Social and demographic determinants of health insurance status in India: Evidence from a nationally representative cross-sectional survey

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Abstract:

BACKGROUND: Out-of-pocket medical expenses are a crucial metric for assessing how well the healthcare system is working toward obtaining universal health coverage in any country. In India, out-of-pocket expenses for health are relatively high compared to other developed countries due to a lack of alternative finance arrangements. The disparity in out-of-pocket medical expenses largely depends upon the public health expenditure, government policies, and level of health insurance coverage.

MATERIALS AND METHODS: The study used a logit regression model to examine the association of the status of health insurance with socio and demographic variables using National Sample Survey 2018 data. The objective of the study is to analyze the impact of demographic variables on the status of health insurance in India.

RESULTS: This research found that education and occupation have a significant impact on the status of health insurance, among other demographic factors.

CONCLUSION: These findings underscore the importance of targeted policies and interventions aimed at improving access to health insurance among specific demographic groups. Addressing disparities in health insurance coverage based on educational and occupational factors is essential for achieving equitable healthcare access and improved health outcomes in the country. Increasing awareness of health insurance reduces out-of-pocket medical expenses and subsequently brings down economic poverty.

Keywords:

Catastrophic health expenditure, demographic factors, health insurance, out of pocket expenditure

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Introduction

According to the Indian Constitution, the state should prioritize "raising the people's standard of living," "enhancing the level of nutrition," and "expanding public health services" among their top priorities as stated in Article 47. India lacks a universal healthcare system; hence, the private health industry serves as the country's main supplier of medical services.[1] The main causes of catastrophic health disasters in India include fast-paced living, excessive pollution, sedimentary living, and bad diet. Such life-threatening disorders drive millions of Indians into poverty, as they must spend a sizable percentage of their income on medical emergencies. As life expectancy and the prevalence of chronic diseases have increased, morbidity and healthcare costs have risen.[2]

The country's political, economic, social, and demographic features determine a country's proportion of funds allotted to health care. The percentage of public health care spending is not the choice of the

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country; rather it depends on regulations and budgets allocated within the country.[3] In most cases, developed countries spend more on health than developing countries as a percentage of GDP. The range of public health spending varies from less than 1% to more than 10% of GDP depending upon the country's profile.[4] According to the World Bank, overall health spending in India in 2020–21 was 2.96 percent of GDP, compared to the global average of 10.89 percent. The percentages of GDP's total health spending vary little between 2009 and 2018. The highest was 3.75 in 2013–14, while the lowest was 3.2 in 2011. Because India's health budget is among the lowest in the world, the majority of healthcare costs are borne by the patient.[5]

The Indian health system is the largest in the world, with nearly 1.3 billion prospective beneficiaries. The insurance sector has seen new heights in the last decades. However, 75 percent of the Indian population pay medical expenses from their pocket due to the poor state of the healthcare system in the rural area and lack of awareness about health insurance plans. In this context, the study has evaluated the socio and demographic factors determining the status of health Insurance in India. The study gives new insight and a way forward for the insurance industry to enhance insurance penetration and decrease the out-of-pocket expenditure.

Out-of-pocket medical expenses in India, as a percentage of total health expenditure, have decreased from 72 percent in 2004 to 48.2% in 2019 as per the 15th Finance Commission as shown in Table 1. Although it is showing decreasing trend the percentages are relatively high in comparison to other industrialized countries. Due to inadequate public investment in health, a lack of human resources, and poor health infrastructure, the Indian government is unable to meet the whole spectrum of healthcare needs, increasing the expense and financial burden of care.[6]

The study[7] measured the out-of-pocket hospitalization costs by disease and their devastating impact on Indian households. It answers the question of how OOPE, Catastrophic Health Expenditure (CHE), and distress health financing affect hospitalization depending on the ailment and kind of healthcare provider (public and private). In general, a large majority of the public may spend on outpatient appointments according to their ability to pay; however, inpatient care requires patients to use emergency measures if they do not have enough savings/income owing to the severity of the sickness. The government, particularly, must pay close attention to interstate differences in OOP health expenditure and the accompanying poverty.[8] Diagnostic tests for medicine, associated fees, physiotherapy, personal medical equipment, blood, oxygen, and other items will not be paid under the programs.[9]

Indian healthcare system is dominated by private health systems with a significant portion of out-of-pocket expenditure by individuals towards health. Social economic factors such as household income, education, and accessibility of healthcare facilities will be determining the probability of OOP expenses along with alternative finance mechanisms like health insurance.[1] Individuals belonging to the higher economic class have a higher probability of incurring more out-of-pocket expenses due to the high capacity of payments. Similarly, out-of-pocket expenditure is also greatly influenced by the level of education.

