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FACTORS ASSOCIATED WITH LENGTH OF STAY AMONG HEALTH INSURANCE PARTICIPANTS: A CASE STUDY AT INSURANCE COMPANY X IN 2025

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Abstract
Length of stay (LOS) is an important indicator of inpatient service utilization and claim efficiency in health insurance management. This study aims to analyze factors associated with LOS among health insurance participants at Insurance Company X in 2025. This research used a quantitative, non-experimental approach with a cross-sectional design and secondary data obtained from inpatient claim and membership records. A total of 499 inpatient cases were analyzed. The independent variables included gender, age, membership status, hospital type, and disease diagnosis category, while the dependent variable was LOS. Data were analyzed using univariate analysis and bivariate analysis with the Chi-square test. The results showed that gender was significantly associated with LOS ($p = 0.034$). Hospital type and disease diagnosis category were also significantly associated with LOS ($p < 0.001$). However, age ($p = 0.404$) and membership status ($p = 0.783$) were not significantly associated with LOS. These findings indicate that clinical and service-related factors are more relevant in explaining LOS variation than demographic or membership characteristics. The study provides practical insight for claim monitoring and inpatient utilization management in health insurance.
Keywords: Length of stay, health insurance, inpatient care, claim management, Chi-square

INTRODUCTION

Efficiency and quality are two essential objectives in the management of modern health care systems. In recent years, health care systems have faced increasing pressure due to rising medical costs, changes in disease patterns, the growing burden of chronic and degenerative diseases, and increasing public expectations regarding service quality and continuity of care (Buttigieg et al., 2018; Hirani et al., 2025). These conditions require health care providers and health financing institutions to ensure that services are not only clinically appropriate, but also efficient in terms of resource utilization.

Inpatient care is one of the most complex and costly components of health services. Compared with outpatient care, inpatient services require greater resource allocation, including hospital beds, multidisciplinary health professionals, medical supporting facilities, medicines, diagnostic examinations, and continuous clinical supervision. Because of this complexity, inpatient care is often a major concern in health care cost control, especially for institutions responsible for health care financing, including insurance companies (Abela, Pace, & Buttigieg, 2019).

One of the most widely used indicators to evaluate inpatient service utilization is length of stay (LOS). LOS refers to the number of days a patient stays in the hospital during one inpatient episode, from admission to discharge. This indicator is important because it reflects the duration of hospital resource use and may indicate the effectiveness of clinical management, service coordination, discharge planning, and hospital operational efficiency (Buttigieg et al., 2018; World Health Organization, 2022). A prolonged LOS may increase the total cost of care, the risk of hospital-acquired infection, and bed occupancy, while a very short LOS may increase the risk of readmission if

patients are discharged before achieving clinical stability (Abela, Pace, & Buttigieg, 2019; Hirani et al., 2025).

In the context of health insurance, LOS has strategic implications because it is directly related to claim costs and utilization management. Each additional inpatient day may increase claim components, including room charges, medical procedures, physician fees, nursing care, medicines, laboratory tests, radiology examinations, and other supporting services. Therefore, LOS is not only a clinical indicator but also an important managerial indicator for insurance companies in monitoring the appropriateness of inpatient care and controlling claim expenditure (Buttigieg et al., 2018; Hirani et al., 2025).

The role of insurance companies in managing inpatient care is becoming increasingly important. Insurance companies are not only responsible for claim payment, but also for ensuring that health services provided to participants are reasonable, medically necessary, and aligned with the benefits stated in the insurance policy. In Indonesia, the Financial Services Authority issued POJK Number 36 of 2025 concerning the strengthening of the health insurance ecosystem, emphasizing governance, risk management, and the sustainability of health insurance financing (OJK, 2025). This regulation reinforces the importance of claim review, utilization monitoring, and evaluation of inpatient service appropriateness.

Previous studies have shown that LOS is influenced by various factors. Patient characteristics such as age and gender may contribute to differences in recovery time and health service needs. Clinical factors, including diagnosis category, disease severity, comorbidities, and treatment complexity, may also determine the duration of hospitalization (Abela et al., 2019; Hirani et al., 2025). In addition, service-related factors such as hospital type, availability of facilities, clinical pathway implementation, coordination among health professionals, and discharge planning may affect whether a patient has a shorter or longer hospital stay (Advisory Board, 2019; Buttigieg et al., 2018).

