The validity test used was Content Validity, in which the list of medications was reviewed and verified for consistency with the literature by the researchers; thus, the instrument was deemed valid and accurate for collecting data on

respondents' medication history without the need for statistical correlation tests.

f. Pittsburgh Sleep Quality Index (PSQI)

The PSQI instrument is used to measure respondents' sleep quality and consists of standardized questions. This instrument is the gold standard in clinical sleep quality assessment. Based on a study by Devani et al. (2024), which also used this instrument, the PSQI demonstrated good validity and reliability with a Cronbach's Alpha value > 0.60, indicating that the instrument is reliable and ready for use.

F. Data Processing

1. Editing (Data Editing)

Data editing was conducted immediately after the questionnaires were collected from student respondents in the Nursing Department at the Bengkulu Public Health Polytechnic under the Ministry of Health. At this stage, the researchers checked the completeness of the questionnaire responses (the DASS-42, FFQ, PSQI, and Rome IV subscales), the consistency of the responses, and compliance with the questionnaire guidelines to ensure there were no blank entries, duplicate entries, or illogical answers. Doubtful data were clarified with the respondents (when possible) or corrected based on field notes.

2. Coding

The complete data was then coded so it could be analyzed statistically. The variable for the occurrence of Dyspepsia Syndrome was coded as 1 = Dyspepsia and 0 = No Dyspepsia (based on the Rome IV criteria). The stress level variable was categorized as normal, mild, moderate, severe, and very severe according to the DASS-42 standard. The dietary pattern (regularity) variable was coded as 1 = Irregular and 0 = Regular. Consumption of irritating foods was categorized as 1 = At Risk (Frequent) and 0 = Not at Risk (Rare) based on the FFQ score. History of NSAID use was coded as 1 = Yes and 0 = No, and sleep quality was categorized as 1 = Poor and 0 = Good based on the

PSQI score. All codes were established in accordance with the study's operational definitions.

3. Classifying (Data Classification)

Setelah diberi kode, data diklasifikasikan berdasarkan jenis variabel. Variabel independen dalam penelitian ini adalah tingkat stres, pola makan, konsumsi makanan iritatif, riwayat penggunaan OAINS, dan kualitas tidur, sedangkan variabel dependennya adalah kejadian sindrom dispepsia pada mahasiswa keperawatan. Data juga dikelompokkan menurut karakteristik responden seperti usia, jenis kelamin, dan tingkat semester. Klasifikasi ini memudahkan peneliti menyusun profil responden dan menentukan bentuk analisis statistik yang digunakan.

4. Saving (Data Storage)

The data, which had undergone editing, coding, and classification, was then stored in digital form using Microsoft Excel and subsequently analyzed using SPSS (Statistical Package for the Social Sciences). A copy of the data was saved as a backup file on another storage medium (USB flash drive or cloud storage) to ensure security and prevent data loss, while the physical questionnaires (if any) were retained as supporting documents.

5. Tabulating (Data Tabulation)

The tabulation stage involved organizing data that had undergone editing, coding, and classification into tables using Microsoft Excel and SPSS. The data were first presented in univariate tables showing the frequency distributions and percentages for each variable—such as the incidence of dyspeptic syndrome, stress level categories, dietary patterns, consumption of irritating foods, NSAID use, and sleep quality—thereby providing an overview of the respondents' profiles. Next, bivariate tables were created in the form of cross-tabulations between each independent variable and the incidence of dyspepsia syndrome as the dependent variable, which then served as the basis for conducting the Chi-Square statistical test during the data analysis stage.

G. Analisis Data

1. Univariate Analysis

Univariate analysis was used to describe the distribution of each study variable. The dependent variable the occurrence of dyspepsia syndrome was presented as a frequency distribution and as the percentage of respondents who experienced dyspepsia and those who did not (based on the Rome IV criteria). Independent variables, including stress levels, eating patterns (regularity), consumption of irritating foods/beverages, history of NSAID use, and sleep quality, were also analyzed univariately. Stress levels were categorized as normal, mild, moderate, severe, and very severe based on the DASS-42 score; eating patterns were presented in the categories of regular and irregular; consumption of irritating foods was categorized as high-risk (frequent) and low-risk (rare) based on the modified FFQ score; history of NSAID use was categorized as yes (ever) and no (never); and sleep quality was categorized as good and poor based on the PSQI score. The results of the univariate analysis are presented in frequency and percentage distribution tables according to Arikunto, 2019, with values of 0% (a small portion), 1%–24% (nearly half), 25%–49% (nearly half), 50% (half), 51%–74% (the majority), 75%–99% (nearly half), and 100% (all), providing an overview of the profile of nursing students at the Bengkulu Ministry of Health Polytechnic (Poltekkes Kemenkes Bengkulu).

