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How Does Health Insurance Affect Healthcare Spending in India over the Decade: A Two Part Model Approach

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Abstract

Healthcare financing (in public and private both ends) is a challenging priority in India where low public healthcare expenditure causing unaffordable cost of treatment. Introduction of health insurance is considered as a major invension in healthcare. The main focal point of the study is to visualize the changes in the insurance coverage and healthcare spending pattern and to assess the relationship between health insurance and healthcare cost emphasizing Out Of Pocket Expenditure (OOPE) on healthcare in India. We use 60th round (2004-2005) and 71st round (2014-2015) data of National Sample Survey Organization covering 65,932 and 73,868 households respectively. Bivariate analysis and two part model has been adopted for the analysis. It has been found that the insurance coverage has shown an excellent advancement between 2004-2005 and 2014-2015 with a higher enhancement among females. Insured persons are more likely to take treatment than that of uninsured for both for inpatient and outpatient cases and also insurance coverage is more influencing the treatment seeking behaviour in rural than urban area. It is to be noted that the insurance is helping people to curtail the OOPE on treatment for both inpatient and outpatient cases but in most cases insured persons pays more for treatments than for uninsured (though it is not uniform on all the factors). The health insurance significantly determines the health-seeking behaviour and out of pocket cost paid for healthcare for all the patient.

Keywords: Health insurance; Pocket expenditure; Two-part model

Introduction

Financing for healthcare by the government and individuals is a challenging priority in India due to its overflowing population, inadequate resources, and low disposable income. Public health expenditure in India has remained the lowest in GDP even in comparison to it its neighboring low economic South Asian countries [1]. India, along with Vietnam, Bangladesh, and China, has some of the highest load of OOPE for health care in Asia [2]. The household can be forced into penury as a consequence of OOPE. Around 150 million among all the global people have to tackle financial catastrophe and impoverishment due to OOPE suffered by about 100 million every year while 90% of them belong to low-income nations [3, 4]. Many studies have highlighted that due to the cost of health care between 32-39 million citizens are dragged into poverty each year in India [2,5-7]. Financially protecting households Health care system of this nation having two major fundamental complication, firstly needy people have not sufficiently gained from the public health care services which implying the government subsidy does not always reach the underprivileged and secondly, the poor people remain significantly endangered against unforeseen shocks due to finite economical health care [8]. Soon after the liberalization, the health care cost has become exorbitant and has set up some serious equity issues [9]. Health insurance is one of the determinants of social security by which peoples are assured to benefit both health and medical care during their illness [10]. Health insurance can either compensate the insured for expenses acquire from ailment or injury or pay the care provider straightway [11]. The introduction of health insurance in developed countries has promoted healthcare utilization and safeguard individuals from impoverishment in developing countries [12]. Health insurance provisions are part of government policies and required long-term planning for the development of affordable and sustainable schemes for different segments of the population. There is a growing recognition that Universal Health Coverage (UHC) is the foundation for ensuring

healthful lives and encourage well-being for all individuals beyond age [13]. In India concept of UHC is just in the initiation stage and under the circumstances, it is important to assess the healthcare financial burden for treatment for insured and non-insured household members [14]. It is estimated that about 75 percent of healthcare is born by OOPE thereby subjecting households to impoverishment whereas about rural and urban families are 10.1 and 6.2 percent, have either turn into poor or poorer as a repercussion of OOPE in India respectively [15,16]. India is going through a double load of disease. Many preventable communicable diseases are growing and with this, nutritional linked problems and chronic health conditions are continuing to plague the country [17]. High healthcare spending as well as high OOPE is also creating a financial burden in the nation's economy [18]. Escalating privatization, rising health care expenditure and inadequate insurance coverage (only for hospitalized expenses) ensure that an increasing number of people below the povertyline in the coming days. Low expenditure on public healthcare in India has led to vast discrimination in the circulation of health care services between the different strata of the society [19]. To ensureUHC, along with financial uncertainty safety, access to kind of essential health-care services and access to secure, efficient, quality, and economical necessary medicines and vaccines for each and every one under the target of SDG Good Health and wellb--eing. However, to the author's best knowledge, there is no sufficient attempt to assess the extent of association between health insurance and

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OOPE particularly in the context of India over time. So, the present study is an attempt to differentiate between the OOPE of individuals with or without health insurance and also to find out the dependency of health insurance on the health care facilities for both inpatient and outpatient cases.