Even if health insurance is there, many are paying out-of-pocket expenses for drugs, diagnostics, and post-treatment care, since the out-patient expenses are not covered by the health insurance policy. As a result, insurance may increase the poor's out-of-pocket expenses for inpatient and inpatient-related care.[10] Although financial protection through public or private health insurance lessens the amount people pay directly for medical care, out-of-pocket costs can still be a barrier to healthcare access and usage in some nations. If healthcare spending becomes more reliant on out-of-pocket expenditures, the burden is shifted to people who consume services more regularly. Out-of-pocket (OOP) spending is an important indication of financial security and specifies the private involvement required for health funding. Individuals' out-of-pocket health expenses means the expenses that are paid directly to hospitals, eliminating any prepayments for services such as insurance premiums, cost of vaccinations, taxes, or contributions.

High out-of-pocket health spending has some negative implications, including pushing individuals and families into poverty. Majority of people who are forced into extreme poverty because of out-of-pocket healthcare costs live in low-income and developing countries. In countries with limited government expenditure on health, the percentage of out-of-pocket spending is considerable. As depicted in Figure 1, India is among the countries with the lowest health expenditure as a percentage of GDP, even low-income countries such as Bhutan (4.4 percent), Sri Lanka (4.1 percent), and Nepal (5.2 percent) percent of their GDP to health expenditure.[11] In comparison to high-income countries, Middle East and North African countries spend less on health care.[12] Healthcare spending in the USA accounted for 18.8% of GDP, but it was significantly lower in Australia and Switzerland (10.6 and 11.8 percent, respectively). In terms of private health insurance coverage, the USA placed first (55 percent). The main cause for the disparity between other nations and the USA is due to disparities in workforce funding policies, pharmaceuticals, and medical equipment being sold at
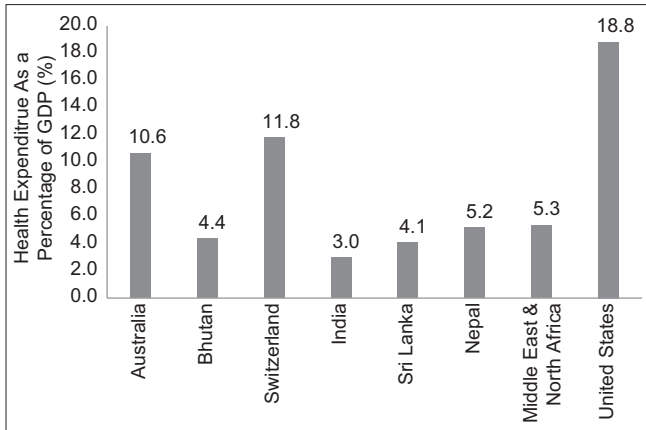
Figure 1: Health Expenditure as a Percentage of GDP for the year 2020. Source: World Bank 2023

Table 1: Percentage of public health expenditure and OOP health expenditure

Years	Government Health Expenditure as a % of Total Health Expenditure	Out of Pocket Expenditure as a % of Total Health Expenditure
2014-2015	29.0	62.6
2015-2016	30.6	60.6
2016-2017	32.4	58.7
2017-2018	40.8	48.8
2018-2019	40.6	48.2
2019-2020	41.4	47.1

Source: National Health Estimates - 2019-2020, Report Released by NHA, April 2023

significantly higher prices in the USA and the deliberate ordering of costly medical tests.

OOP payments in India averaged about 54.8 percent of overall healthcare costs from 2000 to 2019. Although the OOP has fallen from 71.7 percent in 2000 to 54.8 percent in 2019, it remains higher than in many other nations. For most Indian people, savings from income remain the foremost choice for dealing with out-of-pocket expenditures on health. Each year, such high out-of-pocket expenditures force 7% of the population into poverty.[13]

In nations like India without Universal Health Coverage (UHC), alternative financial arrangements like health insurance should function very well because they will help to lessen the load on the individual in the event of hospitalization. Even though the idea of health insurance was first introduced in India in 1948, it is still not able to function well as a tool to offset out-of-pocket medical expenses. Therefore, understanding the variables affecting the state of health insurance is essential for developing better policies. With the aid of logistic regression, the current study describes the demographic characteristics that affect the availability of health insurance. It demonstrates how the status of health insurance is influenced by demographic parameters such as age, gender, geography, education, and type of occupation.

