

The relationship between health insurance ownership and health service utilization, out-of-pocket expenses, and catastrophic health expenditure in the Special Region of Yogyakarta in 2023

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Abstract. Creating financial protection for the Indonesian people is one of the main functions of Universal Health Coverage. Implementing health insurance is expected to protect society from out-of-pocket expenditures. Catastrophic health expenditure can result in various financial consequences. This study aims to determine the relationship between health insurance ownership in households in the Special Region of Yogyakarta and the utilization of health services, out-of-pocket expenses, and catastrophic health expenditures. Studies have shown that having health insurance was associated with increased utilization of inpatient (OR) 3.20 (95% CI 2.16 4.75) and outpatient (OR) 2.08 (95% CI 1.66 2.61) health services compared to household members who did not have health insurance. Ownership of Health Insurance has a significant effect on out-of-pocket health ($p < 0.05$) and is also associated with a greater likelihood of preventing catastrophic health expenditure at the 25% threshold (OR) 0.80 (95% CI 0.68-0.94). Ownership of Health Insurance is proven to be related to increased utilization of inpatient and outpatient care and have a significant effect to potentially decrease Out-of-Pocket Health Costs. It is crucial to optimize and expand the National Health Insurance program, provide financial protection, and reduce the financial burden on households in Indonesia due to catastrophic health spending.

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1 Introduction

According to WHO, it is estimated that globally around 70 million people fell into extreme poverty and an additional 435 million people fell into extreme poverty in 2017 due to Out of Pocket (OOP) health payments [1].

One of the primary objectives of Universal Health Coverage (UHC) is to provide financial protection for the population of Indonesia. The implementation of health insurance is a key strategy intended to shield individuals and families from the burden of out-of-pocket healthcare expenses. Catastrophic health expenditures, funded through out-of-pocket payments, can result in significant financial repercussions. A study by Husna (2017) indicates that, despite the expectation that health insurance ownership would enhance access to healthcare services, particularly among the poor, it does not effectively increase the utilization of healthcare services within the community [2].

Based on the background outlined above, this study aims to examine the relationship between health insurance ownership and the utilization of healthcare services, the burden of out-of-pocket expenses, and catastrophic health expenditures in the Special Region of Yogyakarta. Additionally, the research seeks to identify the determinants influencing these factors.

2 Materials and Methods

This research is a quantitative study using a cross-sectional design. It aims to examine the relationship between health insurance ownership and health service utilization, out-of-pocket cost burden, and catastrophic health expenditures by analyzing secondary national data from the 2023 National Socioeconomic Survey (Susenas) conducted by the Central Bureau of Statistics.

This research is conducted in Yogyakarta City, Special Region of Yogyakarta Province, using Susenas data from March 2023 collected by the Central Bureau of Statistics. The Susenas data represent up to the district/city level.

2.1 Data collection tools

The instruments used include a list of questions from the VSEN23.K questionnaire, which is used for household sample enumeration, and the VSEN23.KP questionnaire, which is used for enumerating household consumption or expenditure data. The inclusion criteria for the sample in this study are household members in the Special Region of Yogyakarta Province who were surveyed by BPS during the March 2023 Susenas and who live in the districts of Kulon Progo, Bantul, Gunungkidul, Sleman, and the City of Yogyakarta. The exclusion criteria are incomplete data. In this study, 13,135 samples met the inclusion criteria, and 40 samples were excluded due to incomplete data, resulting in 13,095 samples being used as the unit of analysis in this study.

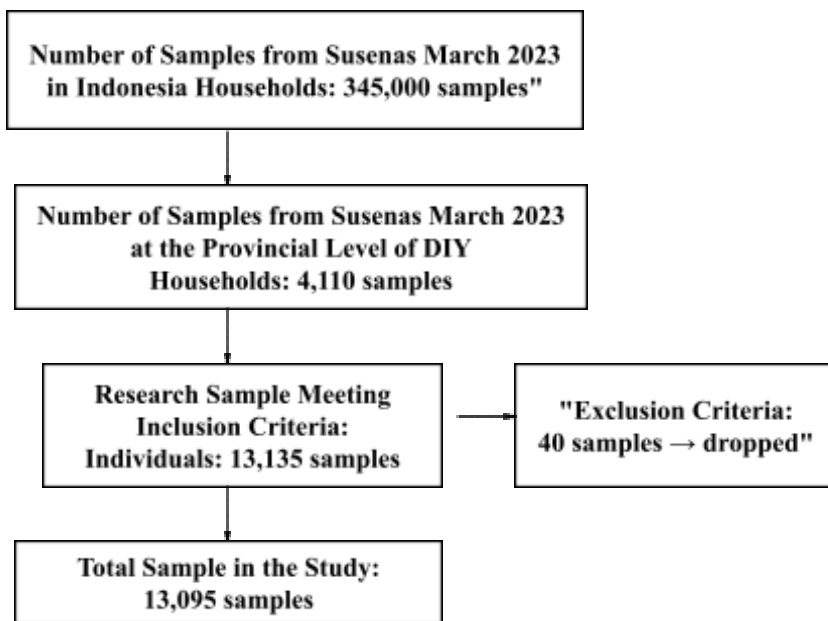


Fig. 1. Flowchart for determining the number of research samples.

2.2 Data evaluation and statistical analysis

Health utilization consists of outpatient and inpatient care. Outpatient health utilization is defined as the number of outpatient visits by household members with health complaints seeking medical consultation and treatment at healthcare facilities within the last month. This is nominal scale data, with a rating of 0 (visited) and 1 (did not visit). Inpatient health utilization is defined as the history of visits by household members for the purpose of treating health complaints that required an overnight stay or longer at a healthcare facility within the last year. This is also nominal scale data, with a rating of 0 (visited) and 1 (did not visit). Out-of-pocket expenditure is ratio scale data defined as the per capita out-of-pocket expenditure of household members, paid in cash when using outpatient and inpatient services directly, excluding health insurance premium costs. Catastrophic health expenditure is defined as the household members' annual expenditure for healthcare services, consisting of three thresholds: equal to or more than 10% of total expenditure, 25% of total expenditure, and 40% of non-food expenditure. Catastrophic health expenditure is calculated using two approaches: the Budget Share Approach (at the 10% and 25% thresholds), which compares the annual healthcare spending of household members to the total household income or expenditure, and the Capacity to Pay Approach (at the 40% threshold), which compares healthcare spending to the household's ability to pay (the remaining household expenditure available after their basic needs are met).