Materials and Methods

Data source

Data were taken from the 60th and 71st round of the National Sample Survey Organization's (NSSO) "Morbidity and health care" survey, conducted during the period 2004-2005 and 2014-2015 respectively by the Ministry of Statistics and Programme Implementations of Government of India [20]. The national representative survey consists of a sample size of 73868 households (47,302 rural and 26,566 urban households) in the 60th round and 65932 households (36,480 rural, and 29,452 urban households) in the 71st. The cross-sectional survey's sample was selected using a two-stage stratified design where First-Stage Units(FSU) for rural and urban areas are census villages and urban blocks respectively and for Second Stage Unit (SSU) is the household [21,22]. The data covers ailment type, no. of hospitalization days, diseases nature, OOPE and utilization of health sector service, concerning individual as well as household socioeconomic backgrounds combinedly.

Key outcome variable and correlates

From the household-level data, the amount of medical insurance premium paid for household members and the household's usual consumption for health expenditure in a month was taken as the dependent variable in the study. Incidence of hospitalization of members including their sex, educational qualification, inpatient time-period, sector, household size, occupation, social group, outpatient status, and any coverage of health insurance schemes wasmarked as a predictor variable in the study. The reference period for outpatient treatment for 15 days was taken and for inpatient cases, reference periods of both the last 365 as well as for the last 15 days were considered.

From NSSO 60th round data to some extent same information including insurance status was taken for comparing purposes concerning the socio-economical and demographical characteristics.

Statistical analysis

Now to understand the insurance coverage for both 2004-2005 and 2014-2015, bivariate analysis was performed with respect to the socio-economical and demographical variables. Similarly, for calculating the total expenditure amount for both insured and uninsured people residing in rural and urban, a Chi-square test was carried out. To determine the determinants of the OOPE, here Two-Part Model (TPM) was fitted separately for inpatient and outpatient cases. It was based on the factor that the OOPE was very much skewed and it could be affected by zero values.

Also true that TPM is having the methodological advantage of handling skewed data [23]. In this study, the first part of the TPM was a binary model that illustrated the distinction between individuals with no OOPE and individuals who incurred OOP payments for health care. Then Ordinary Linear Regression (OLS) model was used to study the out-of-pocket estimated cost and their significance.

The first part of the TPM

$$P(y>0)=\exp(\beta x)/(1+\exp(\beta x)) ;$$

where yi=0 indicates the individual who has no OOP payment for health care. The next part of the TPM model anticipated the level of health care OOPE, conditional on the non-zero values. Multiplying probabilities of TPM's first part by expected levels of TPM's second part provided the estimates of predicted cost as:

$$E(y_i|x_i)=\text{Prob}(y_i>0)E(y_i|x_i; y_i>0)$$

In the above equation's second part, the outcome variable was as log-transformed of Health care OOPE, given that individual having health expenditure. For OOP amount measurement's (Indian Rupees) consistent estimates in the original scale, multiplication of the predicted exponential values with the smearing factor(non-parametric) by Duan, ϕ was calculated, where,

$$\phi=1/n\sum\exp(\epsilon)=1, \epsilon_i=\ln y_i\text{-}x_i\epsilon$$

The expected OOPE for health care at the household level obtained as:

$$E(y_i|x_i)=\text{Prob}(y_i>0)E(y_i|x_i;y_i>0) \; \phi$$

The distribution of ln(yi), (yi>0) was following normal distribution; and in (yi) by OLS considering important covariates weretaken [24]. Here Logit model was used to understand the significant correlates of the OOPE for health care by individuals. Now forestimating the monthly average OOP health care expenditure for selective background, we had to estimate the parameters of OLS of the second part of TPM. The dependent variable was the OOP health care costs in the logarithm scale and the covariates were sector, sex, age groups, educational qualification, household size, employment and social group.

