CHAPTER III
CONCEPTUAL FRAMEWORK, RESEARCH HYPOTHESIS, AND OPERATIONAL DEFINITIONS

A. Conceptual Framework

A research conceptual framework illustrates the relationships among the concepts being observed or measured in accordance with the research objectives and is developed based on the theoretical framework presented in the literature review. The conceptual framework serves as a guide for analyzing and interpreting the research findings (Masriadi *et al*., 2022). This study aims to analyze the difference in fatigue severity between patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those using a catheter double lumen (CDL) as vascular access at the Hemodialysis Unit of Bengkulu Regional General Hospital in 2026.

Based on the theoretical foundation described above, the researcher developed the following conceptual framework:

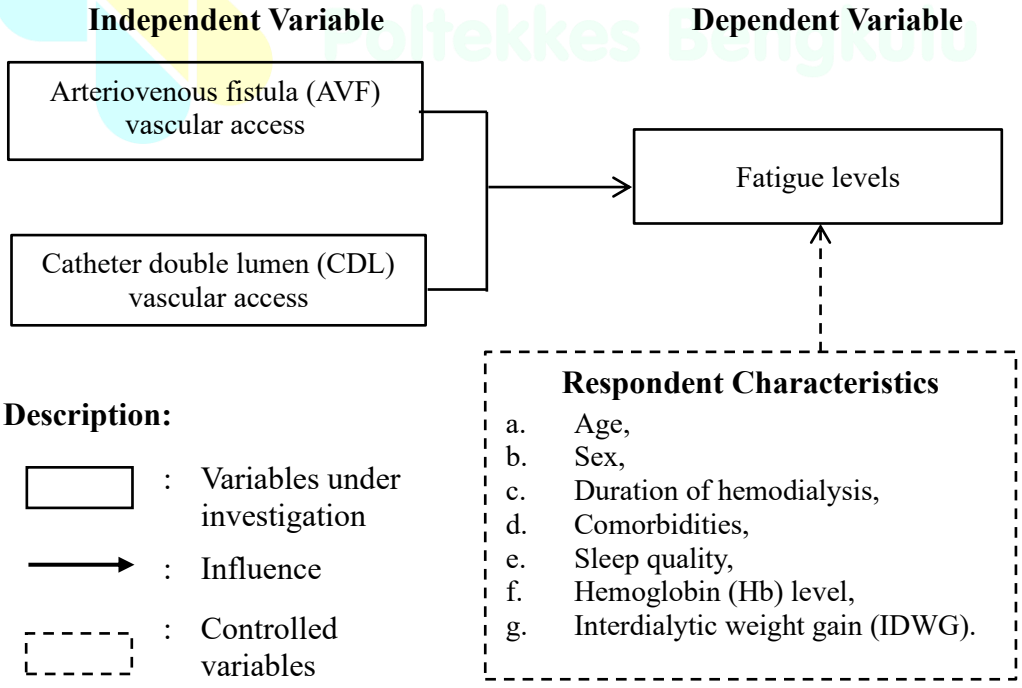

Diagram 3.1 Conceptual Framework

B. Operational Definitions

Operational definitions describe the boundaries of the research variables and the aspects measured for each variable. Each variable should be clearly specified, including its conceptual definition, measurement method or procedure, measurement outcomes or categories, and the scale of measurement (Masriadi *et al*., 2022).

Table 3.1 Operational Definitions of the Independent Variable, Dependent Variable, and Respondent Characteristics (Controlled Variables)

Variable	Operational Definitions	How to Measure	Measuring Instrument	Measure-ment Results	Scale
Independent Variable					
Arteriove-nous fistula (AVF) vascular access	Patients undergoing maintenance hemodialysis using an arteriovenous fistula (AVF), created by surgically connecting an artery and a vein in the arm to provide permanent vascular access for hemodialysis.	Direct observation of the type of vascular access used by each participant and/or review of the participant's medical records.	Medical records or clinical observation form.	0 = CDL vascular access 1 = AVF vascular access	Nominal
Catheter double lumen (CDL) vascular access	Patients undergoing hemodialysis using a catheter double lumen (CDL) as temporary vascular access through a central venous catheter inserted into the internal jugular, subclavian, or femoral vein, with two lumens for blood flow.	Direct observation of the type of vascular access used by each participant and/or review of the participant's medical records.	Medical records or clinical observation form.	0 = CDL vascular access 1 = AVF vascular access	Nominal