However, the relationship between these factors and LOS is not always consistent across different research settings. Some studies have found that age and gender are significantly associated with LOS, while others have reported different findings depending on the population, disease characteristics, and health care system being studied (Buttigieg et al., 2018; Abela et al., 2019). Similarly, hospital type and diagnosis category may influence LOS because they are related to the complexity of services, hospital capacity, referral patterns, and patient case mix. These variations indicate that LOS should be analyzed within a specific institutional and population context.

In Indonesia, the issue of LOS is increasingly relevant because health care cost control has become an important concern in the health insurance industry. The Ministry of Health emphasizes that monitoring the duration of inpatient care is needed to ensure that hospitalization remains consistent with the patient's clinical condition, diagnosis, treatment plan, and medical needs (Kementerian Kesehatan Republik Indonesia, 2024). From the perspective of an insurance company, analyzing LOS

can provide evidence on whether inpatient utilization patterns are influenced more by participant characteristics, clinical conditions, or service-related factors.

Although research on LOS has been widely conducted, most previous studies have focused on the hospital perspective, particularly internal clinical processes and hospital management. Studies that specifically examine factors associated with LOS from the perspective of health insurance remain limited (Abela et al., 2019; Hirani et al., 2025). This creates a research gap because insurance companies require empirical evidence to understand inpatient utilization patterns among their participants and to support more effective claim management.

Based on this background, this study aims to analyze factors associated with length of stay among health insurance participants at Insurance Company X in 2025. The factors examined in this study include gender, age, membership status, hospital type, and disease diagnosis category. The findings are expected to provide practical insights for improving inpatient claim monitoring, utilization management, and health insurance cost control.

METHOD

Research Design

This study used a quantitative, non-experimental research design with a cross-sectional approach. A quantitative approach was applied because the study aimed to examine the relationship between measurable variables using numerical and categorical data. According to Creswell (2022), quantitative research is appropriate for testing relationships among variables through statistical measurement and objective data analysis.

The study was classified as non-experimental because the researcher did not provide any treatment, intervention, or manipulation of the research subjects. Instead, the study analyzed existing administrative and claim data that had been previously recorded by Insurance Company X. The cross-sectional design was used because all variables were observed and analyzed within one specific period, namely inpatient claim data in 2025. This design is suitable for examining associations among variables at a particular point in time, although it does not aim to explain causal relationships directly (Creswell, 2022; Hardani et al., 2020).

Data Source and Study Population

The data used in this study were secondary data obtained from the membership database and inpatient claim records of health insurance participants at Insurance Company X. Secondary data were selected because the required information had already been systematically documented in the company's administrative and claim system. Creswell (2022) explains that secondary data can be used in quantitative research when the data are relevant to the research objectives, accessible, and scientifically accountable.

The population of this study consisted of all health insurance participants of Insurance Company X who received inpatient care during 2025. The unit of analysis was inpatient claim cases recorded in the company's claim database. The data included demographic information, membership characteristics, clinical information, hospital classification, and length of stay. After applying the research criteria and data cleaning process, the final sample consisted of 499 inpatient cases.

Sampling Technique

This study used a non-probability sampling technique with a total sampling method. Total sampling was applied by including all inpatient cases that met the research criteria during the observation period. This method was considered appropriate because the entire population data were available and could be analyzed comprehensively. Creswell (2022) states that total sampling is suitable when researchers intend to use all accessible units of analysis to obtain a complete description of the phenomenon being studied.

The use of total sampling was also intended to maximize the representativeness of the sample and minimize selection bias. Since the study used administrative claim data, random sampling was not required as long as all eligible inpatient cases were included in the analysis.

Inclusion and Exclusion Criteria

The inclusion criteria in this study were: health insurance participants of Insurance Company X, participants who received inpatient care during 2025, and participants with complete data on age, gender, membership status, disease diagnosis category, hospital type, and length of stay. Meanwhile, the exclusion criteria were incomplete inpatient claim data, cases with unclear admission or discharge dates, and inpatient episodes outside the 2025 observation period.