Results

Changes of insurance coverage

The percent distribution of Insurance coverage of both, households and individuals by selected background characteristics for the year 2004-2005 and 2014-2015 was shown in Table 1. The table showed an excellent improvement of insurance coverage from 1.07 percent to 15.25 percent over the decade. The table also showed the percent distribution of insurance coverage changed drastically for everybackground characteristic. Some important changes from 2004-05 to 2014-15 was seen in the increase of insurance percentage among rural residents (38.1 percent), among elderly (20.6 percent), among females (15.1 percent), among illiterates (39.6 percent), among the lowest Monthly Per Capita Expenditure (MPCE) group, among casual laborers (113.5 percent), and among persons belonging to OBC category (43.8 percent).

Profile of total expenditure on insurance basis in the recent period

Total expenditure for insured and uninsured for inpatient and outpatient cases for the year 2014-2015 was presented in Table 2. The table showed that for both inpatient and outpatient cases expenditure was not uniformly low for insured persons. In case of inpatient cases for insured persons being females, urban residents, adults, MPCE group (except lowest catagory), people irrespective of all occupational categories, higher educated and community belonging to Scheduled Tribe and Other Backward Class groups were more paying than uninsured peoples. Again, in the case of outpatient cases, urban people and people who are pursuing higher studies are paying more money than the uninsured.

Year Insurance coverage	2004-2005	2014-2015
Residence		
Rural	0.36	14.06
Urban	3.13	18.02
Age group		
Children	0.69	12.03
Adults	1.32	16.25
Elderly	0.88	19.01
Sex		
Male	1.23	14.04
Female	0.9	14.46
Educational qualification		
Illiterate	0.34	13.81
Primary or less	0.71	14.24
Secondary & Higher secondary	1.87	15.78
Higher studies	6.79	24.47
Monthly per capita consumption expenditure (MPCE)		
Lowest	0.23	13.4
Second	0.38	13.44
Middle	0.56	15.78
High	1.7	14.81
Highest	3.96	20.61
Occupation		
Self employed	0.44	14.9
Regular wage	3.86	17.64
Casual labourer	0.13	14.88
Others	1.9	15.83
Household Size		
Less than 3	1.34	20.35
3 to 5	1.6	18.15
5or more	0.86	12.05
Social Groups		
ST	0.47	18.82
SC	0.94	15.37
OBC	0.86	38.51
Others	1.85	27.31

Table 1: Percent distribution of Insurance coverage of both, households and individuals by the selected background in 2004-2005 and 2014-2015.

Covariates	Expenditure for inpatient cases (in Rupees)	Expenditure for outpatient cases (in Rupees)	OBC	OBC
Sex	Insured	Uninsured	Insured	Uninsured
Male	21198	22016	570	699
Female	14381	12588	617	667
Sector				
Rural	12890	13396	487	646
Urban	24083	21021	745	743
Monthly Per Capita Expenditure (MPCE)				
Lowest	7460	8412	365	588
Second	11302	11417	496	604
Middle	12666	12334	566	592
Higher	16042	15953	598	741
Highest	31657	31258	1104	939
Occupation				
Self employed	19613	17534	595	699
Regular wage	14783	14451	670	733

Casual labourer	9985	8753	516	567
Others	24613	22227	585	762
Age group				
Children	10906	12486	428	463
Adults	17250	14356	628	733
Elderly	20574	25526	589	776
Household Size				
Less than three members	17089	18873	524	671
3 to 5 members	15610	17615	629	650
More than 5 members	15709	16052	562	731
Educational qualification				
No education	11271	12083	484	610
Primary or less	10722	14879	553	624
Secondary/higher secondary	13222	14556	629	792
Higher studies	18643	16765	1103	979
Social group				
Scheduled tribe	9599	8702	524	627
Scheduled caste	10539	11582	433	565
Other backward class	15846	15209	592	682
Others	20630	27216	695	752

Table 2: Total expenditure for insured and uninsured for inpatient and outpatient cases.

The scenario of total expenditure in rural-urban setting

The total expenditure for rural and urban residents for inpatient and outpatient cases with respect to some background characteristics was shown in Table 3. From the table, it can be said that for inpatient cases expenditure was uniformly low for rural persons for most of the background variable due to less available health service. But, people belonging to rural areas with the highest MPCE group (Rs. 27465) and the person getting regular wages (Rs.15557) were paying more health expenditure than urban people. Rural inpatient insured people were paying less than the uninsured peoples while the scenario was opposite for urban residents. Discussing social group it was viewed that Scheduled Tribe and elderly rural people expending least amount of money on health while at urban Scheduled Tribe and for children payment was second-highest and highest respectively. For outpatient cases, the expenditure was uniform for all the covariates that is rural people are paying less than urban persons.