Dependent Variable					
Fatigue levels	A subjective, persistent, and pervasive feeling of fatigue experienced by patients with chronic kidney disease (CKD) prior to undergoing maintenance hemodialysis using either an arteriovenous fistula (AVF) or a catheter double lumen (CDL) as vascular access. Fatigue severity was measured using the validated *Functional Assessment of Chronic Illness Therapy–Fatigue (FACIT-Fatigue) Scale, Version 4*.	Fatigue severity was assessed through a structured interview using the *FACIT-Fatigue Scale, Version 4*, which consists of 13 items. Respondents were asked to select one response for each item on a 5-point Likert scale ranging from 0 to 4, where 4 = Not at all, 3 = A little bit, 2 = Somewhat, 1 = Quite a bit, and 0 = Very much. The scoring for Items 7 and 8 was reverse-coded. The total score ranges from 0 to 52. A total score of < 30 indicates severe fatigue, whereas higher scores indicate lower fatigue severity and better health-related quality of life.	The Indonesian version of the *FACIT-Fatigue Scale, Version 4*, which has been translated and validated for use in Indonesia, was employed in this study.	The total score ranges from 0 to 52, For descriptive analysis, fatigue severity was categorized as follows: 0 = Severe fatigue, 0-29 1 = Mild fatigue, 30-52 (Maesaroh & Agung, 2020; Sihombing *et al*., 2016; Tennant, 2019).	Interval
Respondent Characteristics (Controlled Variables)					
Age	The respondent's age, calculated from birth until the date of data collection.	Interview	Respondent data collection questionnaire	0 = > 50 years 1 = 35-50 years	Ordinal

				2 = < 35 years (Alshammari *et al*., 2024).	
Sex	The respondent's biological sex as recorded in the official civil registration data at birth.	Interview	Respondent data collection questionnaire	0 = Female 1 = Male (Mailani *et al*., 2025).	Nominal
Duration of hemodialysis	The length of time the respondent has been receiving routine maintenance hemodialysis, calculated from the date of the first hemodialysis session until the time of data collection.	Medical records and respondent interviews.	The duration of hemodialysis was obtained by reviewing the patient's medical records and confirmed through direct interviews with the respondents.	0 = > 3 years 1 = 1 – 3 years 2 = < 1 years (Mailani *et al*., 2023).	Ordinal
Comorbidities	The presence of one or more medical conditions other than chronic kidney disease (CKD) experienced by the respondent, as diagnosed by a physician and documented in the patient's medical record.	Medical records and respondent interviews.	Respondent data collection questionnaire and review of diagnoses documented in the patient's medical records.	0 = ≥ 3 Comorbidities 1 = 1-2 Comorbidities 2 = < 1 Comorbidities (Alshammari *et al*., 2024).	Nominal
Sleep quality	The respondent's subjective perception of sleep quality and sleep patterns during the previous month, measured using the Indonesian version of the	Structured interviews were conducted using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. The questionnaire consists of 19	Indonesian version of the *Pittsburgh Sleep Quality Index* (PSQI) questionnaire.	The total PSQI score ranges from 0 to 21 and is categorized as follows:	Ordinal

	Pittsburgh Sleep Quality Index (PSQI).	items that generate seven component scores. Each component is rated on a four-point scale ranging from 0 to 3, with higher scores indicating poorer sleep quality.		0 = Poor sleep quality, total score 6-21 1 = Good sleep quality, total score ≤ 5 (Alim Ikbal *et al*., 2015; Mustofa *et al*., 2022).	
Hemoglobin (Hb) level	Hemoglobin (Hb) level measured before the patient undergoes hemodialysis.	Medical records (laboratory test results) or direct measurement performed by the researcher using the *EasyTouch GCHb* device.	Review of laboratory test results documented in the patient's medical records.	0 = 7.0 - < 10.0 g/dl 1 = 10.0-11.0 g/dl 2 = > 11.0 g/dl (Hara *et al*., 2020).	Ordinal
Interdialytic weight gain (IDWG)	The increase in body weight between two consecutive hemodialysis sessions, calculated as the difference between the post-hemodialysis body weight from the previous session and the pre-hemodialysis body weight of the current session.	Body weight data were obtained from the hemodialysis observation record.	Weighing scale and hemodialysis observation record. Formula: (Pre HD bodyweight – Previous post HD bodyweights) / Previous post HD bodyweights x 100%.	0 = High risk (> 6 %) 1= Moderate (4 % - 6 %) 2 = Mild (< 4 %) (Wayunah, 2022).	Ordinal

C. Research Hypothesis

A research hypothesis is a tentative answer or preliminary assumption regarding the relationship between two or more variables. Its validity must be verified through scientific investigation and empirical testing. A hypothesis is formulated based on the facts and evidence related to the research problem (Masriadi *et al*., 2022). The hypothesis of this study is as follows:

Ha : There is a significant difference in the *mean* fatigue levels between patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those undergoing maintenance hemodialysis using a catheter double lumen (CDL) as vascular access.