These criteria were established to ensure that the data analyzed were consistent with the research objectives and suitable for statistical testing. In secondary data-based research, data completeness and consistency are important because they determine the validity of the analysis and the accuracy of the interpretation (Sahir, 2021).

Research Variables

The dependent variable in this study was length of stay (LOS). LOS was defined as the number of days a participant stayed in the hospital during one inpatient episode, calculated based on the difference between the discharge date and the admission date. In the analysis, LOS was categorized into two groups: non-prolonged LOS and prolonged LOS. Non-prolonged LOS referred to inpatient stays of four days or less, while prolonged LOS referred to inpatient stays of more than four days.

The independent variables consisted of gender, age, membership status, hospital type, and disease diagnosis category. Gender was categorized into male and female. Age was measured in years

and then grouped into age categories for statistical analysis. Membership status was classified as principal or dependent. Hospital type was categorized based on the classification of the hospital where the participant received inpatient care. Disease diagnosis category was based on the diagnosis classification recorded in the medical claim data. These variables were selected based on previous studies indicating that patient characteristics, clinical conditions, and service-related factors may influence LOS (Buttigieg et al., 2018; Abela et al., 2019; Hirani et al., 2025).

Data Collection Technique

The data collection technique used in this study was documentation. The researcher reviewed and extracted relevant data from the company's administrative documents and inpatient claim database. No questionnaire, interview, or direct observation was used because the study relied entirely on secondary data.

The documentation technique is appropriate for research using existing records, archives, or institutional databases. Hardani et al. (2020) explain that documentation is suitable when the required data are already available in official records and can be used to obtain factual and objective information. In this study, the data collected included age, gender, membership status, disease diagnosis category, hospital type, and length of stay.

Data Processing Procedure

The data processing procedure was carried out through several stages. First, the researcher identified the relevant data sources, namely the membership data and inpatient claim data of Insurance Company X in 2025. Second, the researcher selected data according to the inclusion and exclusion criteria. Third, data completeness was checked, particularly for variables required in the analysis. Fourth, data cleaning was conducted by removing incomplete, duplicate, or inconsistent records. Fifth, categorical variables such as gender, membership status, hospital type, and disease diagnosis category were coded to support statistical analysis. Finally, the final dataset was prepared for analysis using statistical software.

This systematic data processing procedure was necessary to ensure that the data were accurate, consistent, and suitable for statistical testing. In quantitative research, careful data preparation helps reduce errors and improves the reliability of the research findings (Hardani et al., 2020).

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS). SPSS was used because it supports descriptive analysis and bivariate statistical testing required in this study. The analysis consisted of univariate and bivariate analysis.

Univariate analysis was used to describe the characteristics of each variable. The results were

presented in frequency distributions and percentages for categorical variables, such as gender, membership status, hospital type, diagnosis category, and LOS category. For age, descriptive statistics and grouped frequency distributions were used to describe the characteristics of the participants.

Bivariate analysis was conducted to examine the relationship between each independent variable and LOS. The Chi-Square test was used because the variables were analyzed in categorical form. The relationships tested in this study included gender with LOS, age with LOS, membership status with LOS, hospital type with LOS, and disease diagnosis category with LOS. The Chi-Square test is appropriate for examining the association between categorical variables in cross-sectional research (Hardani et al., 2020).

The level of significance used in this study was 0.05. A p-value of less than or equal to 0.05 indicated a statistically significant relationship between the independent variable and LOS. Conversely, a p-value greater than 0.05 indicated that there was no statistically significant relationship between the independent variable and LOS. Therefore, the decision to accept or reject the research hypothesis was based on the p-value generated from the Chi-Square test.

RESULTS AND DISCUSSION

General Description of Research Data

This study analyzed secondary data obtained from membership records and inpatient claim data of health insurance participants at Insurance Company X in 2025. The final dataset consisted of 499 inpatient cases. The variables analyzed in this study included gender, age, membership status, hospital type, disease diagnosis category, and length of stay (LOS). Before conducting the statistical analysis, the data were selected based on inclusion and exclusion criteria, checked for completeness, cleaned, and coded to ensure that the dataset was suitable for univariate and bivariate analysis.