Association of hospitalization with health insurance and estimated OOP cost

Finally, the concern was to find whether hospitalization was having a significant association with health insurance or not Table 4 was showing hospitalization had a significant association with health insurance. The people who were insured were taking treatment 1.13 times more than that of uninsured. The odds ratio for most of the covariates showing significant results except urban area, highest MPCE, and secondary or higher secondary education. Now TPM was fitted for inpatient and outpatient cases separately for estimating the Out-Of-Pocket Expenditure (OOPE). Results from the Ordinary least Square (OLS) model in Table 4 also showed the estimated OOP cost paid for health expenditure. Results from the OLS model showed significant results with cost paid for inpatient's insurance status, social group, sex, age group, MPCE, casual laborer, household size 5 or more, and education. Here Age group, insurance status, second and highest MPCE group, household size with members 3 to 5 and 5 or more, under social

group SC and OBC were coming up significant for outpatient cases.It was also visible that in inpatient cases women paid Rs. 4958 which was significantly lower than men, Rs.7590, while for the outpatient cases estimated cost remained almost the same for both the gender in recent time. The result also highlighted that urban people were spending more money in OOPE compared to rural people for both inpatient and outpatient cases. With increasing monthly per capita consumption expenditure people were likely to pay more OOPE except for outpatient cases second category of MPCE, which was lesser than the lowest category. If considering the employment category for inpatient cases, a casual laborer was paying Rs.1929 which was less than the amount of OOPE paid by self-employed person, regular wage, and others whereas for outpatient cases regular wage occupied person paying less among all the category. Now looking into the scenario of insurance status, Insured inpatient people were paying Rs 3705 which was less than Rs 6443 paid by uninsured people, and the difference was statistically significant while for outpatient patients insured people were paying Rs.226 which was less than Rs.360 paid by uninsured people and the difference was statistically significant. Adult and Elderly people were paying Rs.5734 and Rs.7512 respectively which were significantly higher than the amount Rs.5211 paid for children. The payment for outpatient cases of adult and elderly people was paying OOPE of Rs.326 and Rs.375 respectively which were significantly higher than the amount Rs.278, paid for children. With the increment of household members, the OOPE was also increasing. People with educational status for secondary and higher secondary group or higher education were paying Rs.6438, Rs.10033 respectively, were significantly larger than that of an illiterate person paying Rs. 4925 but it was significantly more than the amount Rs.4849,paid by a primary or less primary educated person for inpatient cases. While for outpatient cases, with the increment of education qualification, OOPE had also increased. Likewise, a person belonging to SC, OBC, and other class have to pay OOPE of Rs.4468 Rs.6030, Rs.7540 respectively, more than Rs.3551 paid by a person belonging to ST group for inpatient cases but outpatient cases amount paid by SC group Rs.243, which was lesser than the amount paid by ST,OBC and others.

Covariates	Expenditure for inpatient cases (in Rupees)		Expenditure for outpatient cases (in Rupees)	
	Rural	**Urban**	**Rural**	**Urban**
Sex				
Male	18754	27656	673	837
Female	10448	18190	639	740
Insurance status				
Uninsured	13396	21021	687	788
Insured	12890	24083	534	770
Monthly per capita expenditure				
Lowest	8232	8412	570	596
Second	10862	13221	620	640
Middle	11974	13431	631	643
Higher	13758	26299	654	753
Highest	27645	10885	826	942
Occupation				
Self employed	14626	22702	706	769
Regular wage	15557	12984	664	825
Casual labourer	9017	10084	536	609
Others	18129	29676	711	924
Age group				
Children	12515	13996	495	532
Adults	18990	20114	709	821
Elderly	9346	33099	699	877
Household Size				
Less than three members	13522	24117	636	861
3 to 5 members	13319	211174	610	792
More than 5 members	13259	21999	704	752
Educational qualification				
Illiterate	11067	14813	611	628
Primary or less	13392	15422	624	643
secondary and higher secondary	14818	22556	751	903
Higher studies	22463	38957	878	1160
Social group				
Scheduled tribe	7057	24958	649	811
Scheduled caste	10100	12630	611	638
Other backward class	14089	19031	644	728
Others	17076	28315	702	885

Table 3: Total expenditure for rural and urban for inpatient and outpatient cases.

