**Factors associated with health insurance ownership among ever-married women of**

**reproductive age in Bangladesh: A Cross-Sectional Study**

Sabrin Sultana1, Mohammad Nayeem Hasan2,3, Taslima Akther1, Muhammad Abdul Baker Chowdhury2,4, Md Jamal Uddin2,5\*\*

1. Department of Banking and Insurance, University of Chittagong, Chittagong-4331, Bangladesh

2. Department of Statistics, Shahjalal University of Science & Technology, Sylhet-3114, Bangladesh.

3. UNITY Bangladesh, Sylhet, Bangladesh.

4. Department of Neurosurgery, University of Florida College of Medicine, Gainesville, FL, USA.

5. Faculty of Graduate Studies, Daffodil International University, Dhaka, Bangladesh.

\*\*Corresponding Author

Address:

Md Jamal Uddin, Ph.D.

Professor, Department of Statistics, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh

Phone: +8801716972846

Email: [jamal-sta@sust.edu](mailto:jamal-sta@sust.edu);

ORCID ID: https://orcid.org/0000-0002-8360-3274

**Lead Author’s ORCID ID:** [**https://orcid.org/000-0002-2383-0459**](https://orcid.org/0000-0002-1706-5615)

**Acknowledgments**

We acknowledge USAID and the Government of Bangladesh for allowing us to use the data.

**Abstract**

**Background and Aims:** In a rapidly evolving landscape of the healthcare system in Bangladesh, it has become a pivotal fact to understand the intricate characteristics or factors in order to have the development of greater healthcare equity and widened well-being especially among the underprivileged population.In Bangladesh, health insurance is an unusual idea. The number of health insurance plans provided by insurance firms is extremely low and this only makes up a small percentage of the population and makes up a tiny amount of the funding issues with this type of financing, including minimal coverage. The objective of the paper is to investigate the sociodemographic characteristics associated with Bangladeshi women's health insurance coverage.

**Methods:** The ninth national survey of the 2022 Bangladesh Demographic and Health Survey (BDHS) is used to report on the health and demographic status of women and their families in Bangladesh. Among all interviewed women, 20,029 ever-married women aged 15–49 shared the information on health insurance coverage. The outcome variable was insurance ownership, and it was measured by interviewing the respondent about insurance ownership. Classifications have been made into individual levels of independent variables in different groups such as socioeconomic, demographic and child related factors.

**Results:** This study found that 99.71% of women lacked health insurance. A bivariate study showed that among women of reproductive age, ownership of health insurance coverage was significantly correlated with parameters such as respondents age, education, spouse age, division, and mass media exposure. From adjusted logistic regression model, women aged 25-34 years had 3.04 times (AOR: 3.04, 95% CI: 1.34–6.89) higher health insurance ownership than the women aged 35-49 years and women with mass media exposure had 2.99 times (AOR: 2.99, 95% CI: 1.27–7.04) higher health insurance ownership than the women not exposed to mass media.

**Conclusion:** According to the study's findings, extremely few Bangladeshi women of reproductive age have health insurance. Additionally, women's ownership of health insurance coverage was linked to socioeconomic and demographic characteristics. Consequently, policymakers must create a tax-based health finance system that targets young, illiterate women from the poorest households.

**Keywords:** Health Insurance Ownership, Women of Reproductive age, Determinants, Healthcare Equity, Bangladesh

**Background**

As part of the most current Sustainable Development Goals, the World Health Organization has suggested that all United Nations members attain universal health coverage (UHC) status by 2030, given that half of the world's population still lacks access to basic health care (WHO). Furthermore, the presence of low-income individuals makes this situation even more uncertain, leading to disastrous financial strain and widespread poverty in Bangladeshi households (Mahumud et al., 2017; Khan et al., 2017). Expanding the ownership of health insurance for ever-married women of age 15 to 49 could be the key way for unlocking greater end results associated with child birth and maternal health. According to the Bangladesh Demographic and Health Survey (BDHS, fewer than 1% of women who have ever been married and are between the ages of 15 and 49 have health insurance. Additionally, people may have to pay out-of-pocket for their medical bills if they do not have insurance. Because of this, significant expenses could discourage women from getting therapy or seeking medical attention. Their capacity for saving money and growing in other aspects of their lives may also be hampered by this financial load and adverse selection often results in the exclusion of the risk groups. Thus, the underprivileged are unable to pay for private insurance.

