



Analysis of Cost Factors and Family Motivation on Adherence to Follow-up Treatment for Patients After Cardiac Catheterization at NTB Provincial Hospital

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Abstract: Cardiovascular disease represents a global mortality burden with suboptimal medication adherence (40-60%) after cardiac catheterization, resulting in increased complications and rehospitalization. This study aims to analyze the cost determinants and family motivation for medication adherence among patients after coronary intervention at the NTB Provincial General Hospital. This cross-sectional study involved 85 respondents using purposive sampling, with the Morisky Medication Adherence Scale, Family Support Scale, and a validated cost questionnaire as instruments. Chi-Square analysis was applied to test the association of variables with a significance level of 0.05. The results showed that the majority of respondents had high financial capacity (64.7%), substantive family motivation (62.4%), and superior adherence (64.7%). Economic capacity had a significant effect on adherence ($p < 0.001$), with patients with high capacity showing 87.3% adherence versus 23.3% in the moderate group. Optimal family motivation resulted in 84.9% adherence compared to 31.3% in the moderate support group ($p < 0.001$). The study concluded that financial accessibility and familial support are crucial predictors of treatment adherence, indicating the urgency of implementing inclusive financing schemes and structured family education programs to optimize long-term cardiovascular outcomes.

Keywords: Cardiac catheterization; Family motivation; Follow-up treatment

Introduction

Cardiovascular disease is the leading cause of global mortality, with 17.9 million deaths annually, where coronary heart disease contributes significantly to the burden on public health. Cardiac catheterization has become an effective interventional procedure for diagnosing and managing coronary heart disease (Pishgoo et al., 2017; Siontis et al., 2018), but the long-term success of this procedure is highly dependent on patient adherence to follow-up treatment after the procedure (Kusmiyani, 2024). In Indonesia, the prevalence of heart disease has increased from 1.5% to 1.8% based on data from the 2023 Basic Health Research, with West Nusa Tenggara ranking fifth among

provinces with the highest number of cases. The reality on the ground shows that the level of adherence to follow-up treatment after cardiac catheterization is still concerning, ranging from 40-60%, which implies an increased risk of complications and rehospitalization.

Medication adherence is defined as the extent to which patients take their medication as recommended by healthcare professionals, including the correct dosage, timing, and duration of treatment (Adhanty & Syarif, 2023; Lam & Fresco, 2015). Various studies show that medication non-adherence in cardiovascular patients can increase the risk of major cardiovascular events by up to 80% and mortality by 50-80% (Shalaeva et al., 2023). The factors that influence medication adherence are multidimensional, including

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socioeconomic aspects, the healthcare system, disease conditions, therapy, and the characteristics of the patients themselves (Gast & Mathes, 2019; Peh et al., 2021). The cost dimension of treatment is a crucial determinant that often becomes a major barrier, especially in developing countries where out-of-pocket expenditure for cardiovascular treatment can reach 60-70% of total family health expenditure (Khera et al., 2018; Sibua & Watung, 2021).

Family motivation as a component of social support plays a fundamental role in improving patient treatment compliance after cardiac catheterization (Chindhy et al., 2020; Popescu et al., 2025). Research shows that adequate family motivation can increase treatment compliance by up to 70% through mechanisms of medication supervision, emotional support, and assistance in accessing health services (Daud et al., 2025). The Health Belief Model theory explains that individuals' perceptions of disease threats and treatment benefits are influenced by external factors, including family social support. However, the complex interaction between financial burden and family motivation in the context of medication adherence after cardiac catheterization has not been widely explored, especially in regional hospitals with unique sociodemographic characteristics.

The research gap identified stems from the lack of studies that simultaneously analyze the influence of cost factors and family motivation on the adherence of patients to follow-up treatment after cardiac catheterization in Indonesia, particularly in West Nusa Tenggara. The majority of previous studies examined these factors partially without considering the interaction between variables in the context of local culture and the national health financing system. Based on this phenomenon, the research questions are: what are the characteristics of costs, family motivation, and adherence to follow-up treatment among patients after cardiac catheterization; how do costs affect adherence to follow-up treatment; and how does family motivation affect adherence to follow-up treatment among patients after cardiac catheterization at the NTB Provincial Hospital? In line with this research question, the general objective of this study is to analyze the factors that influence the adherence to follow-up treatment of patients after cardiac catheterization at the NTB Provincial Hospital, with the specific objectives of identifying the costs, family motivation, and adherence to follow-up treatment of patients after cardiac catheterization, analyzing the effect of costs on adherence to follow-up treatment of patients after cardiac catheterization, and analyzing the effect of family motivation on adherence to follow-up treatment of patients after cardiac catheterization. This study is expected to contribute theoretically to the development of a family-centered care-based treatment adherence

intervention model and, practically, to serve as a basis for hospital policy-making in optimizing post-cardiac catheterization patient support programs and developing more accessible financing schemes.