We also conducted an analysis on several covariate variables, including gender (Male vs. Female), age (Infants 0-4 years, Children 5-18 years, Adults 19-59 years, and Elderly 60-100 years), education level (No Schooling, Elementary or Equivalent, Junior High School or Equivalent, High School or Equivalent, and Higher Education), employment status (Unemployed vs. Employed), marital status (Unmarried vs. Married), average per capita expenditure per month (Q1 Very Low, Q2 Low, Q3 Medium, Q4 High, and Q5 Very High), residential area (Rural vs. Urban), health status (No Complaints vs. With Complaints), activity

impairment (No Activity Impairment vs. With Activity Impairment), and the ratio of medical staff per 100 population (with a 95% confidence interval).

Quantitative data from the March 2023 Susenas were analyzed using STATA 17 software. Data on the characteristics of health service utilization, out-of-pocket cost burden, and catastrophic health expenditures were processed to obtain descriptive (univariate) analysis. In the study of the dependent variable, the bivariate analysis was conducted and different statistical tests are employed depending on the nature of the predictor variables. For continuous predictor variables, simple logistic regression is utilized to analyze the relationship with the response variable. Conversely, for categorical independent variables, the Chi-square test is employed to examine the associations. The t-test is used to analyze the relationship between a numeric outcome variable and a categorical predictor. When the predictor variables are divided into three or more groups, an Analysis of Variance (ANOVA) is conducted to test for mean differences among the groups. Additionally, the Pearson correlation test and simple regression analysis are used to explore the relationships between numeric outcome variables and numeric predictors. Multivariate analysis for health service utilization is conducted using Multiple Logistic Regression to comprehensively understand the interactions between variables. Multivariate analysis for Out-of-pocket variables is carried out using the Ordinary Least Squares (OLS) method. To ensure that the estimators are the Best Linear Unbiased Estimators (BLUE), classic assumption tests, including tests for normality, multicollinearity, and heteroscedasticity, are conducted. Multivariate analysis for catastrophic health expenditure is executed using binary outcome models, specifically through a logit model employing a maximum likelihood estimator.

3 Results

3.1 Characteristics of Respondents

Univariate analysis was conducted to provide a descriptive overview of the research variables. Below are the characteristics of household members in the Special Region of Yogyakarta based on health insurance ownership. Table 1 below presents the characteristics of research respondents based on the status of health insurance ownership in 2023, using data from the 2023 National Socio-Economic Survey (Susenas) in the Special Region of Yogyakarta Province. The majority of research respondents have health insurance (86.9%). The proportion of individuals with health insurance is highest among females (50.7%) and predominantly in the adult age group (19-59 years) at 56.7 %. The highest educational attainment is elementary or equivalent (29.3%).

The majority of individuals with health insurance are employed (55.9%), are married (53.4%), and their household per capita expenditure is in the highest quintile, Q5 (20.5%), residing in urban areas (66.5%). The majority of respondents with health insurance report no health complaints in the last month (fever, cough, cold, diarrhea, dizziness, chronic diseases, etc.) accounting for 70.9 percent, and those who reported health complaints in the last month (29.1%) indicate that these health issues did not disrupt their work, school, or daily activities (88.3%).

The majority of respondents with Health Insurance did not experience catastrophic health expenditures at the 10% total expenditure threshold (70.5%), the 25% total expenditure threshold (89.4%), and the 40% non-food total expenditure threshold (86.2%).

Table 1. Characteristics of respondents based on health insurance ownership status

Characteristics	Respondents		
	No Health Insurance (n: 1.709)	With Health Insurance (n: 11.386)	Total (n: 13.095)
Gender			
Male	888 (52.0)	5616 (49.3)	6504 (49.7)
Female	821 (48.0)	5770 (50.7)	6591 (50.3)
Age			
Infants (0-4 years)	211 (12.3)	470 (4.1)	681 (5.2)
Children (5-18 years)	406 (23.8)	2238 (19.7)	2644 (20.2)
Adults (19-59 years)	893 (52.3)	6457 (56.7)	7350 (56.1)
Elderly (60-100 years)	199 (11.6)	2221 (19.5)	2420 (18.5)
Education			
No Schooling	298 (17.4)	1040 (9.1)	1338 (10.2)
Elementary or Equivalent	450 (26.3)	3337 (29.3)	3787 (28.9)
Junior High School or Equivalent	285 (16.7)	1963 (17.2)	2248 (17.2)
High School or Equivalent	410 (24.0)	2990 (26.3)	3400 (26.0)
Higher Education	266 (15.6)	2056 (18.1)	2322 (17.7)
Employment			
Unemployed	904 (52.9)	5025 (44.1)	5929 (45.3)
Employed	805 (47.1)	6361 (55.9)	7166 (54.7)
Marital Status			
Unmarried	963 (56.3)	5306 (46.6)	6269 (47.9)
Married	746 (43.7)	6080 (53.4)	6826 (52.1)
Average Per Capita Expenditure Per Month			
Q1 Very Low	348 (20.4)	2261 (19.9)	2609 (19.9)
Q2 Low	341 (20.0)	2280 (20.0)	2621 (20.0)
Q3 Medium	361 (21.1)	2260 (19.8)	2621 (20.0)
Q4 High	377 (22.1)	2247 (19.7)	2624 (20.0)
Q5 Very High	282 (16.5)	2338 (20.5)	2620 (20.0)
Residential Area (Rural/Urban)			
Rural	568 (33.2)	3813 (33.5)	4381 (33.5)
Urban	1141 (66.8)	7573 (66.5)	8714 (66.5)
Health Status			
No Complaints	487 (28.5)	3311 (29.1)	3798 (29.0)
With Complaints	1222 (71.5)	8075 (70.9)	9297 (71.0)
Activity Impairment			
No Activity Impairment	1515 (88.6)	10050 (88.3)	11565 (88.3)
With Activity Impairment	194 (11.4)	1336 (11.7)	1530 (11.7)
Outpatient Utilization (Last Month), n (%)			
Did Not Visit	1570 (91.9)	9919 (87.1)	11489 (87.7)
Visited	139 (8.1)	1467 (12.9)	1606 (12.3)
Inpatient Utilization (Last Year), n (%)			
Did Not Visit	1681 (98.4)	10867 (95.4)	12548 (95.8)
Visited	28 (1.6)	519 (4.6)	547 (4.2)