The Government of India is attempting to improve steps to achieve Universal Health Coverage (UHC), and this became more important than ever after WHO announced the Sustainable Development Goals in 2015. Countries like China made health insurance one of the means of achieving UHC. China achieved great success in decreasing OOP spending by establishing centralized and state-owned methods, as well as pioneering a variety of health insurance systems and providing

universal access to excellent health care to their whole population.[14] As a result, China can cut out-of-pocket spending from 62.85 percent in 2002 to 34.79 percent in 2020. Therefore, the objective of this study is to estimate the diverse effects of health insurance together with sociodemographic variables. The main objective of this study is to determine the impact of demographic factors such as age, gender, location, marital status, level of educational level, and type of occupation on the status of health insurance.

The following is the hypothesis of the study:
H_0: Demographic factors do not influence the status of health insurance.
H_1: Demographic factors influence the status of health insurance.

Materials and Methods

Study design and setting
Ethical committee approval obtained from 3.1.2023. In this study, we have used data from the 75th round of the National Sample Survey Office (NSSO) health survey (NSSO, 2018). The NSSO is a public organization under the Ministry of Statistics and Programme implementation by the Government of India since 1950. The NSSO 75th round survey conducted from July 2017 to June 2018 covered the whole of the Indian Union.

Study participants and sampling
The NSSO collects data on various issues such as employment, migration, consumption expenditure, education attainment, and morbidity. The 25th Schedule of the 75th round of the NSSO, known as the «Household Social Consumption: Health» collected quantitative information on the health sector, such as morbidity, the profile of ailments, including their treatment, the role of government and the private sector in providing healthcare, pharmaceutical spending, expenditure on medical consultation, and investigation hospitalization and expenditure thereon, maternity and childbirth, the condition of the aged, etc., The NSSO collected information from 1,13,823 households (64,552 in rural areas and 49,271

Table 2: Summary statistics of variables

Variables	Measurement	n	Minimum	Maximum	Mean	SD
Insurance status	0=not covered by insurance, 1=covered by insurance	555107	0.00	1.00	0.1700	0.37559
Gender	1=male, 2=female, 3=transgender	555351	1.00	3.00	1.4901	0.50004
Age (in years)	Individuals age	555351	0.00	115.00	28.7408	19.69166
Marital status	1=Never Married, 2=Currently Married, 3=Widowed and 4=Divorced	555351	1.00	4.00	1.6146	0.58688
General Education	1=Not Literate, 2=Literate Without Any Formal Schooling, 3=Formal Schooling Till Primary, 4=Primary To Higher Secondary, 5=Graduation To Post Graduation And Above	555351	1.00	16.00	6.9730	4.41782
Occupation	1=Self Employed (Own Account Worker), 2=Self Employed - Employer, 3=Unpaid Family Worker, 4=Regular Salaried/Wage Employee, 5=Wage Labour In Public Works, 6=Age Labour In Other Types, 7=Seeking And Available For Work, 8=Attended Educational Institution, 9=Attended Domestic Duties Only, 10=Domestic Duties And Also Involved In Collection, 11=Pensioners And Remittance Recipients, 12=Not Able To Work Due To Disability, 13=Others (Beggars', Prostitution Etc)	555351	11.00	99.00	71.0097	32.38012
Sector	1=Rural, 2- Urban	555351	1.00	2.00	1.4129	0.49236
Valid *n* (list wise)		555107				

Source: 75th Round of NSSO Health Survey, 2018

in urban areas), covering 5, 55,115 persons (3, 25,883 in rural areas and 2, 29,232 in urban areas).

Data collection tool and technique

For all the important factors, separate estimates were given for the population in each gender, State/UT, sector (rural/urban) combination, and for many parameters, by age group as well. The NSSO provides information on the population with health expenditure coverage in rural and urban. NSSO covered about 14 percent of the rural population, and 19th percent of the urban population had health expenditure. It also collected information on expenses incurred during the last 365 days for each State/UT. Expenditure in case of hospitalization was calculated including bed charges, doctors› surgeon›s fees, the total amount paid for medicines, diagnostics tests, attendant charges, physiotherapy, personal medicine appliance, and blood oxygen, etc., with a reference period of the last 365 days.