In Bangladesh, health insurance remains a relatively uncommon concept. The availability of health insurance plans is limited, with only a small portion of the population benefiting from such coverage. These plans contribute minimally to addressing the country's healthcare funding challenges, often offering limited coverage due to high premiums. Additionally, health insurance is mostly accessible to urban residents employed in the formal sector. Tallon & Block (1988) mentioned that healthcare costs and utilization have risen dramatically in recent years, but an increasing number of people lack health insurance, making care more difficult to acquire. NGOs and nearby hospitals are currently running several community-based programs at the local level. The schemes are integrated in that they function as both service providers and insurers. However, the program's effectiveness is questionable in a small area, but overall, they make up little to nothing of the nation's spending. However, because of methodological and measurement variability, the results are not comparable across the research, and they are mostly based on small-scale samples. The aim was to close this gap in the current study by examining data from health and demographic surveys that employ standardized data gathering tools. The produced estimations will be more dependable, generalizable for the full population, and comparable across the study settings because the Demographic and Health Surveys are also nationally representative.

Healthcare and social researchers have highlighted that the lack of empowerment opportunities such as limited access to quality education, as well as restricted participation in social, political, and labor markets are significant barriers preventing women from making informed decisions about their health and other life aspects that influence long-term well-being, such as fertility and nutrition (Yaya et al., 2018; Moonzwe Davis et al., 2014; Ehrhardt et al., 2009). Additionally, women are disproportionately affected by catastrophic health expenditures, which not only exacerbate their vulnerability but also undermine their ability to become more empowered, leading to deeper poverty. To address these challenges, variety of measures have been proposed and implemented to protect women from financial hardship and health risks. One key initiative is the improvement of maternity care, with a focus on making it free and accessible as part of the broader effort to achieve Universal Health Coverage (UHC), a crucial element of the health-related Sustainable Development Goals (SDGs) (Gera et al., 2018; Acharya et al., 2018; Chapman 2016; Acharya 2015; Wong et. al., 2016).

Moreover, several countries have already taken various measures. Giedion et al. (2013) highlighted that sub-Saharan Africa has employed a variety of strategies to expand health insurance coverage across its populations. According to a comprehensive review by the World Bank, which examined the effects of universal health coverage initiatives in developing nations, Rwanda and Nigeria stand out as examples of countries implementing multiple health insurance schemes. These schemes are designed to address the needs of different population groups, with the overarching goal of achieving universal health coverage. This is important to emphasize how these nations are working toward inclusive healthcare by offering tailored insurance options to various segments of their population. Furthermore, in countries like Namibia and South Africa, voluntary insurance systems have been established. These systems include private health insurance as a key component, providing individuals with more flexibility and choice in their healthcare coverage (Spaan et al., 2012).

This study seeks to address a critical knowledge gap in Bangladesh by exploring the socio-demographic factors associated with health insurance ownership among women of reproductive age, using nationally representative data. By identifying the barriers and enablers of health insurance enrollment, this research aims to contribute to a deeper understanding of the factors influencing coverage. The findings can help inform more effective policies and strategies to expand health insurance coverage in Bangladesh and other similar low- and middle-income countries (LMICs).

**Materials and Methods**

We followed the STROBE guideline for better observational cross-sectional study reporting in epidemiology (Table S1).

**Data Source**

The ninth nationwide study to evaluate health and demographic circumstances of Bangladeshi women and their families is the 2022 Bangladesh Demographic and Health study (BDHS). The National Institute of Population Research and Training (NIPORT), a division of the Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh, provided direction for the conduct of this study. Both the United States Agency for International Development (USAID) and the Government of Bangladesh provided financial support. A Dhaka-based research company called Mitra and Associates carried out the poll. The period of data collecting in 2022 was June 27–December 12. Through USAID-funded The Demographic and Health Surveys (DHS) Program, ICF provided technical assistance. The DHS Program provides technical and financial assistance for demographic and health surveys across the world. Furthermore, technical assistance was provided by the International Centre for Diarrheal Disease Research, Bangladesh (icddr,b), namely in the creation and administration of verbal autopsy questionnaires to ascertain the causes of mortality in children under five.

**Sample Design**

The Integrated Multi-Purpose sample Master Sample, which was compiled from an exhaustive list of enumeration areas (EAs) nationwide, served as the sample frame for the 2022 BDHS. The Bangladesh Bureau of Statistics (BBS) first created this list during the country's 2011 population census. Each EA's location, the kind of habitation (city corporations, non-city corporations, or rural regions), and the approximate number of households which are residential are all included in the sample frame. Additionally, a sketch map of each EA's geographic limits is accessible. The eight administrative divisions of Bangladesh are Rangpur, Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, and Sylhet. Zilas is created from these divisions, and upazilas are created from each zila. Urban areas are separated into wards within each upazila, which are further subdivided into mohallas. Union parishads (UPs) and mouzas are the divisions of rural regions inside upazilas. The division of regions into rural and urban zones is made possible by these administrative frameworks.