Catastrophic Health Expenditure (CHE)			
10% of total expenditure (CHE 10% of total exp)			
<10% of total exp	1169 (68.4)	8026 (70.5)	9195 (70.2)
≥ 10% of total exp	540 (31.6)	3360 (29.5)	3900 (29.8)
25% of total expenditure (CHE 25% of total exp)			
<25% of total exp	1492 (87.3)	10181 (89.4)	11673 (89.1)
≥ 25% of total exp	217 (12.7)	1205 (10.6)	1422 (10.9)
40% of non-food total expenditure (CHE 40% of total exp)			
<40% of non-food exp	1441 (84.3)	9818 (86.2)	11259 (86.0)
≥ 40% of non-food exp	268 (15.7)	1568 (13.8)	1836 (14.0)
Ratio of Medical Staff per 100 Population (95% CI)	2.0 (2.0; 2.0)	2.1 (2.1; 2.2)	2.1 (2.1 2; 2.1)

3.2 Analysis of Health Service Utilization

3.2.1 Bivariate and Multivariate Analysis of Health Service Utilization

Table 2. Results of bivariate and multivariate analysis of outpatient health service utilization

Research Variables	Health Service Utilization (Outpatient Care)			
	Bivariate Analysis		Multivariate Analysis	
	p-value	cOR (95%CI)	p-value	aOR (95%CI)
Health Insurance Ownership				
No Health Insurance	0.00*	Reff	0.00*	Ref.
With Health Insurance		1.67 (1.39-2.00)		2.08 (1.66-2.61)
Gender				
Male	0.00*	Reff	0.00*	Ref.
Female		1.29 (1.16-1.43)		1.28 (1.12-1.47)
Age				
Infants (0-4 years)	0.00*	Reff		Ref.
Children (5-18 years)		0.60 (0.48-0.75)	0.00*	0.44 (0.30-0.65)
Adults (19-59 years)		0.47 (0.38-0.58)	0.00*	0.47 (0.31-0.73)
Elderly (60-100 years)		1.16 (0.93-1.45)	0.92	0.97 (0.65-1.46)
Education				
No Schooling	0.00*	Reff		Ref.
Elementary or Equivalent		0.93 (0.78-1.09)	0.01*	1.42 (1.06-1.91)
Junior High School or Equivalent		0.53 (0.44-0.65)	0.76*	0.95 (0.68-1.32)
High School or Equivalent		0.57 (0.48-0.68)	0.44*	1.13 (0.82-1.56)
Higher Education		0.46 (0.37-0.56)	0.58*	0.90 (0.63-1.28)
Employment				
Unemployed	0.00*	Reff	Ref.	Ref.
Employed	0.00*	0.70 (0.63-0.78)	0.00	0.79 (0.67-0.94)
Marital Status				
Unmarried	0.64	Reff		Ref.
Married	0.64	1.02 (0.92-1.13)	0.04	1.19 (1.00-1.42)

Average Per Capita Expenditure Per Month				
Q1 Very Low	0.00*	Reff		Ref.
Q2 Low		1.21 (1.01-1.4)	0.30	1.12 (0.90-1.39)
Q3 Medium		1.45 (1.22-1.72)	0.00*	1.58 (1.28-1.96)
Q4 High		1.48 (1.24-1.75)	0.00*	1.50 (1.21-1.87)
Q5 Very High		1.40 (1.18-1.66)	0.00*	1.49 (1.18-1.87)
Residential Area (Rural/Urban)				
Rural	0.08	Reff		Ref.
Urban	0.08	0.9 (0.81-1.01)	0.31	1.08 (0.92-1.26)
Health Status				
No Complaints	0.00*	-		-
With Complaints	omitted	omitted		-
Activity Impairment				
No Activity Impairment	0.00*	Reff	0.00*	Ref.
With Activity Impairment		31.99 (28.03-36.52)		32.47 (28.27-37.29)
Health Worker Ratio per 1000 Population	0.232	1.04 (0.97-1.10)	0.00*	0.97 (0.89-1.07)
LR chi (22)				3164
Prov > chi2				0.00
Pseudo R2				0.32
Number of Obs				13.095

* statistically **significant**

Based on the bivariate analysis in Table 2 above, it is observed that the variables significantly associated (p-value < 0.05) with the utilization of outpatient health services include health insurance ownership, gender, age, education, employment, average per capita expenditure per month, health status, and activity impairment.

The bivariate analysis of the predictor variable, health status, against the response variable of outpatient service utilization indicated results were omitted due to collinearity issues. Therefore, in the multivariate analysis of outpatient utilization, this variable was excluded from the model.

Table 2 presents the results of the multivariate analysis for outpatient health service utilization. The analysis was conducted to explain the significance of the model overall. The results show that the logistic regression model constructed has high statistical significance as the p-value is less than α (<0.05), indicating that the independent variables within the model are significantly related to the utilization of outpatient health services.

Statistical test results show that household members with health insurance are 2.08 (1.66-2.61) times more likely to visit outpatient services than those without health insurance. Higher household expenditures increase the likelihood of seeking outpatient care, with household members in Q3 being 1.58 (1.28-1.96) times more likely to seek care compared to those in Q1. Household members with activity impairments are 32 (28.27-37.29) times more likely to visit outpatient services compared to those without impairments. The ratio of available healthcare staff does not increase the likelihood of household members utilizing outpatient services.