Analytical framework

The binary logistic regression model is used to study the impact of demographic factors on the status of health insurance. The dependent variable is binary, i.e. "1" for the individual having health insurance and "0" for not having health insurance. The result of logistic regression was presented as an adjusted odds ratio (AOR). The binary choice model is best fitted given the theoretical

background. In the binary logistic model, one tries to estimate a probability function of an observed discrete random variable—the status of health insurance. It takes two values 1 and 0, where 1 is for having health insurance and 0 is for not having health insurance.

To ensure the dependent variable lies between 0 and 1, we transform the dependent variable into a cumulative distribution function.

Prob $(Y_i=1) = f(Z_i) = f(\alpha + \beta X_i))$, + where CDF (.) is selected in advance and assume

$E (\mu_i = 0$

$$P = (Y_i = 1) = P_i = \frac{1}{1+e^{-(\alpha+\beta X_i)}} = \frac{1}{1+e^{-Z_i}} = \frac{e^{Z_i}}{1+e^{z_i}}$$

And

$$1 - P_i = \frac{1}{1+e^{Z_i}}; \frac{P_i}{1-P_i} = \frac{1+e^{z_i}}{1+e^{-Z_i}} = e^{z_i}$$

$$Logit = ln\left(\frac{P_i}{1-P_i}\right) = Z_i = \alpha + \beta X_i$$

Prob of **(Y_i=1) *tends to* 0 *as* $\alpha + \beta X_i$** tends to minus infinity and ***Prob* (Y_i=1)** tends to 1 as **$\alpha + \beta X_i$** tends to infinity. Thus, probabilities from the logit model will be between 0 and 1.

The theoretical construct as discussed suggests that the explanatory variables are relevant for the model. These are demographic variables (age, gender, marital status, education, occupation, etc.). Hence, we construct the following logit model considering the relevant variables.

$$Status\ of\ insurance\ i = \beta_0 + \beta_1\ age + \beta_2\ gender + \beta_3\ marital\ status + \beta_4\ location + \beta_5\ education + \beta_6\ occupation + \varepsilon$$

This code includes six variables: five categorical variables (gender, marital status, location, education, and occupation) and one continuous variable (age). The one outcome variable is dichotomous, i.e. status of health insurance (0, with no health insurance and 1, with health insurance). The analysis is useful in addressing factors determining the status of health insurance. The values of each category are arranged vertically for better understanding. Categorical variables such as education status and occupation have been reclassified for better thoughtful results.

As shown in Table 2, data was prepared for analysis by being cleaned, coded, and added to SPSS. For categorical data, descriptive statistics like frequencies and proportions were calculated, while continuous variables were summed up by mean with standard deviation (SD) or median. Then, tables and graphs were used to present the data. To determine the factors that influence the status of health insurance, variables with a *P* value of less than 0.05 in the bivariate logistic regression analysis were added to the multivariate logistic regression model. The outcome›s statistically relevant factors were identified using a *P* value of less than 0.05 and an AOR with a 95% confidence interval.

Results

Descriptive statistics of sample has been computed for better understanding of data. Logistic regression analysis has been performed to find out impact of demographic variables on status of health insurance.

Table 3 represents the health insurance status and gives an accurate picture concerning various demographic variables. It is reported that out of the total samples of 5, 55, 107, 17% of the people are covered under insurance and the rest of 83% are not covered. The middle and older age groups are having more insurance coverage than the young population. However, there is no significant difference observed among gender and sectors, i.e., rural and urban. It is observed that those who have more educational backgrounds, i.e. graduation and above graduation, are having more percentage of insurance. Interestingly, for those who are having marital status as separated or divorced, the percentage of insurance is more. Among people who underwent

hospitalization, 20.7% are covered by health insurance. No clear pattern of insurance status is observed as far as infections-related diseases are concerned. Further, the survey data shows that the persons who are suffering from non-communicable diseases are having more percentage of health insurance than those with communicable diseases.

For the model, the status of health insurance was the dependent variable, whereas sociodemographic (age, gender, location, marital status, educational status and occupation) were the independent variables.