Univariate Analysis

The univariate analysis was conducted to describe the characteristics of inpatient cases included in this study. Based on gender, most patients were male, with 323 cases or 64.7%, while female patients accounted for 176 cases or 35.3%. This indicates that inpatient service utilization in the study population was dominated by male participants.

Based on age category, most patients were adults, with 362 cases or 72.5%. The second largest group was toddlers, with 68 cases or 13.6%, followed by children with 36 cases or 7.2%, elderly patients with 18 cases or 3.6%, and adolescents with 15 cases or 3.0%. The minimum age was 0 years and the maximum age was 69 years, with a mean age of 26.70 years and a standard deviation of 16.676. This distribution shows that inpatient claims were dominated by productive-age participants, although cases were also found among vulnerable age groups such as toddlers and elderly participants.

In terms of membership status, most patients were dependents, with 321 cases or 64.3%, while principal participants accounted for 178 cases or 35.7%. This finding shows that inpatient service utilization was not only concentrated among principal members but was also largely used by family members covered under the insurance policy.

Based on hospital type, most inpatient cases occurred in type C hospitals, with 230 cases or 46.1%, followed by type B hospitals with 204 cases or 40.9%, type D hospitals with 59 cases or 11.8%, and type A hospitals with 6 cases or 1.2%. This indicates that most participants received inpatient care in type B and type C hospitals, which together represented 87.0% of all inpatient cases.

For the dependent variable, LOS was categorized into two groups: non-prolonged LOS, defined as LOS of four days or less, and prolonged LOS, defined as LOS of more than four days. The results showed that 265 cases or 53.1% had prolonged LOS, while 234 cases or 46.9% had non-prolonged LOS. This indicates that the proportion of patients with LOS >4 days was slightly higher than those with LOS ≤4 days.

Based on disease diagnosis category, most patients were classified into the acute or infectious disease group, with 311 cases or 62.3%. Meanwhile, 188 cases or 37.7% were classified into the non-infectious, chronic, special condition, trauma, or symptom category. This finding indicates that acute and infectious diseases contributed more to inpatient utilization in the study population.

Table 1. Distribution of Respondent Characteristics and Research Variables

Variable	Category	Frequency	Percentage
Gender	Male	323	64.7%
	Female	176	35.3%
Age	Toddlers	68	13.6%
	Children	36	7.2%
	Adolescents	15	3.0%
	Adults	362	72.5%
	Elderly	18	3.6%
Membership status	Dependent	321	64.3%
	Principal	178	35.7%
Hospital type	Type D	59	11.8%
	Type C	230	46.1%
	Type B	204	40.9%
	Type A	6	1.2%
LOS	≤4 days	234	46.9%
	>4 days	265	53.1%
Diagnosis category	Acute/infectious disease	311	62.3%
	Non-infectious/chronic/special condition/trauma/symptom	188	37.7%

Bivariate Analysis

Bivariate analysis was conducted using the Chi-Square test to examine the relationship between each independent variable and LOS. LOS was categorized into LOS ≤4 days and LOS >4 days. The

independent variables analyzed were gender, age, membership status, hospital type, and disease diagnosis category. The decision criterion was based on a significance level of 0.05; a p-value ≤0.05 indicated a significant relationship, while a p-value >0.05 indicated no significant relationship.

Table 2. Chi-Square Test Results for Factors Associated with LOS

Variable	Pearson Chi-Square	df	p-value	Result
Gender	4.512	1	0.034	Significant
Age	4.011	4	0.404	Not significant
Membership status	0.076	1	0.783	Not significant
Hospital type	19.467	3	<0.001	Significant
Disease diagnosis category	13.489	1	<0.001	Significant

Relationship Between Gender and LOS

The Chi-Square test showed that gender was significantly associated with LOS, with a Pearson Chi-Square value of 4.512, df = 1, and p-value = 0.034. Since the p-value was lower than 0.05, the result indicates a statistically significant relationship between gender and LOS. This means that the distribution of LOS differed between male and female patients.

This finding suggests that gender may be one of the demographic factors related to variation in inpatient duration. The result is consistent with the view of Buttigieg et al. (2018), who explained that LOS is influenced by multiple factors, including patient characteristics, clinical conditions, and hospital service processes. Abela et al. (2019) also emphasized that LOS is not determined by a single factor but by the interaction of patient-related, disease-related, and service-related factors. Therefore, gender differences may reflect differences in disease patterns, clinical response, treatment needs, or other conditions that influence hospitalization duration.