Tabel 3. Results of bivariate and multivariate analysis of inpatients health service utilization

Research Variables	Health Service Utilization (Inpatient Care)			
	Bivariate Analysis		Multivariate Analysis	
	p-value	cOR (95%CI)	p-value	aOR (95%CI)
Health Insurance Ownership				
No Health Insurance	0.00*	Ref	Ref.	Ref.
With Health Insurance		2.86 (1.95-4.20)	0.00*	3.20 (2.16-4.75)
Gender				
Male	0.01*	Ref	Ref.	Ref.
Female		1.25 (1.05-1.49)	0.00*	1.04 (0.86-1.25)
Age				
Infants (0-4 years)	0.00*	Ref	Ref.	Ref.
Children (5-18 years)		0.23 (0.16-0.32)	0.00*	0.18 (0.11-0.31)
Adults (19-59 years)		0.34 (0.25-0.44)	0.00*	0.45 (0.25-0.79)
Elderly (60-100 years)		0.50 (0.37-0.68)	0.00	0.47 (0.27-0.80)
Education				
No Schooling	0.00*	Ref		Ref.
Elementary or Equivalent		0.51 (0.39-0.67)	0.74*	1.07 (0.67-1.72)
Junior High School or Equivalent		0.46 (0.34-0.63)	0.89*	0.96 (0.58-1.60)
High School or Equivalent		0.58 (0.44-0.76)	0.67*	1.11 (0.67-1.81)
Higher Education		0.57 (0.42-0.76)	0.57*	0.86 (0.51-1.45)
Employment				
Unemployed	0.00*	Ref	Ref.	Ref.
Employed		0.45 (0.38-0.54)	0.00	0.35 (0.28-0.43)
Marital Status				
Unmarried	0.19	Ref		Ref.
Married		1.12 (0.94-1.33)	0.04	1.45 (1.14-1.84)
Average Per Capita Expenditure Per Month				
Q1 Very Low	0.00*	Ref		Ref.
Q2 Low		1.35 (0.97-1.88)	0.12	1.29 (0.92-1.82)
Q3 Medium		1.53 (1.11-2.12)	0.00*	1.55 (1.12-2.17)
Q4 High		2.24 (1.65-3.03)	0.00*	2.24 (1.63-3.09)
Q5 Very High		2.7 (2.02-3.64)	0.00*	2.63 (1.91-3.62)
Residential Area (Rural/Urban)				
Rural	0.08	Ref	Ref.	Ref.
Urban		1.42 (1.17-1.73)	0.023	1.29 (1.03-1.62)
Health Status				
No Complaints	0.00*	Ref.	Ref.	Ref.
With Complaints		2.30 (1.94-2.74)	0.76	0.96 (0.73-1.24)
Activity Impairment				
No Activity Impairment	0.00*	Ref	Ref.	Ref.
With Activity Impairment		4.2 (3.5-5.08)	0.00*	3.98 (3.00-5.28)
Health Worker Ratio per 1000 Population	0.002	1.16 (1.06-1.28)	0.64*	0.97 (0.86-1.09)
LR chi (22)				481.24
Prov > chi2				0.00
Pseudo R2				0.10
Number of Obs				13.095

Table 3 presents the results of the multivariate analysis of inpatient service utilization. The variables significantly associated (p -value < 0.05) with the utilization of inpatient health services include health insurance ownership, gender, age, education, employment, marital status, average per capita expenditure per month, residential area, health status, activity impairment, and the ratio of healthcare staff per 1000 residents.

An F-test was conducted to explain the overall significance of the model. The results indicate that the logistic regression model constructed has high statistical significance as the p -value is less than α (<0.05), demonstrating that the independent variables within the model are significantly related to the utilization of inpatient health services.

The statistical test results show that household members with health insurance are 3.20 (2.16-4.75) times more likely to be hospitalized compared to those without health insurance. Higher household expenditures increase the likelihood of hospitalization, with household members in Q5 being 2.6 (1.91-3.62) times more likely to be hospitalized compared to those in Q1. Household members with activity impairments are 3.98 (3.00-5.28) times more likely to be hospitalized compared to those without impairments.

3.2.2 Analysis of Out-of-Pocket Health Expenditures Using Ordinary Least Squares (OLS) Estimation

The multivariate analysis was conducted using a log-linear model with an Ordinary Least Squares (OLS) estimator. Table 19 presents the OLS estimation results for Out-of-Pocket Health Expenditures.

The F-test results indicate that the regressors are jointly significant in explaining the model's significance, with the F-test p -value being less than α (<0.05). This signifies that, statistically, the independent variables collectively in the constructed model are significantly related to health-related out-of-pocket costs. Simultaneously, all independent variables explain 29.2 percent of the dependent variable, with the remainder explained by other variables outside the model. The significance of each independent variable is determined based on the t -test values conducted for each variable. A negative sign on a parameter coefficient indicates that the presence of that variable may reduce Out-of-Pocket Health Costs, while a positive sign suggests that it may increase Out-of-Pocket Health Costs. Variables to note are those with a p -value < 0.05 and are statistically significant.

The analysis reveals that variables potentially reducing Out-of-Pocket Health Costs include the proportion of health insurance ownership, age, education, and the ratio of healthcare staff availability. Conversely, variables that may increase Out-of-Pocket Health Costs include marital status, the quintile of average per capita expenditure per month, health status, and activity impairment.

After estimating with OLS, the next step involves conducting classical assumption tests to ensure that the parameters produced are BLUE (Best Linear Unbiased Estimator). These tests include checks for normality, multicollinearity, and heteroskedasticity. After conducting these tests, it was found that there is an issue of heteroskedasticity in the model. This issue can be addressed through a remedial measure with robust standard errors, chosen considering that the error variance is unknown and such an approach is commonly employed in large sample data. This solution is selected to ensure that the parameter coefficients produced remain efficient, thereby meeting the BLUE criteria. The results of the remedial measures, along with a comparison to the OLS estimation results, are as follows:

Table 4. Comparison of OLS estimates with Robust Standard Errors

Independent Variable	Test Results for Dependent Variable, Out-of-pocket Health Expenditure				
	OLS		Robust		
	β	sig	β	sig	(eksponen ^{β} -1)*100
Health Insurance Ownership					
No Health Insurance	Ref.	Ref.	Ref.	Ref.	Ref.
With Health Insurance	-.130	0.041	-.130	0.036	-12.27
Gender					
Male	Ref.	Ref.	Ref.	Ref.	Ref.
Female	.0173	0.690	.0173	0.691	1.75
Age					
Infants (0-4 years)	Ref.	Ref.	Ref.	Ref.	Ref.
Children (5-18 years)	-.273	0.048	-.273	0.010	-23.90
Adults (19-59 years)	-.550	0.000	-.550	0.000	-42.31
Elderly (60-100 years)	-.406	0.005	-.406	0.001	-33.39
Education					
No Schooling	Ref.	Ref.	Ref.	Ref.	Ref.
Elementary or Equivalent	-.228	0.029	-.228	0.008	-20.43
Junior High School or Equivalent	-.261	0.020	-.261	0.006	-23.01
High School or Equivalent	-.300	0.007	-.300	0.001	-25.93
Higher Education	-.155	0.195	-.155	0.142	-14.42
Employment					
Unemployed	Ref.	Ref.	Ref.	Ref.	Ref.
Employed	.006	0.914	.006	0.921	0.63
Marital Status					
Unmarried	Ref.	Ref.	Ref.	Ref.	Ref.
Married	.382	0.000	.382	0.000	46.53
Average Per Capita Expenditure Per Month					
Q1 Very Low	Ref.	Ref.	Ref.	Ref.	Ref.
Q2 Low	.871	0.000	.871	0.000	138.96
Q3 Medium	1.143	0.000	1.143	0.000	213.87
Q4 High	1.649	0.000	164.988	0.000	420.64
Q5 Very High	2.603	0.000	2.603	0.000	1251.11
Residential Area (Rural/Urban)					
Rural	Ref.	Ref.	Ref.	Ref.	Ref.
Urban	.078	0.131	.0780854	0.105	8.12
Health Status					
No Complaints	Ref.	Ref.	Ref.	Ref.	Ref.
With Complaints	.471	0.000	.471	0.000	60.31
Activity Impairment					
No Activity Impairment	Ref.	Ref.	Ref.	Ref.	Ref.
With Activity Impairment	.214	0.000	.214	0.000	23.97
Health Insurance Ownership	-.173	0.000	-.173	0.000	-15.89

Based on the table above, there is no significant difference between the OLS estimation results and the robust standard error results. There are no changes in the signs of the parameter coefficients; what occurs is a slight change in the p-values, and for some variables, this alters their significance. This happens because the correction is applied only to the standard errors,

with no re-estimation of the coefficients themselves. Subsequently, the results are interpreted according to the outcomes of the remedial measures, distinguishing them based on the results of the parameter coefficients.

The parameter coefficients (β) derived from the OLS estimation tests are subsequently transformed into exponential form for interpretative purposes, as the dependent variable was previously transformed into logarithmic form. The calculation is done using $(e^{\beta} - 1) * 100$ and the results are presented in Table 20, with the transformed results from the above analysis as follows:

3.2.3 Factors associated with the reduction of Out-of-Pocket Health Costs

1. Health Insurance Ownership

The proportion of health insurance ownership has the potential to reduce out-of-pocket health costs by 12.27% (statistically significant, $p=0.00$). The greater the proportion of household members with JKN (national health insurance) in the household, the lower the out-of-pocket health costs. A 1% increase in the proportion of household members with health insurance can reduce out-of-pocket health costs in the household by 12.27%.

2. Age

The age of household members significantly decreases out-of-pocket health costs ($p<0.05$). The older the age range of the household, the lower the out-of-pocket health costs. Increases in age will decrease out-of-pocket health costs by 23.90% for children, 42.31% for adults, and 22.39% for the elderly.

3. Education Level

Education level has the potential to decrease out-of-pocket health costs compared to those with no education, with a p-value for all education levels except higher education being less than $p < 0.05$, thus statistically significant. Out-of-pocket health costs with education levels of elementary, middle, and high school will decrease compared to those with no education, with decreases of 20.43% for elementary, 23.01% for middle school, and 25.93% for high school.

4. Healthcare Staff Availability Ratio

The availability ratio of healthcare staff significantly decreases out-of-pocket health costs, with an increase in the healthcare staff availability ratio reducing out-of-pocket health costs by 15.89%.

3.2.4 Factors associated with an increase in Out-of-Pocket Health Costs:

1. Marital Status

Marital status has the potential to significantly increase out-of-pocket health costs ($p\text{-value}<0.05$), with married status increasing out-of-pocket health costs by 46.53%.

2. Average Per Capita Expenditure Per Month

The quintile of per capita expenditure per month has a statistically significant chance ($p\text{-value}<0.05$) of increasing out-of-pocket health costs. The higher the household's expenditure quintile, the higher the out-of-pocket health costs. Out-of-pocket health costs for household members in higher quintiles will increase compared to those in quintile 1, with increases of 138.96% in quintile 2, 213.87% in quintile 3, 420.64% in quintile 4, and 1251.11% in quintile 5.

3. Health Status

Health status can potentially increase out-of-pocket health costs (p-value<0.05) significantly. The more household members experiencing health complaints, the higher the out-of-pocket health costs. Health status will increase out-of-pocket health costs by 60.31%.

4. Activity Impairment

Activity impairments can potentially significantly increase out-of-pocket health costs (p-value<0.05). The more household members experiencing activity impairments, the higher the out-of-pocket health costs. Activity impairments will increase out-of-pocket health costs by 23.97%.

3.3 Analysis of Catastrophic Health Expenditure

Bivariate analysis determined the relationship between predictor variables and the response variable of catastrophic health expenditure at thresholds of 10%, 25%, and 40%. The statistical test used for numeric predictor variables (continuous) is simple logistic regression, while the Chi-square test is used for categorical independent data.

Multivariate analysis results of catastrophic health expenditure show that the logistic regression model constructed is statistically significant overall, as the p-value is less than α (<0.05), indicating that the independent variables within the model are significantly related to catastrophic health expenditures. The z-test probability values in logistic regression explain the significance of each independent variable against the dependent variable.

Table 5. Bivariate and multivariate analysis of catastrophic health expenditure $\geq 10\%$ of total exp

Research Variables	Catastrophic Health Expenditure $\geq 10\%$ of total exp			
	Bivariate Analysis		Multivariate Analysis	
	p-value	cOR (95%CI)	p-value	aOR (95%CI)
Health Insurance Ownership				
No Health Insurance	0.08	Reff	0.08	Ref.
With Health Insurance		0.90 (0.81-1.01)		0.90 (0.80-1.01)
Gender				
Male	0.24	Reff	0.80	Ref.
Female		1.04 (0.97-1.12)		1.00 (0.93-1.09)
Age				
Infants (0-4 years)	0.00*	Reff	Ref.	Ref.
Children (5-18 years)		0.54 (0.45-0.65)	0.00*	0.65 (0.51-0.82)
Adults (19-59 years)		0.64 (0.54-0.75)	0.00*	0.70 (0.53-0.90)
Elderly (60-100 years)		0.95 (0.80-1.14)	0.86	0.97 (0.76-1.25)
Education				
No Schooling	0.00*	Reff		Ref.
Elementary or Equivalent		0.78 (0.68-0.89)	0.16	0.87 (0.73-1.05)
Junior High School or Equivalent		0.66 (0.57-0.77)	0.03*	0.81 (0.66-0.98)
High School or Equivalent		0.66 (0.57-0.75)	0.03*	0.80 (0.66-0.98)
Higher Education		0.84 (0.73-0.97)	0.92	1.01 (0.81-1.24)