Results:

Omnibus Tests of Model Coefficients show that Table 4. Sig (p) <.05, hence at least one predictor variable in the model is statistically significant. The Sig. (p) is. 000, which is less than. 05; this indicates at least one of the predictor variables statistically significant for predicting outcome variables, i.e. status of health insurance. To discover which variable is statistically significant in predicting the outcome variable, in the table variables in the equation help us to identify the rows where sig. (p) is less than or equal to. 05.

Discussion

It is observed from Table 5 that the logistic regression analysis shows that age is the significant factor in determining the status of health insurance at the (significant level ≤5%). As the age increases, the probability of buying health insurance is high. Marital status is not an important factor in determining the status of health insurance (never married, currently married, and widowed) on the status of health insurance at the (significant level of ≤5%). In the case of marital status, the chance of taking health insurance is less than never married, currently married, and widowed. Therefore, marital status does not influence the buying of health insurance. In the case of education level, there is no positive relation between the education level and determining health status (significant level ≤5%). However, occupational categories have a significant effect on the status of health insurance. Among the occupation level, the labor class is showing significant and positive. It depicts that the probability of having health insurance in the case of labor is high due to government schemes. In the case of the self-employed, the probability of buying health insurance is less in the self-employed. According to the model, the regular wage/salary and retirees/pensioners is showing a high chance of buying health insurance. This means that if the government takes care of occupation, then automatically the insurance penetration increases. According to the analysis, there is no significant effect

Table 3: Status of Insurance (in %)

Demographic Characteristics	Details	Sample Size	Not Covered (%)	Covered by Insurance (%)
Age (in years)	0-4	64732	88.5%	11.5%
	5-14	90913	85.0%	15.0%
	15-29	152908	83.6%	16.4%
	30-44	116005	81.5%	18.5%
	45-59	87787	79.7%	20.3%
	60-69	35275	79.3%	20.7%
	70 Above	7487	78.8%	21.2%
Gender	Male	283197	83.1%	16.9%
	Female	271873	82.9%	17.1%
	Transgender	37	83.8%	16.2%
Sector (Location)	Rural	325876	84.1%	15.9%
	Urban	229231	81.4%	18.6%
Education status	Not Literate	147273	85.3%	14.7%
	Literate Without Any Formal Schooling	2669	90.6%	9.4%
	Formal Schooling Till Primary	3558	85.9%	14.1%
	Primary To Higher Secondary	346975	83.1%	16.9%
	Graduation To Post Graduation And Above	54632	75.6%	24.4%
Marital status	Never Married	242415	85.3%	14.7%
	Currently Married	285786	81.4%	18.6%
	Widowed	25426	80.1%	19.9%
	Divorced/Separated	1480	74.1%	25.9%
Occupation	Self Employed (Own Account Worker)	63354	83.5%	16.5%
	Self Employed - Employer	4966	80.2%	19.8%
	Unpaid Family Worker	28187	79.7%	20.3%
	Regular Salaried/Wage Employee	39930	72.9%	27.1%
	Wage Labour In Public Works	4030	85.2%	14.8%
	Wage Labour In Other Types	44051	80.6%	19.4%
	Seeking And Available For Work	8223	83.3%	16.7%
	Attended Educational Institution	126644	84.1%	15.9%
	Attended Domestic Duties Only	107298	82.8%	17.2%
	Domestic Duties And Also Involved In Collection	37421	87.9%	12.1%
	Pensioners And Remittance Recipients	11741	74.8%	25.2%
	Not Able To Work Due To Disability	3209	84.0%	16.0%
	Others (Beggars', Prostitution Etc)	31825	85.8%	14.2%

Source: 75th Round of NSSO Health Survey, 2018

Table 4: Omnibus tests of model coefficients

	Chi-square	Df	Sig.
Step 1			
Step	4316.282	15	0.000
Block	4316.282	15	0.000
Model	4316.282	15	0.000

Source: Author Calculation from the 75th Round of NSSO data 2018. Note: Omnibus Tests of Model Coefficients shows that. Sig (p) <0.05, hence at least one predictor variable in the model is statistically significant

of gender on the status of health insurance services. There is a significant effect of age, location, marital status, level of education, and type of occupation on the status of health insurance services (significant level ≤5%). Given the significant effect of age on the status of health insurance services, policymakers should design age-specific initiatives to cater to the varying needs of different age groups. As location has been found to have a significant effect on the status of health insurance services, policymakers should implement regional healthcare planning strategies.