Households were chosen for the survey using a two-stage stratified sampling technique. Based on a likelihood proportionate to the EA's size, 675 EAs were chosen in the first stage, 237 of which were in urban regions and 438 of which were in rural areas. Of the 45 families in each EA, 30 were chosen at random to participate in the individual interviews and complete a comprehensive questionnaire; the other 15 households were requested to complete a condensed version. With 30,018 of the inhabited families successfully interviewed, the response rate was nearly 100%. 30,358 ever-married women between the ages of 15 and 49 who lived in these homes were found to be qualified for one-on-one interviews. In the end, 30,078 women were interviewed, and 20,029 of them provided information on their health insurance coverage (Figure 1).

|  |
| --- |
|  |
| Figure 1: Diagram illustrating the analytical study sample |

**Outcome variable**

The outcome variable was health insurance ownership, measured by asking respondents whether they were covered by any health insurance. Responses were categorized as 'Yes' for those with coverage and 'No' for those without.

**Possible factors**

By the study's goals and because of the BDHS data's hierarchical structure, two-level independent variables were considered. We classified individual levels of independent variables in different groups such as socioeconomic and demographic factors. The socioeconomic and demographic factors are the respondent’s age (15-24, 25-34, 35+), husband's age (15-29, 30-44, 45+), respondent’s and their husbands’ level of education (such as; education, primary, secondary, or higher), household heads’ occupation (not working, farmer/agriculture, businessman, skilled others), respondents’ current work status (yes, no), wealth index (poor, middle, rich), respondents’ exposure to the mass media (yes, no). On the other hand, division, and area of residence (urban, rural) are regional independent variables.

**Statistical Data Analysis**

We performed a comprehensive analysis using descriptive statistics to assess health insurance ownership prevalence among participants from different socio-economic backgrounds. Cross-tabulation and Chi-square tests evaluated the association, with significance set at p < 0.05 and 95% confidence intervals. Initially, bivariable analysis (chi-square test) was performed individually for each independent variable. A significance threshold of p-value ≤ 0.20 was applied arbitrarily to determine the inclusion of covariates in the multivariable models (Hasan et al., 2020). Multivariable (adjusted) logistic regression analyses were then conducted to identify associated risk factors for pooled data. Results were reported as adjusted odds ratios (AOR) with their respective 95% confidence intervals and 5% level of significance. Additionally, we assessed multicollinearity in the final model using a cut-off value of 4.00 for the variance inflation factor (VIF) analysis (Hasan et al., 2023; Kim, 2019). At this stage, all variables were incorporated into the model since the VIF values for each variable were below 4.00.

To assess the accuracy of the best model, we used the Area Under the Receiver Operating Characteristic (AUROC) curve, specificity, sensitivity indicators, and the Hosmer-Lemeshow goodness-of-fit test. We utilized the Area Under the Receiver Operating Characteristic (AUROC) curve, sensitivity, and specificity to assess the accuracy of the best model. Higher AUROC values indicated superior model performance. In the ROC curve, a lower p-value suggests that the model effectively discriminates between two categories, with an area under the curve exceeding 0.50 (Cook & Rajbhandari, 2018; Hasan et al., 2022). The Hosmer-Lemeshow goodness-of-fit test assess how well the model-estimated probabilities align with the observed outcomes. A p-value greater than 0.05 in both tests indicates that the model accurately classifies observations into outcome categories (Fagerland & Hosmer, 2012; Nattino et al., 2017).

All analysis was conducted using STATA 18 (College Station, TX: Stata Corp LP). All analyses were adjusted for the cluster design by using the ‘svy’ command. This command uses the information on sampling weight, strata, and primary sampling unit provided with the datasets (Stata, 2022).

**Ethical Approval**

Our study was wholly based on an analysis of existing public domain health survey datasets obtained from the BDHS 2022 which is freely available online with all personal identifying information removed. The BDHS procedures were reviewed and approved by the National Institute of Population Research and Training (NIPORT), Medical Education and Family Welfare Division, Ministry of Health and Family Welfare (MOHFW) and USAID. Informed consent was obtained from participants while interviewing them. Because this study involved the analysis of secondary data thus, it did not require the ethical approval of the respective institution.

**Results**

In Figure 2, the percentage of health insurance ownership among ever-married women in the divisions is as follows: Barisal (5.98%), Chittagong (18.75%), Dhaka (25.31%), Khulna (11.95%), Mymensingh (7.61%), Rajshahi (13.12%), Rangpur (11.43%), and Sylhet (5.85%). The percentage of health insurance ownership among ever-married women in the top five districts is Dhaka (26.18%), Tangail (13.76%), Dinajpur (10.11%), Mymensingh (6.92%), and Rajshahi (4.6%). Out of the 64 districts in Bangladesh, 40 reported no health insurance ownership among ever-married women.

|  |
| --- |
|  |
| **Figure 2: Division and district level health insurance coverage in Bangladesh** |