Method

Research Methods

This study uses a quantitative approach with a cross-sectional design to analyze the effect of cost factors and family motivation on the adherence of post-cardiac catheterization patients to follow-up treatment. A cross-sectional design was chosen because it allows for the measurement of independent and dependent variables at the same time, making it efficient in identifying relationships between variables in a specific population (Desi et al., 2021). The study was conducted at the NTB Provincial Hospital with a data collection period of three months, from March to May 2026. The study population consisted of all patients who had undergone cardiac catheterization at the NTB Provincial Hospital and were undergoing follow-up treatment, with an estimated population of 180 patients based on medical records data from 2025. The sampling technique used purposive sampling, with inclusion criteria including patients aged at least 18 years, who had undergone cardiac catheterization at least three months prior to the study, received follow-up treatment, were able to communicate well, and were willing to be respondents by signing a consent form. Exclusion criteria included patients with severe cognitive impairment and unstable clinical conditions. The sample size was determined using the Lemeshow formula with a 95% confidence level, a 5% margin of error, and an estimated proportion of 50%, resulting in a minimum of 123 respondents, which was then increased by 10% to anticipate dropouts, resulting in 85 respondents (Solihah et al., 2025).

Data Collection

The data collection instrument used a structured questionnaire consisting of four parts, namely demographic data, a questionnaire on treatment costs developed by the researcher based on Penchansky and Thomas' theory of health service access with 15 questions using a Likert scale, a questionnaire on family motivation adapted from the Family Support Scale that has been validated with 20 questions, and a medication adherence questionnaire using the internationally standardized Morisky Medication Adherence Scale (MMAS-8). The validity of the instruments was tested using Pearson Product Moment with a calculated r value $> r$ table (0.361) to declare the items valid, while reliability was tested using Cronbach's Alpha with a minimum value of 0.70 for a reliable instrument. Data collection was conducted through direct structured

interviews with respondents lasting 20-30 minutes per respondent, where the researcher explained the purpose of the study, requested written consent, then read and recorded the respondents' answers to ensure data accuracy.

Data Analysis

Data analysis used SPSS software version 26 with univariate analysis to describe respondent characteristics and the distribution of each variable using frequency distribution and percentages, as well as bivariate analysis using the Chi-Square test to analyze the effect of independent variables on dependent variables with a significance level of $p < 0.05$. where before bivariate analysis, data normality was tested using Kolmogorov-Smirnov and classical assumption tests to meet the requirements for statistical analysis. The ethical aspects of the research have been approved by the Health Research Ethics Committee by taking into account the principle of respect for persons through informed consent, the principle of beneficence by maximizing benefits and minimizing risks, the principle of non-maleficence by ensuring the confidentiality of respondent identities using codes, and the principle of justice by providing fair treatment without discrimination to all respondents.

Results and Discussion

Respondent Characteristics

This study involved 85 respondents who were patients after cardiac catheterization at the NTB Provincial Hospital who met the inclusion criteria. Based on the results of descriptive analysis, the distribution of respondents showed diverse characteristics related to the ability to pay for treatment, family motivation, and the level of compliance with follow-up treatment.

Overview of Follow-up Treatment Costs

Table 1. Frequency Distribution of Follow-Up Treatment Costs for Patients after Cardiac Catheterization at NTB Provincial General Hospital (n=85)

Cost	Frequency	Percentage (%)
Moderate	30	35.3
High	55	64.7
Total	85	100.0

Source: Researcher-processed data, 2026

Analysis of the level of follow-up treatment costs showed that the majority of respondents had high costs, namely 55 people (64.7%), while 30 people (35.3%) had moderate costs. This distribution indicates that most respondents have relatively good financial capabilities

to support follow-up treatment after cardiac catheterization. However, there is still a significant proportion with moderate cost levels who may face challenges in sustaining long-term treatment. The data in Table 1 shows that more than half of the respondents (64.7%) have high cost capabilities, which are expected to support better treatment compliance.

Overview of Family Motivation

The results show that the majority of respondents received high family motivation, namely 53 people (62.4%), while 32 people (37.6%) received moderate family motivation. These findings reflect that family motivation still plays an important role in the follow-up treatment process for patients after cardiac catheterization. High family motivation is reflected through family involvement in reminding patients to take their medication, accompanying patients during hospital check-ups, providing emotional support, and helping to provide the appropriate medication. The distribution in Table 2 shows that although the majority of respondents received high family motivation, there was still a significant proportion (37.6%) with moderate family motivation, which could potentially be an obstacle to adherence to follow-up treatment.