2. Bivariate Analysis

Bivariate analysis was used to determine the relationship between each independent variable (stress level, dietary patterns, consumption of irritating foods/beverages, history of NSAID use, and sleep quality) and the occurrence of dyspepsia syndrome as the dependent variable. Since all analyzed variables were categorical, the Chi-Square test was used with a significance level (alpha) of 0.05. The results of the analysis were considered statistically significant if the p-value was < 0.05. Additionally, the magnitude of the risk in each category of independent variables for the occurrence of dyspeptic syndrome was indicated by the prevalence ratio (PR) or odds ratio (OR) along with the 95% confidence interval (CI). The results of the bivariate analysis are presented in a cross-tabulation table between the independent variables and the occurrence

of dyspeptic syndrome, accompanied by p-values and PR/OR values, thereby illustrating the presence or absence of a significant association as well as the magnitude of the risk.

Table 1 Bivariate Test

No.	Independent Variables	Dependent Variables	Data Scale	Statistical Tests	Main Output
1.	Stress Level (Normal / Stressed)	Occurrence of Dyspepsia Syndrome (Yes / No)	Categorical	Chi-Square	p-value, pR/OR, CI 95%
2.	Eating habits (Regular / Irregular	Occurrence of Dyspepsia Syndrome (Yes / No)	Categorical	Chi-Square	p-value, pR/OR, CI 95%
3.	Consumption of Irritating Foods (High-Risk / Low-Risk)	Occurrence of Dyspepsia Syndrome (Yes / No)	Categorical	Chi-Square	p-value, pR/OR, CI 95%
4.	History of NSAID Use (Yes / No)	Occurrence of Dyspepsia Syndrome (Yes / No)	Categorical	Chi-Square	p-value, pR/OR, CI 95%
5.	Sleep Quality (Good / Poor)	Occurrence of Dyspepsia Syndrome (Yes/No)	Categorical	Chi-Square	p-value, pR/OR, CI 95%

H. Research Procedures and Research Process

1. Conducting the preliminary research

   Before the study was conducted, the researcher first obtained a preliminary study permit and research approval (ethical clearance) from the Health Research Ethics Committee (KEPK), as well as permission to proceed from the Chair of the Nursing Department at the Bengkulu Public Health Polytechnic (Poltekkes Kemenkes). These permits serve as the legal basis for conducting the research and ensure that all research procedures comply with ethical standards, including the principles of respect for persons, justice, and beneficence.

2. Research Implementation

   After obtaining official permission, the researchers coordinated with the Academic Administration Office (BAA) of the Department of Nursing to obtain data on the number of active students (Associate's and Applied Bachelor's degree programs) to serve as the sampling frame. The researcher then selected study participants using the proportionate stratified random sampling technique, in which the sample size was calculated proportionally based on semester level and class to reach a total target of 196 participants. Selected participants were briefed on the purpose, benefits, and procedures of the study, as well as assurances regarding data confidentiality. For respondents who agreed to participate, the researcher asked them to sign an informed consent form. Data collection was conducted through the completion of a questionnaire (both in person and online using Google Forms), which included:

   a. Stress Level: Measured using the Stress Level Questionnaire (adapted from the stress subscale of the DASS-42).
   b. Eating Patterns (Regularity): Measured using the Dietary Habits Questionnaire.
   c. Consumption of Irritating Foods: Measured using a modified FFQ (Food Frequency Questionnaire) that assesses the frequency of consumption of spicy, acidic, and coconut-milk-based foods, as well as caffeine.