Employment				
Unemployed	0.35	Reff	Ref.	Ref.
Employed		0.96 (0.89-1.04)	0.00	0.89 (0.80-0.99)
Marital Status				
Unmarried	0.00*	Reff		Ref.
Married		1.1 (0.09-1.27)	0.00*	1.25 (1.13-1.38)
Average Per Capita Expenditure Per Month				
Q1 Very Low	0.00*	Reff		Ref.
Q2 Low		1.2 (1.08-1.39)	0.00*	1.28 (1.13-1.46)
Q3 Medium		1.28 (1.13-1.44)	0.00*	1.38 (1.21-1.56)
Q4 High		1.36 (1.20-1.54)	0.00*	1.55 (1.38-1.79)
Q5 Very High		1.75 (1.55-1.97)	0.00*	2.02 (1.78-2.31)
Residential Area (Rural/Urban)				
Rural	0.00*	Reff	Ref.	Ref.
Urban		0.79 (0.73-0.86)	0.00*	0.84 (0.76-0.92)
Health Status				
No Complaints	0.00*	Reff.	Ref.	Ref.
With Complaints		1.53 (1.41-1.66)	0.00*	1.24 (1.12-1.38)
Activity Impairment				
No Activity Impairment	0.00*	Reff	Ref.	Ref.
With Activity Impairment		1.85 (1.66-2.06)	0.00*	1.47 (1.28-1.69)
Health Worker Ratio per 1000 Population	0.00	0.856 (0.81-0.89)	0.64*	0.83 .78-0.87)
LR chi (22)				464.66
Prov > chi2				0.00
Pseudo R2				0.0291
Number of Obs				13.095

*statistically significant

Based on the bivariate analysis in Table 5, it is evident that the variables significantly associated (p-value < 0.05) with catastrophic health expenditure at the 10% threshold of total expenditure are Age, Education, Marital Status, Average Per Capita Expenditure Per Month, Residential Area, Health Status, Activity Impairment, and Healthcare Staff Ratio per 1000 residents.

At the 25% threshold of total expenditure, the variables significantly associated with catastrophic health expenditure are Health Insurance Ownership, Age, Education, Employment, Marital Status, Average Per Capita Expenditure Per Month, Health Status, and Activity Impairment.

Table 6. Bivariate and multivariate analysis of catastrophic health expenditure $\geq 25\%$ of total exp

Research Variables	Catastrophic Health Expenditure $\geq 25\%$ of total exp			
	Bivariate Analysis		Multivariate Analysis	
	p-value	cOR (95%CI)	p-value	aOR (95%CI)
Health Insurance Ownership				
No Health Insurance	0.01*	Reff	0.00*	Ref.
With Health Insurance		0.81 (0.69-0.94)		0.80 (0.68-0.94)
Gender				
Male	0.66	Reff	0.05*	Ref.
Female		0.97 (0.87-1.08)		0.89 (0.79-1.00)
Age				
Infants (0-4 years)	0.00*	Reff	Ref.	Ref.
Children (5-18 years)		0.44 (0.34-0.57)	0.00*	0.43 (0.30-0.61)
Adults (19-59 years)		0.57 (0.46-0.71)	0.01*	0.63 (0.43-0.92)
Elderly (60-100 years)		0.88 (0.70-1.11)	0.54	0.89 (0.6-1.25)
Education				
No Schooling	0.00*	Reff		Ref.
Elementary or Equivalent		0.77 (0.64-0.93)	0.65	1.06 (0.80-1.42)
Junior High School or Equivalent		0.69 (0.55-0.85)	0.92	0.98 (0.76-1.40)
High School or Equivalent		0.76 (0.63-0.93)	0.83	1.03 (0.76-1.40)
Higher Education		0.90 (0.73-1.10)	0.80	1.04 (0.75-1.43)
Employment				
Unemployed	0.00*	Reff	Ref.	Ref.
Employed		0.76 (0.68-0.85)	0.00*	0.61 (0.52-0.70)
Marital Status				
Unmarried	0.00*	Reff		Ref.
Married		1.20 (1.08-1.35)	0.00*	1.35 (1.16-1.56)
Average Per Capita Expenditure Per Month				
Q1 Very Low	0.00*	Reff		Ref.
Q2 Low		1.9 (1.54-2.35)	0.00*	1.97 (1.59-2.44)
Q3 Medium		1.86 (1.51-2.30)	0.00*	2.00 (1.61-2.47)
Q4 High		2.42 (1.97-2.96)	0.00*	2.71 (2.18-3.34)
Q5 Very High		3.38 (2.77-4.11)	0.00*	3.83 (3.10-4.73)
Residential Area (Rural/Urban)				
Rural	0.29	Reff	Ref.	Ref.
Urban		1.06 (0.94-1.19)	0.61	1.03 (0.90-1.18)
Health Status				
No Complaints	0.00*	Reff.	Ref.	Ref.
With Complaints		1.5 (1.35-1.70)	0.27	1.08 (0.93-1.26)
Activity Impairment				
No Activity Impairment	0.00*	Reff	Ref.	Ref.
With Activity Impairment		2.02 (1.75-2.33)	0.00*	1.74 (1.44-2.10)
Health Worker Ratio per 1000 Population	0.134	0.95 (0.88-1.02)	0.00*	0.83 (0.76-0.90)
LR chi (22)				425.53
Prov > chi2				0.00
Pseudo R2				0.0473
Number of Obs				13.095

Table 7. Bivariate and multivariate analysis of catastrophic health expenditure $\geq 40\%$ of total exp