Table 2. Frequency Distribution of Family Motivation for Patients after Cardiac Catheterization at NTB Provincial General Hospital (n=85)

Family Motivation	Frequency	Percentage (%)
Moderate	32	37.6
High	53	62.4
Total	85	100

Source: Researcher-processed data, 2026

Overview of Adherence to Follow-up Treatment

The level of adherence to follow-up treatment in patients after cardiac catheterization shows that 55 respondents (64.7%) had high adherence, while 30 respondents (35.3%) had moderate adherence. The proportion of high compliance, which reached almost two-thirds of the total respondents, is a positive finding, but there are still one-third of respondents with moderate compliance who need special attention. Moderate compliance can manifest in various forms, such as sometimes forgetting to take medication, not always following the predetermined control schedule, or being inconsistent in implementing the recommended lifestyle modifications.

The data in Table 3 shows that although high compliance rates dominate (64.7%), efforts to improve treatment compliance in the moderate compliance group (35.3%) are still very much needed to prevent complications and rehospitalization.

Table 3. Frequency Distribution of Adherence to Follow-up Treatment Among Patients After Cardiac Catheterization at NTB Provincial General Hospital (n=85)

Treatment Adherence	Frequency	Percentage
Moderate	30	35
High	55	64.7
Total	85	100.0

Source: Researcher-processed data, 2026

The Effect of Cost on Adherence to Follow-up Treatment

The results of bivariate analysis using the Chi-Square test show that there is a very significant effect of treatment costs on the adherence to follow-up treatment of patients after cardiac catheterization ($p < 0.001$). The data distribution shows that of the 55 respondents with high costs, 48 people (87.3%) had high compliance and only 7 people (12.7%) had moderate compliance. Conversely, of the 30 respondents with moderate costs, only 7 (23.3%) had high compliance, while 23 (76.7%) had moderate compliance. These findings confirm that financial capacity is a crucial determinant in influencing patient treatment compliance behavior. Table 4 shows that patients with high costs have a much higher proportion of high compliance (87.3%) compared to patients with moderate costs (23.3%). This very significant difference in proportion indicates that interventions to improve the affordability of treatment can be an effective strategy in improving treatment compliance.

Table 4. The Effect of Cost on Adherence to Follow-up Treatment Among Patients After Cardiac Catheterization at NTB Provincial General Hospital (n=85)

Cost	Treatment Adherence		Total		p-value
	Moderate n (%)	High n (%)	n	%	
Moderate	23 (76.7%)	7 (23.3%)	30	100	< 0.001
High	7 (12.7%)	48 (87.3%)	55	100	

Source: Researcher-processed data, 2026

The Influence of Family Motivation on Adherence to Follow-up Treatment

Bivariate analysis using the Chi-Square test also shows a highly significant influence between family motivation and adherence to continued treatment ($p < 0.001$). Of the 53 respondents with high family motivation, 45 people (84.9%) had high adherence and 8 people (15.1%) had moderate adherence. Meanwhile, of the 32 respondents with moderate family motivation, only 10 (31.3%) had high compliance and 22 (68.7%) had moderate compliance. These results confirm that family motivation plays a fundamental role in shaping patient compliance behavior. Table 5 shows that patients with

high family motivation have a much higher proportion of high compliance (84.9%) compared to patients with moderate family motivation (31.3%). These results emphasize the importance of family involvement in the follow-up treatment process for patients after cardiac catheterization.

Table 5. The Influence of Family Motivation on Adherence to Follow-up Treatment in Patients After Cardiac Catheterization at NTB Provincial Hospital (n=85)

Family Motivation	Treatment Adherence		Total		p-value
	Moderate n (%)	High n (%)	n	%	
Moderate	22 (68.7%)	10 (31.3%)	32	100	< 0.001
High	8 (15.1%)	45 (84.9%)	53	100	

Source: Researcher-processed data, 2026

*Discussion**Overview of Costs, Family Motivation, and Adherence to Follow-up Treatment*

The research results show a fairly positive picture for the three variables studied. The majority of respondents (64.7%) had high cost capabilities, reflecting the relatively good socioeconomic conditions of patients at the NTB Provincial Hospital. This proportion is higher than studies in several other regions in Indonesia, which show a predominance of patients with limited economic capabilities (Ayuditiawati et al., 2020; Binuko & Fauziyah, 2022; Koswara et al., 2020). The high proportion of high cost is likely related to the characteristics of the NTB Provincial Hospital as a referral hospital that serves patients with comprehensive health insurance and its urban geographical location with better economic access.