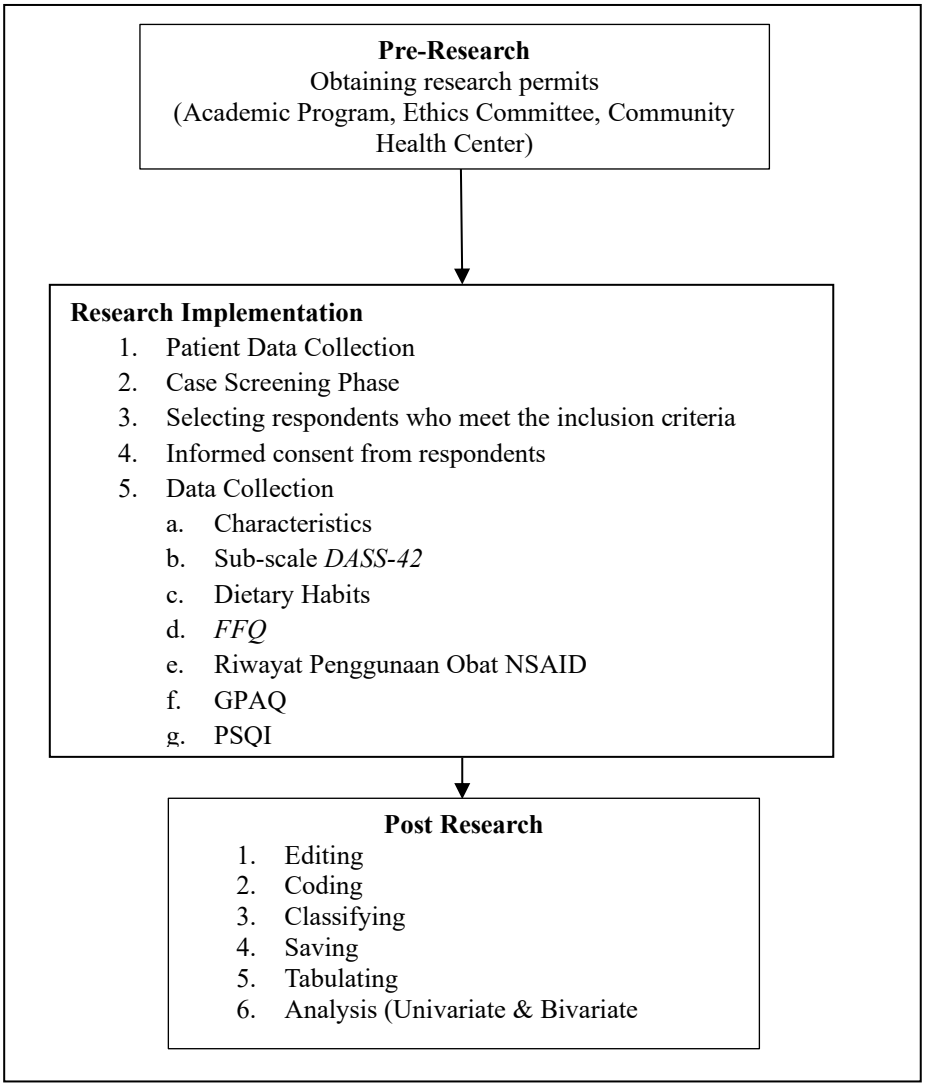
d. History of NSAID use: Assessed using the pain reliever (NSAID) usage history checklist.
e. Sleep Quality: Measured using the Pittsburgh Sleep Quality Index (PSQI) questionnaire.
f. Incidence of Dyspepsia Syndrome: Identified using the Rome IV Criteria diagnostic questionnaire.

In addition, data on respondent characteristics such as age, gender, and semester level were recorded using a subject identification form (biographical data).

Post-research activities

After data collection was completed, the researchers reviewed (edited) the questionnaire responses to ensure there were no blank or invalid entries. The complete data was then coded and entered into a computerized system (SPSS). The final stage involved data analysis using univariate (frequency distribution) and bivariate (Chi-Square test) statistical analyses to address the research.

3. Research Process



Charts 1 Research Process

I. Research Ethics

The primary goal of research ethics is to ensure the confidentiality of respondents' personal data. In this study, the research subjects are patients with thalassemia major; therefore, the application of research ethics is crucial for establishing boundaries and identifying considerations during the conduct of the study. The principles of research ethics applied are as follows:

1. Before the study begins, the researcher provides a full explanation of the study to be conducted and obtains written informed consent from potential research participants.

2. Each research subject is given the opportunity to ask questions and has the right to fully understand the research.
3. Participation in this study is strictly voluntary.
4. Research participants have the freedom to refuse to participate in the study or to withdraw from it without facing any penalties.
5. The researcher will use polite language that is easy for the research subjects to understand in order to create a comfortable atmosphere during the interviews. All research subjects will be treated equally and fairly.
6. Researchers have a duty to protect the privacy and confidentiality of respondents' data
7. All costs associated with the research will be the responsibility of the researcher.

J. Schedule of Activities

Table 2 Research Process

No	Kegiatan	Bulan											
		9	10	11	12	1	2	3	4	5	6	7	8
1	Completion of the Thesis Proposal	■	■										
2	Thesis Proposal Seminar Examination			■									
3	Revision and Approval of the Thesis Proposal			■	■								
4	Submission of the Thesis Proposal to the Study Program			■	■								
5	Obtaining Ethical Clearance				■	■	■						
6	Obtaining Research Introduction and Permission Letters						■						
7	Preliminary Research Survey							■					
8	Conducting the Research and Data Collection								■	■			
9	Obtaining the Certificate of Research Completion									■			
10	Data Entry, Analysis, and Interpretation of Research Findings									■			
11	Preparation of the Research Report									■			
12	Thesis Examination										■		
13	Thesis Revision											■	■
14	Thesis Approval by the Board of Examiners and the Head of the Study Program												■
15	Submission of the Thesis to the Study Program											■	■
16	Submitting Manuscript to Scientific Journal												■
17	Submitting the Journal Article Letter												■

	of Acceptance (LOA) to the Study Program												
18	Submission of the Published Journal Article to the Study Program												