Recommendation

Given the significant effect of education level on the status of health insurance services, there is a need for comprehensive education and awareness campaigns about the importance of health insurance and how to navigate the healthcare system. Policymakers should invest in promoting health literacy, making information easily accessible, and providing guidance to individuals with varying levels of education. Policymakers should recognize the importance of occupation in determining access to health insurance services. They should explore ways to address the specific healthcare needs of different occupational groups and consider tailored health insurance options or employee benefits to cater

Table 5: Variables in the equation

	B	S.E.	Wald	Df	Sig.	Exp (B)	95% C.I. for Exp (B)	
							Lower	Upper
Age	0.009	0.000	713.577	1	0.000***	1.009	1.008	1.009
Gender			27.005	2	0.000			
Male	-0.134	0.493	0.074	1	0.785	0.874	0.333	2.298
Female	-0.089	0.493	0.032	1	0.857	0.915	0.348	2.405
Marital Status			55.496	3	0.000			
Never Married	-0.364	0.061	36.135	1	0.000***	0.695	0.617	0.782
Currently Married	-0.402	0.060	45.332	1	0.000***	0.669	0.595	0.752
Widowed	-0.422	0.062	46.380	1	0.000***	0.656	0.581	0.740
Location	-0.099	0.008	160.225	1	0.000***	0.906	0.892	0.920
Education Status			1565.281	4	0.000			
Illiterate	-0.527	0.015	1313.309	1	0.000***	0.591	0.574	0.608
Up to Primary Education	-0.416	0.015	788.221	1	0.000***	0.660	0.641	0.679
Up to Higher Education	-0.388	0.012	1106.836	1	0.000***	0.678	0.663	0.694
Up to Graduation	-0.121	0.029	17.593	1	0.000***	0.886	0.837	0.937
Occupation Status			441.617	4	0.000***			
Labour	0.206	0.019	117.049	1	0.000***	1.228	1.184	1.275
Self-employed	-0.048	0.021	5.518	1	0.019**	0.953	0.915	0.992
Regular wage/Salary	0.073	0.018	17.286	1	0.000***	1.076	1.039	1.114
Retirees/Pensioners	0.236	0.028	69.387	1	0.000***	1.267	1.198	1.339
Constant	-0.982	0.497	3.906	1	0.048**	0.374		
Chi-square					0.000			
Pseudo R^2								

Source: Author Calculation from the 75th Round of NSSO data 2018. Note: ***Significant at 1 percent, **Significant at 5 Percent and *Significant at 10 percent. Variables entered in the model are: Age, Gender, Location, Marital Status, Education, and Occupation

to these diverse needs. Policymakers must ensure that all individuals, regardless of gender, have equal access to health insurance services. While gender might not have a significant effect on health insurance status according to the analysis, it is crucial to continuously monitor this aspect to prevent any potential disparities from emerging.

Limitations
The NSSO 2018 survey relies on self-reporting from respondents, which can cause biases in the data collected. Potential measurement mistakes could occur because of respondents' erroneous memory or reporting of their health expenses. The NSSO 2018 data is a snapshot of a particular time, and the factors that influence out-of-pocket medical expenses may change over time. It is possible that the analysis did not take into account factors like policy modifications, economic situations, or healthcare system improvements that took place after 2018. The study's conclusions based on the NSSO 2018 data may differ depending on the period, area, or sample size used. In light of the fact that different environments can have distinct out-of-pocket health expenditure determinants, extrapolating the findings to other contexts or populations should be done with care.

Conclusion

In a nation where people purchase health care even at the expense of their livelihoods, proactive measures must be taken to safeguard citizens from unaffordable catastrophic medical costs. It is a fact that most participants are not covered by insurance plans; the patient's family members are burdened by OOP costs. It is important to evaluate the various tiers of the current healthcare financing models. Starting at the primary care level itself, existing health insurance services should be enhanced to make them more available, inexpensive, and acceptable to all beneficiaries. The results of this study indicate that people who have higher levels of formal education are more likely to have health insurance, as they are well aware of the benefits. The data presents a largely favorable picture of access to health insurance among those who are in full-time employment than self-employed. Therefore, efforts should be made to inform the general public of the advantages of health insurance programs and to persuade both employees and employers to enlist in group health insurance programs to lessen personal financial burdens.

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There are no conflicts of interest.

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