Research Variables	Catastrophic Health Expenditure $\geq 40\%$ of total exp			
	Bivariate Analysis		Multivariate Analysis	
	p-value	cOR (95%CI)	p-value	aOR (95%CI)
Health Insurance Ownership				
No Health Insurance	0.03*	Reff	0.07	Ref.
With Health Insurance		0.85 (0.74-0.98)		0.87 (0.75-0.01)
Gender				
Male	0.65	Reff	0.05*	Ref.
Female		0.9 (0.88-1.07)		0.90 (0.81-1.00)
Age				
Infants (0-4 years)	0.00*	Reff	Ref.	Ref.
Children (5-18 years)		0.44 (0.35-0.55)	0.00*	0.50 (0.37-0.67)
Adults (19-59 years)		0.54 (0.45-0.66)	0.03	0.70 (0.50-0.97)
Elderly (60-100 years)		0.86 (0.69-1.06)	0.77	0.95 (0.70-1.29)
Education				
No Schooling	0.00*	Reff		Ref.
Elementary or Equivalent		0.77 (0.65-0.91)	0.75	0.96 (0.75-1.21)
Junior High School or Equivalent		0.62 (0.51-0.75)	0.16	0.83 (0.64-1.07)
High School or Equivalent		0.64 (0.54-0.76)	0.25	0.86 (0.66-1.11)
Higher Education		0.65 (0.54-0.79)	0.24	0.84(0.64-1.11)
Employment				
Unemployed	0.00*	Reff	Ref.	Ref.
Employed		0.83 (0.75-0.92)	0.00*	0.69 (0.60-0.78)
Marital Status				
Unmarried	0.00*	Reff		Ref.
Married		1.21 (1.10-1.34)	0.00*	1.30 (1.14-1.49)
Average Per Capita Expenditure Per Month				
Q1 Very Low	0.00*	Reff		Ref.
Q2 Low		1.30 (1.1-1.53)	0.00*	1.37 (1.16-1.62)
Q3 Medium		1.15 (0.98-1.36)	0.00*	1.27 (1.07-1.50)
Q4 High		1.33 (1.13-1.57)	0.00*	1.59 (1.34-1.88)
Q5 Very High		1.51 (1.29-1.77)	0.00*	1.85 (1.56-2.20)
Residential Area (Rural/Urban)				
Rural	0.00	Reff	Ref.	Ref.
Urban		0.84 (0.76-0.93)	0.59	0.96 (0.86-1.09)
Health Status				
No Complaints	0.00*	Reff.	Ref.	Ref.
With Complaints		1.40 (1.26-1.56)	0.65	1.03 (0.89-1.18)
Activity Impairment				
No Activity Impairment	0.00*	Reff	Ref.	Ref.
With Activity Impairment		1.91 (1.67-2.18)	0.00*	1.73 (1.45-2.05)
Health Worker Ratio per 1000 Population	0.134	0.81 (0.76-0.86)	0.00*	0.78 (0.72-0.84)
LR chi (22)				319.38
Prov > chi2				0.00
Pseudo R2				0.0301
Number of Obs				13.095

At the 40% threshold of non-food total expenditure, the variables significantly associated with catastrophic health expenditure include Health Insurance Ownership, Age, Education, Employment, Marital Status, Average Per Capita Expenditure Per Month, Residential Area (Rural/Urban), Health Status, Activity Impairment, and the Healthcare Staff Ratio per 1000 residents.

The multivariate analysis results for each threshold show that health insurance ownership status does not have a significant relationship with the risk of catastrophic events at the 10% and 40% thresholds, with p-values >0.05. At the 25% threshold, health insurance ownership has a significant relationship with catastrophic events, p-value = 0.00, where household members with health insurance have a 0.80 (0.68-0.94) times lower chance of experiencing catastrophic events compared to households without health insurance.

The age groups of children and adults significantly have a lower risk of experiencing catastrophic events across all thresholds ($p < 0.05$). Education levels of junior high and high school significantly have a lower risk of catastrophic events at the 10% threshold. Being employed significantly reduces the risk of experiencing catastrophic health expenditures at all thresholds, and being married also significantly lowers the risk of catastrophic events compared to unmarried individuals at all thresholds. Households in quintiles 2, 3, 4, and 5 are significantly more at risk of experiencing catastrophic health expenditures compared to households in quintile 1. At the 25% threshold, households in quintile 5, with very high expenditures, have a 3.83 (3.10-4.73) times higher risk of experiencing catastrophic events compared to households in quintile 1.

Living in urban areas poses a greater risk of catastrophic events at the 10% threshold compared to household members living in rural areas. Having health complaints increases the risk of catastrophic events by 1.2 (1.12-1.38) times significantly higher compared to no health complaints at the 10% threshold. The presence of activity impairments increases the risk of catastrophic events at all thresholds; at the 25% and 40% thresholds, the presence of activity impairments has a 1.7 times higher chance of catastrophic events compared to the absence of activity impairments. The ratio of available healthcare staff significantly lowers the risk of catastrophic events across all thresholds.

4 Discussion

In the Special Region of Yogyakarta, the proportion of health insurance ownership based on Susenas Kor and Susenas KP data from this study's respondents is 86.9%. This is higher compared to the welfare statistics of the DIY province from Susenas data in March 2022, which showed that 85.2% of the population had health insurance [3].

4.1 Relationship Between Health Insurance Ownership and Health Service Utilization

Health insurance ownership is associated with increased utilization of outpatient and inpatient health services. Individuals with health insurance are 2.08 times more likely to use outpatient services and 3.20 times more likely to be hospitalized compared to those without insurance. People who possess health insurance cards tend to seek healthcare services when they are ill because they have the means to access such facilities. Participation in health insurance significantly reduces the health burden, especially for those with serious illnesses, thus encouraging the utilization of healthcare services. A study in 2019 stated that health insurance schemes improve access to healthcare services and enhance equity in healthcare utilization [4].

The findings of this study also suggest that the higher the household expenditure, the greater the likelihood of utilizing outpatient and inpatient services, except for those in the second expenditure quintile. Household income has two impacts, The health impact indicates that

people with higher incomes tend to have better health status and a lower probability of falling ill, while the wealth impact shows that individuals with higher socioeconomic status have a better ability to pay for medical expenses after falling ill [5]. These findings also indicate that low-income individuals face budget constraints in medical consumption, leading to a tendency to delay medical treatment after falling ill. This is consistent with studies which showed that national health insurance ownership increases average health service utilization, particularly among socioeconomically better-off and more educated individuals [6].

