BAB III

METHODS
Study Design and Participants

This study employed a quantitative research approach using a survey method combined with measurement and testing techniques. This design examined the causal relationships between multiple variables on cardiorespiratory endurance, specifically body composition, hemoglobin, and motivation. The research was conducted at Universitas Islam 45, Bekasi, Indonesia, involving athletes from the university's Pencak Silat student activity unit or Unit Kegiatan Mahasiswa (UKM). The total population consisted of 20 athletes who regularly participated in training sessions. Demographic data collected included age, gender, height, and weight, which are essential for calculating body composition and providing descriptive insights into the sample characteristics.

Ethical approval statement

Ethical clearance No. E.1.098/UNISMA.LPPM/E/V/2025 for this research was obtained from the LPPM Universitas Islam 45 Bekasi, Indonesia.

Research Instruments

Several standardized instruments were employed to measure the key variables in the study. Cardiorespiratory endurance was assessed using the multistage fitness test (bleep test). Body Mass Index (BMI) was calculated using the formula $BMI = weight\ (kg)\ /\ height^2\ (m^2)$ to represent body composition. Hemoglobin was measured using the Harenz scale, a fieldappropriate method for quick hemoglobin assessment. Motivation was evaluated using a Likert-scale questionnaire, with a Cronbach's alpha of 0.80, indicating good reliability (Manouchehri et al., 2015), designed to capture the participants' intrinsic and extrinsic motivation toward physical activity. All instruments were selected for relevance and practicality in a university sports setting.

Data Analysis

The data analysis technique used to analyze the causal relationships between multiple variables, specifically body composition, hemoglobin, and motivation, on cardiorespiratory endurance. The study utilized path analysis, a statistical technique suitable for evaluating the direct and indirect effects among variables within a multivariate framework.