Covariates	Odds ratio	Inpatient		Outpatient	
		Coefficient	**Estimated OOP cost**	**Coefficient**	**Estimated OOP cost**
Sex					
Male®	1		7590.04		330.41
Female	2.05	-0.43***	4958.64	-0.04	327.01
Sector					
Rural®	1		5566.88		316
Urban	1.01	-0.022	6853.4	0.07	341.19
Monthly per capita expenditure (MPCE)					
Lowest®	1		3077.76		256.6
Second	1.04*	0.30***	3923	-0.14**	243
Middle	1.04*	0.61***	5375	-0.01	280.57
Higher	1.05**	0.82***	6781	0.18	310.7
Highest	1.02	1.15***	9512.68	0.52***	467.33

Occupation					
Self employed®	1		3501.97		346.73
Regular wage	1.07***	-0.03	2817.65	-0.07	303.33
Casual labourer	1.05***	-0.07*	1929.1	0.14	311.62
others	1.08***	0.801	4635.18	0.04	346
Insurance status					
Not insured®	1		6443.24		360
Insured	1.13***	-0.40***	3705.46	-0.31***	226
Age group					
Children®	1		5211.98		276
Adults	2.89***	0.15***	5734.5	0.19***	326
Elderly	4.73***	0.27***	7512.15	0.36***	375
Household Size					
Less than 3®	1		5519		266.03
3 to 5	0.70***	-0.053	6063.75	0.21**	318.76
5 or more	0.45***	.27***	5847	0.16*	353.58
Educational qualification					
Illiterate®	1		4925.46		302.42
Primary or less	1.06***	-0.07**	4850	0.06	310
Secondary/Higher Secondary	1.01	0.08*	6438.53	0.061	361.42
Higher Studies	1.06**	0.35**	10033.14	0.063	410.13
Social group					
ST®	1		3551.97		302.05
SC	1.11***	0.14***	4468.74	-0.37***	243.18
OBC	1.08***	0.33***	6030.86	0.21**	325.79
OTHERS	1.07***	0.36***	7612	-0.11	378.67
Constant.	0.0689	7.9715		5.81	
® Represents reference category, * implies p<0.05, ** implies p< 0.01 ,*** implies p<.001					

Table 4: Odds ratios for seeking inpatient care and parameter estimates of ols and tpm estimates of inpatient and outpatient healthcare expenditure.

Discussion

The study seeks to investigate the total health care expenditure for both inpatient and outpatient cases of being insured and uninsured. Escalating privatization, increasing costs of care, and lacking coverage of health insurance assures that a large number of people will keep falling into poverty in the future. But it has been also highlighted in this study that OOPE has not been uniformly low for all insured persons whereas it has been noticed that health insurance, as well as OOPE, has doubled over the period from 2004-2005 to 2014-2015, which was supported by another study where it has been observed that health care costs have doubled over the decade forging the 2004-2005 NSSO survey. This could be because of purchase of drugs constitutes up to 80% of the total cost incurred for treatment in government hospitals in rural areas. Again interestingly, it has been found that in some cases OOPE is high for insured persons but low for uninsured persons like for inpatient cases being females, urban residents, having middle,higher and highest MPCE, of all occupational groups, higher educated, adult persons and people belonging to ST and OBC groups whereas in case of outpatient cases urban people and people who are pursuing higher studies are paying more than uninsured. This finding contradicts the finding of an African-based study where it has been concluded that insured are more likely to take formal health care providers than uninsured [25]. In our context, it is justified to say that insured people paying more than uninsured in both inpatient and outpatient cases. During comparing health expenditure differentials for rural-urban people's expenditure, the study identified that cost is not uniformly low for rural persons for inpatient cases. For people belonging to rural areas with the highest MPCE group people with regular wage-paying more health expenditure than urban people but the differential is seen to be uniform for outpatient cases. Due to OOPE, the poverty headcount ratio has risen by 3.5%, this increase has varied among lower and higher MPCE. It has also been exposed that seeking inpatient care is generally associated with insurance status for outpatient cases while an earlier study established that a large number of outpatient costs have a significant effect to impoverishing effect on households. Now if the effect sector-wise has been visualized, then it can be found that for outpatient cases rural people are to some extent dependent upon the insurance coverage but for urban people, it is not the case. For inpatient cases, hospitalization is dependent on insurance irrespective of the rural or urban sector. It has been seen that rural people are taking more government insurance policies than urban people, using private policies a little more. Being from poor families, OOPE and impoverishment are primarily the results because of paying a relatively low cost in items like drugs and ambulatory care, which over time contemplate to substantial amounts [26]. Policies of the central Government Insurance Scheme and Employment Social Insurance Scheme are provide as medicine reimbursement. In case private health insurance companies generally deny the policy-holders of any outpatient coverage. If considering the OOPE for outpatient cases and inpatient cases, it can be seen that for both the cases age group, MPCE and insurance, household size, the social group are playing some major roles. Though another study