However, this result should be interpreted carefully. The significant relationship does not mean that gender directly causes longer or shorter LOS. It only indicates that the distribution of LOS differs significantly between male and female patients. Further analysis involving diagnosis, disease severity, comorbidities, and treatment complexity would be needed to explain why gender is associated with LOS in this study.

Relationship Between Age and LOS

The Chi-Square test showed that age was not significantly associated with LOS, with a Pearson Chi-Square value of 4.011, df = 4, and p-value = 0.404. Since the p-value was greater than 0.05, the result indicates that there was no statistically significant relationship between age category and LOS. In other words, the distribution of LOS ≤4 days and LOS >4 days did not differ significantly across age groups.

This finding is not fully consistent with several previous studies that found age to be associated with LOS. Gonzalez et al. (2016) reported that age and comorbidities were significant factors affecting inpatient LOS. Hirani et al. (2025) also stated that older patients may experience longer

hospitalization due to chronic conditions, degenerative diseases, complications, and slower recovery processes. Theoretically, elderly patients are expected to have longer LOS because they often require more intensive monitoring and longer recovery periods.

The difference between this study and previous findings may be explained by the age distribution of the sample. In this study, most patients were adults, while elderly patients represented only a small proportion of the sample. This imbalance may have reduced the ability to detect significant differences in LOS across age groups. In addition, LOS may have been more strongly influenced by clinical and service-related factors, such as diagnosis category and hospital type, rather than age alone.

Relationship Between Membership Status and LOS

The Chi-Square test showed that membership status was not significantly associated with LOS, with a Pearson Chi-Square value of 0.076, df = 1, and p-value = 0.783. Since the p-value was greater than 0.05, the result indicates that there was no statistically significant relationship between membership status and LOS. This means that principal and dependent participants did not show a meaningful difference in the distribution of LOS.

This finding indicates that administrative membership status may not directly influence inpatient duration. Although dependents made up the majority of inpatient cases, their LOS distribution was not statistically different from that of principal participants. This result may occur because membership status in this study reflects an administrative position in the insurance policy rather than clinical severity, type of disease, hospital access, or treatment complexity.

This finding is different from studies that examine insurance status more broadly, such as private insurance, public insurance, or uninsured groups. In this study, both principal and dependent participants were covered under the same insurance scheme, so differences in access or payment mechanism may have been relatively limited. Therefore, LOS in this context appears to be more closely related to clinical and hospital-related factors than to administrative membership status.

Relationship Between Hospital Type and LOS

The Chi-Square test showed that hospital type was significantly associated with LOS, with a Pearson Chi-Square value of 19.467, df = 3, and p-value <0.001. Since the p-value was lower than 0.05, the result indicates a significant relationship between hospital type and LOS. This means that the distribution of LOS differed significantly across hospital types.

This finding shows that hospital characteristics play an important role in inpatient duration. Different hospital types may have different levels of facility availability, service capacity, medical resources, specialist services, diagnostic equipment, and referral functions. Hospitals with higher classifications may manage more complex cases, while hospitals with lower or middle classifications

may mostly handle general inpatient cases. These differences may affect diagnostic processes, treatment decisions, specialist consultations, supporting examinations, and discharge planning.

The finding is in line with James et al. (2017), who stated that structural factors in health care services can influence LOS. Walker et al. (2025) also explained that improvement in hospital service quality and care processes can reduce LOS without increasing readmission. Therefore, LOS should not be viewed only as a patient-level issue, but also as an indicator affected by hospital structure and service management. For insurance companies, this finding is important because hospital type can be considered in utilization review and claim monitoring.

Relationship Between Disease Diagnosis Category and LOS

The Chi-Square test showed that disease diagnosis category was significantly associated with LOS, with a Pearson Chi-Square value of 13.489, df = 1, and p-value <0.001. Since the p-value was lower than 0.05, the result indicates a significant relationship between disease diagnosis category and LOS. This means that patients with acute or infectious diseases and those with non-infectious, chronic, special conditions, trauma, or symptom-related diagnoses had different LOS distributions.