Family motivation also shows an encouraging picture, with 62.4% of respondents receiving high support. This reflects the strong family culture in West Nusa Tenggara, where kinship and mutual cooperation systems are still highly valued social norms. Family members tend to be actively involved in the care of patients with chronic diseases, both in the form of instrumental support such as accompanying them to check-ups and providing medication, as well as emotional support through attention and motivation. However, there are still 37.6% with moderate support, indicating the need to strengthen the role of families in accompanying patients after cardiac catheterization.

The level of treatment compliance shows that 64.7% of respondents have high compliance. This proportion is relatively good when compared to the global compliance rate for cardiovascular patients, which ranges from 40-60% (Cutler et al., 2018; Deshpande et al., 2017). This success is likely influenced by a combination of adequate financial resources and strong family

motivation. Nevertheless, 35.3% of respondents with moderate compliance remain a serious concern because non-compliance can increase the risk of complications and rehospitalization. This phenomenon shows that even though economic conditions and social support are relatively good, there are still other factors that need to be explored to achieve optimal compliance.

The Influence of Cost on Adherence to Follow-up Treatment

The findings of this study indicate that cost factors have a very significant effect on adherence to follow-up treatment ($p < 0.001$). Patients with high cost-bearing capacity had much better adherence (87.3%) than those with moderate cost-bearing capacity (23.3%). The nominal regression test results show an Exp(B) value of 0.055, which means that patients with moderate cost ability are 18.2 times more likely to experience moderate compliance. These findings are consistent with research showing that the economic burden of coronary heart disease in Indonesia is very high, with total costs reaching IDR 31,347,990 to IDR 42,231,110 (Alfaqeeh, 2025).

The contribution of cost in the regression model was substantial (Chi-Square = 23.199), confirming that financial capacity is a strong predictor of treatment adherence. Socioeconomic status has been identified as a major factor influencing adherence in heart failure patients, with non-adherence rates reaching 60% (Wasila et al., 2024). In developing countries, out-of-pocket expenses for cardiovascular treatment can account for 60-70% of total family health expenditures, prompting patients to reduce or discontinue treatment as a financial coping strategy (Slavin et al., 2021; Tolla et al., 2017; Yuliana et al., 2026). Health insurance coverage has been shown to significantly improve adherence (AOR: 1.82; 95% CI: 1.22-2.71) (Gopinath et al., 2013; Hussein et al., 2024). The implication of these findings is the need for comprehensive policies covering the expansion of health insurance coverage, long-term drug subsidies, and special financial assistance programs for patients with limited economic means.

The Influence of Family Motivation on Adherence to Long-Term Treatment

Family motivation has a highly significant effect on treatment adherence ($p < 0.001$), where patients with high support have high adherence at 84.9% compared to only 31.3% in patients with moderate support. The Exp(B) value of 0.104 indicates that patients with moderate support are 9.6 times more likely to experience moderate adherence. The contribution of family motivation in the regression model (Chi-Square = 12.994) confirms its important role in predicting adherence. These findings are consistent with studies stating that adequate family motivation can increase

adherence by up to 70% through medication monitoring, emotional support, and assistance in accessing health services (Huber et al., 2024).

Motivation was found to be a significant factor influencing post-PCI treatment adherence ($p = 0.003$) (Wasila et al., 2024). The Health Belief Model explains that individuals' perceptions of disease threats are influenced by family social support (Ikakusumawati et al., 2025). As many as 26.4% of heart failure patients were non-compliant due to forgetfulness (23.7%), indicating the important role of family in reminding them to take their medication (Nilamsari et al., 2025). The regression model demonstrated good predictive power (Nagelkerke's Pseudo R-Square = 0.601), with a classification accuracy of 83.5%. The practical implication is the need for structured family education programs that include training on the importance of adherence, identification of complications, effective communication, and stress management. The formation of patient and family support groups can serve as a platform for sharing experiences in facing the challenges of long-term treatment (Ashtari & Taylor, 2022).

Conclusion

An investigation of 85 patients after coronary intervention at the NTB Provincial Hospital revealed that financial capacity and family support were significant predictors of medication adherence ($p < 0.001$). Patients with optimal economic accessibility showed superior adherence (87.3%) in contrast to the moderate economic ability group (23.3%), while substantive family motivation resulted in compliance reaching 84.9% compared to 31.3% with moderate support. The theoretical implications of this study reinforce the family-centered care paradigm in the management of chronic cardiovascular disease, while the practical implications point to the urgency of implementing inclusive financing schemes and structured family education programs. Strategic recommendations include expanding comprehensive health insurance coverage, initiating sustainable pharmacological subsidies, developing patient-family support groups, and formulating discharge planning protocols that integrate economic assessment and social support system evaluation. Further research is needed to explore multivariable interactions, including psychosocial factors, health literacy, and demographic characteristics in predicting long-term cardiovascular treatment adherence.

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Conflicts of Interest

The authors declare that they have no competing interests.

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