suggests that, community-based health insurance is a proper way of reaching the poor, rather than market mediated or government-provided insurance [27]. For inpatient treatment cases it is proved that women are spending less OOPE than men as gender differentials are high and can be seen in many parts of the country but for outpatient cases, its almost equal while a study from the USA shows that woman with diabetes having more OOPE than diabetic men [28]. In the case of age group, for higher age groups OOPE is more than the lower age groups because it can be said that when age is increasing people are becoming more vulnerable to diseases and the old people suffer the most. With the increment in monthly per capita expenditure, OOPE for health care is increasing and it is more significant for inpatient cases. Because health status is influenced by income. A study from nine developed countries finds the same with the current study, found that one-quarter or more of poor citizens had to allocate at least 5 percent of their income to OOPE while one-in-four elderly citizens had high OOPE [29]. Theoretically, absolute income determines the health status of an individual or household because higher income leads to greater capability to afford better medical facilities [30,31]. Naturally, insured people have to spend less amount of OOPE than the uninsured person for health purposes. Here sector is not affecting both the inpatient and outpatient cases whereas sex, occupation, and education are not creating a significant effect for the outpatient case. It is hypothesized in some studies that due to lack of awareness and lack of dumping income, poor and illiterate face inflation the burden of health bill [32]. It is always true that for inpatient cases people have to take decision regarding the huge cost for treatment because generally for outpatient treatment the expense is lower than that of inpatient cases where people can go when he feels sick and its cost is lower than that of inpatient cost [33]. Household size is significant for both inpatient and outpatient OOPE but for outpatient cases, it is more significant. For inpatient cases, it is significant for 5 or more family members. Social groups are more significant for inpatient cases than for outpatient cases.

Conclusion

From 2007-2008 onwards the number of health insurance policies from the central, state as well as private ends is rising like nowhere and the number of covered members is also increasing day-by-day. Multiple insurance schemes that aimed at households and individuals below the poverty line were launched. The Universal Health Insurance Scheme was established in 2003, which offered hospitalization benefits up to a limit to BPL families for a nominal premium. While Rashtriya Swasthya Beema Yojna (RSBY) has rapidly become an important feature in India's insurance landscape was launched by the Ministry of Labour & Employment, Government of India (GoI) in October 2007 to provide insurance coverage for hospitalization costs to BPL families (up to five members) in the country's unorganized sector. Again recently, Ayushman Bharat Pradhan Mantri Jan Arogya Yojana was launched in September 2018 to the bottom 40% poor and vulnerable population in the country. Despite this type several attempts, UHC is still a far-reaching concept in the country. Not only health insurance coverage helps people to reduce OOPE but the Government has to take necessary steps to provide good healthcare facilities with lower costs. Here also it is needed to provide more insurance policies like Central Government Health Scheme (CGHS) and Employees' State Insurance Scheme (ESIS) should cover the outpatient cost on medicines as the impoverishment effect of OOP is mainly due to the payment of a higher share of health expenditure on outpatient care in drugs. Also, it is true that not only new interventions will work but also it is necessary to aware people about them. So here it is to be said that the cost of treatment should be lower and the insurance coverage should be higher and new insurance

policies with coverage of outpatient care and medical coverage should be incorporated and that can protect people from the poverty caused by the healthcare system.

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Conflict of Interest

The authors have no conflict of interest to declare.

Ethical Approval

The study was based on publicly available DHS data and did not use any individual identifiers. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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