This finding is clinically relevant because diagnosis category reflects the patient's medical condition and the complexity of care required during hospitalization. Different diagnoses may require different lengths of observation, treatment, diagnostic testing, medical procedures, and recovery time. For example, chronic or complex conditions may require longer monitoring, while some acute conditions may require intensive but shorter treatment depending on the severity and response to therapy.

This result is consistent with Krzysztof et al. (2017), who found that disease severity was associated with LOS. It is also supported by Sutaip et al. (2023), who showed that inpatient utilization patterns and LOS may vary according to disease groups. Stone et al. (2022) also stated that LOS can be predicted by several factors, including diagnosis and clinical characteristics. Therefore, disease diagnosis category can be considered one of the most important factors in explaining LOS variation in this study.

Overall Discussion

Overall, the results show that gender, hospital type, and disease diagnosis category were significantly associated with LOS, while age and membership status were not significantly associated with LOS. These findings indicate that LOS among health insurance participants at Insurance Company X in 2025 was more strongly related to clinical and service-related factors than to general demographic or administrative membership factors.

The significant relationship between hospital type and LOS confirms that inpatient duration is influenced not only by patient characteristics but also by the structure and process of hospital services.

This supports the argument that LOS is a multidimensional indicator reflecting clinical conditions, hospital management, care coordination, and resource utilization. In the context of health insurance, this finding is important because hospital type may affect claim size, service intensity, and utilization patterns.

The significant relationship between diagnosis category and LOS also confirms that clinical condition is a major factor in inpatient duration. Patients with different disease categories may require different levels of treatment, monitoring, and recovery time. Therefore, claim assessment should not evaluate LOS only based on the number of inpatient days, but also consider the diagnosis, disease complexity, medical procedures, and clinical justification.

The non-significant relationship between age and LOS suggests that age alone may not be sufficient to explain inpatient duration in this dataset. Although older age is often associated with longer LOS in previous studies, this study found no significant relationship, possibly because the sample was dominated by adult patients and did not include enough elderly cases to show a strong statistical difference. Similarly, membership status was not significantly associated with LOS, indicating that the distinction between principal and dependent is more administrative than clinical.

From a health insurance management perspective, these findings provide practical implications. Insurance companies need to pay greater attention to diagnosis category and hospital type when conducting claim review and utilization monitoring. LOS evaluation should be based on clinical appropriateness, hospital service level, diagnosis complexity, and supporting medical evidence. This approach can help insurance companies manage inpatient utilization more effectively while maintaining fairness and quality of care for participants.

CONCLUSION

This study aimed to analyze factors associated with length of stay among health insurance participants at Insurance Company X in 2025. Based on the analysis of 499 inpatient cases, the study found that gender, hospital type, and disease diagnosis category were significantly associated with LOS. Meanwhile, age and membership status were not significantly associated with LOS.

The findings indicate that LOS is not only influenced by demographic characteristics, but is more strongly related to clinical and service-related factors. The significant relationship between hospital type and LOS suggests that differences in hospital classification, service capacity, available facilities, and care processes may contribute to variations in inpatient duration. Similarly, the significant relationship between disease diagnosis category and LOS shows that clinical conditions and disease complexity are important factors in determining the length of inpatient care.

On the other hand, age was not significantly associated with LOS in this study. This finding suggests that age alone may not be sufficient to explain variations in inpatient duration, particularly when the sample is dominated by adult participants. Membership status also showed no significant

relationship with LOS, indicating that the distinction between principal and dependent participants is more administrative in nature and does not directly reflect clinical severity or treatment needs.

From a health insurance management perspective, these findings provide practical implications for claim monitoring and inpatient utilization control. Insurance companies should pay greater attention to hospital type and diagnosis category when reviewing inpatient claims, especially for cases with prolonged LOS. LOS evaluation should not be based only on the number of inpatient days, but should also consider diagnosis, clinical justification, hospital service level, treatment complexity, and discharge planning. Overall, this study contributes to the understanding of inpatient utilization patterns from the perspective of health insurance. The results may support Insurance Company X in improving claim review, strengthening utilization management, and developing more evidence-based policies for controlling inpatient care costs while maintaining the quality and appropriateness of health services.

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