4.2 Relationship Between Health Insurance Ownership and Out-of-Pocket Health Costs

From the analysis, the variables potentially reducing Out-of-Pocket Health Costs include the proportion of health insurance ownership, age, education, and the ratio of available healthcare staff. Conversely, variables that can potentially increase Out-of-Pocket Health Costs include marital status, the quintile of average per capita expenditure per month, health status, and activity impairment.

The proportion of health insurance ownership has the potential to reduce out-of-pocket health costs by 12.27% (statistically significant, $p=0.00$). The greater the proportion of household members with JKN (National Health Insurance), the smaller the out-of-pocket health costs. An increase of 1% in the proportion of household members with health insurance can reduce out-of-pocket health costs in the household by 12.27%. One of the direct functions of health insurance is to provide financial protection by reducing out-of-pocket health expenditures [7]. Households with a lower economic level and having JKN tend to have smaller OOPs because they are more likely to utilize health insurance [8]. High out-of-pocket health expenditures occur when households choose to use health services without financial protection against high healthcare costs due to a lack of access to insurance protection and other forms of guarantees against out-of-pocket health costs [9].

Other significant variables affecting out-of-pocket health costs are the level of household expenditure, where the larger the income quintile, the greater the OOPs incurred. The quintile of per capita expenditure per month has a statistically significant chance to increase out-of-pocket health costs ($p\text{-value}<0.05$). The higher the household members are in the top expenditure quintile, the higher the out-of-pocket health costs. Out-of-pocket health costs for household members in higher quintiles will increase compared to those in quintile 1, with increases of 138.96% in quintile 2, 213.87% in quintile 3, 420.64% in quintile 4, and 1251.11% in quintile 5. A higher economic level indicates better economic conditions, giving individuals more resources and better capability to pay out-of-pocket for healthcare services. Maulana et al. (2022) state that with an increase in economic status, the likelihood of receiving health services without out-of-pocket expenditures decreases [8]. This is because wealthier populations have a stronger preference for private facilities or medications, which are usually not covered by National Health Insurance (JKN), thus there is a tendency that the higher the household's economic level, the greater the out-of-pocket health costs incurred.

This condition can be explained based on the demand theory, which explains that there is a condition where individuals have limitations in financial resources that they can allocate to meet their health needs [10]. Therefore, efforts are needed to manage healthcare consumption according to their capabilities. A higher economic level will increase an individual's ability to pay for healthcare services, as more abundant resources allow for greater demand for healthcare compared to individuals with limited resources.

4.3 The Relationship Between Health Insurance Ownership and Catastrophic Health Expenditure

This study shows that health insurance ownership status does not have a relationship with the risk of catastrophic events at the 10% and 40% thresholds with a p-value >0.05 . At the 25% threshold, health insurance ownership status has a significant relationship with catastrophic events (p-value =0.00), where household members with health insurance have a 0.80 times lower chance of experiencing catastrophic events compared to households without health insurance. A 2020 study conducted in China found that over the past two decades, health insurance has offered financial protection against the risk of catastrophic health expenditures (CHE). [11]. This study is further supported by research from 2015, which suggests that health insurance reduces the risk of catastrophic events. Additionally, the findings reveal no significant relationship between health insurance ownership and the risk of catastrophic events at the 10% and 40% thresholds. This aligns with previous studies which also conclude that health insurance ownership does not significantly affect the occurrence of catastrophic events. [12-14].

In contrast, studies from 2011 indicate that owning health insurance can actually be a risk factor for the occurrence of catastrophic health expenditures [15,16]. Inappropriate hospital service usage may be another important reason for the increase in catastrophic health expenditure (CHE) levels in China [17]. Over the last two decades, the rise in hospitalization rates in China has been rapid due to expanded health insurance coverage, which encourages both healthcare providers and patients to opt for hospitalization. Additionally, the ineffective role of primary healthcare services as gatekeepers has not sufficiently promoted reasonable hospitalization behaviors among patients. The increased coverage of health insurance encourages people to seek treatment at higher-level medical institutions.

According to the Behavioral Model of Health Services Use, determinants related to catastrophic health expenditure can be understood through a healthcare utilization framework, which is influenced by predisposing factors (individual characteristics), enabling factors (those that facilitate access to healthcare), and need factors (related to an individual's health status or perceived need for care) [18].

From this study, it was found that predisposing factors affecting the occurrence of catastrophic expenditure include age, education, occupation, and marital status. Age is closely related to the prevalence of disease as people grow older, and gender is another factor strongly associated with health and illness. Education is closely related to the occurrence of catastrophic expenditure, where individuals with higher education levels tend to be more economically active and have better capabilities to manage healthcare costs. Marital status is a risk factor because it affects the number of household members, where larger households have a higher likelihood of facing financial challenges due to the healthcare needs of household members.

The enabling factor influencing catastrophic health expenditure in this study is the economic level, represented by the average per capita expenditure per month. The higher the expenditure quartile, the greater the risk of experiencing catastrophic health expenditure. This finding differs from a 2022 study in India, which found that households in the lowest income quartile are at higher risk of experiencing catastrophic healthcare costs [19].

One of the determinants of healthcare utilization is health status, previous studies mentioned that individuals with multimorbidity are more likely to access healthcare services, significantly driving households to seek healthcare services. Individuals with multimorbidity incur higher healthcare costs than those without multimorbidity, as this condition is closely related to increased healthcare utilization and out-of-pocket expenses [20-22].

5 Conclusion

Based on the analysis and discussion outlined, the conclusions of this study are, first there is a relationship between health insurance ownership and health service utilization in the Special Region of Yogyakarta. The utilization of outpatient health services is influenced by gender, age, employment, marital status, average per capita expenditure per month, and the presence of activity impairments. The utilization of inpatient health services is influenced by health insurance ownership, age, employment, marital status, average per capita expenditure per month, residential area, and the presence of activity impairments.

Health insurance ownership has a significant effect on out-of-pocket health costs. Variables that can potentially decrease Out-of-Pocket Health Costs include the proportion of health insurance ownership, age, education, and the availability ratio of healthcare staff. Conversely, variables that can potentially increase Out-of-Pocket Health Costs include marital status, the quintile of average per capita expenditure per month, health status, and activity impairments.

There is a relationship between health insurance ownership and the occurrence of catastrophic health expenditure at the 25% threshold. Catastrophic health expenditure is influenced by age, employment, marital status, average per capita expenditure per month, residential area, health complaints, activity impairments, and the availability ratio of healthcare staff.

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