A total of 20029 ever-married women participated and gave their information on ownership of health insurance. Among them, 57.19% of ever-married women are from the age group 35-49 years which is higher than the other age group 25-34 years (30.21%) and 15-24 years (12.59%) who have the ownership of health insurance. The highest percentage (43.81%) of ever-married women have the ownership of health insurance and secondary completed, followed by higher (27.20%), primary (22.16%), and no education (6.83%). The highest health insurance ownership (48.22%) was noticed in 30-44 years of husband/partner’s age ever-married women. In the other age group, 45 or above years of husband 33.50% of ever-married women had the ownership of health insurance and the lowest 5.58% had ownership of health insurance of ever-married women whose husbands were 15-29 years old. Geographic location (division)–wise distribution of prevalence presents that alone Dhaka has the ownership of 45.29% among total health insurance ownership and 54.71% own the rest of the health insurance. The highest rate of health insurance ownership (88.63%) was observed among ever-married women who have exposure to mass media **(Table 1)**.

**Table 1: Percentage of ever-married women aged 15–49 with health insurance ownership by sociodemographic characteristics**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Status of Health Insurance Ownership** | | |  |
|  | **Yes**  **n (%)** | **No**  **n (%)** | **Total**  **n (%)** | **P-value** |
| **Age (in years)** | | | | |
| 15-24 | 7 (12.59) | 5011 (25.09) | 5018 (25.06) | 0.016 |
| 25-34 | 18 (30.21) | 6943 (34.76) | 6960 (34.75) |  |
| 35-49 | 33 (57.19) | 8017 (40.14) | 8050 (40.19) |  |
| **Education** | | | | |
| No education | 4 (6.83) | 2748 (13.76) | 2752 (13.74) | 0.046 |
| Primary | 13 (22.16) | 5201 (26.04) | 5214 (26.03) |  |
| Secondary | 26 (43.81) | 9333 (46.74) | 9359 (46.73) |  |
| Higher | 16 (27.20) | 2687 (13.46) | 2703 (13.50) |  |
| **Women currently working** | | | | |
| Yes | 22 (38.50) | 6389 (31.99) | 6412 (32.01) | 0.350 |
| No | 36 (61.50) | 13581 (68.01) | 13617 (67.99) |  |
| **Body Mass Index** | | | | |
| Underweight | 3 (5.94) | 979 (4.90) | 982 (4.90) | 0.494 |
| Normal weight | 10 (17.28) | 5311 (26.60) | 5321 (26.57) |  |
| Overweight | 10 (16.28) | 2832 (14.18) | 2842 (14.19) |  |
| Obese | 35 (60.50) | 10848 (54.32) | 10884 (54.34) |  |
| **Husband age** | | | | |
| 15-29 | 3 (5.58) | 3481 (18.32) | 3484 (18.28) | 0.033 |
| 30-44 | 34 (48.22) | 9156 (48.18) | 9190 (48.22) |  |
| 45 or above | 20 (33.50) | 6365 (33.50) | 6385 (33.50) |  |
| **Husband education** | | | | |
| No education | 11 (19.16) | 4072 (21.47) | 4083 (21.47) | 0.299 |
| Primary | 10 (17.48) | 5376 (28.35) | 5386 (28.32) |  |
| Secondary | 23 (38.99) | 6173 (32.55) | 6196 (32.57) |  |
| Higher | 14 (24.37) | 3342 (17.62) | 3356 (17.64) |  |
| **Husband currently working** | | | | |
| Not working | 0 (0.00) | 646 (3.41) | 646 (3.39) | 0.293 |
| Working | 58 (100.00) | 18317 (96.59) | 18375 (96.61) |  |
| **Husband occupation** | | | | |
| Not working | 0 (0.00) | 646 (3.41) | 646 (3.39) | 0.649 |
| Farmer/Agriculture | 11 (19.68) | 4425 (23.34) | 4436 (23.32) |  |
| Businessman | 11 (18.62) | 3749 (19.77) | 3760 (19.77) |  |
| Skilled | 28 (48.84) | 8081 (42.62) | 8109 (42.64) |  |
| Others | 7 (12.86) | 2061 (10.87) | 2069 (10.88) |  |
| **Residence** | | | | |
| Urban | 18 (31.36) | 5682 (28.45) | 5700 (28.46) | 0.689 |
| Rural | 40 (68.64) | 14288 (71.55) | 14328 (71.54) |  |
| **Division** | | | | |
| Dhaka | 26 (45.29) | 5054 (25.31) | 5080 (25.37) | 0.016 |
| Others | 32 (54.71) | 14916 (74.69) | 14948 (74.63) |  |
| **Religion** | | | | |
| Islam | 50 (85.52) | 18057 (90.44) | 18107 (90.43) | 0.302 |
| Others | 8 (14.48) | 1908 (9.56) | 1916 (9.57) |  |
| **Wealth index** | | | | |
| Poor | 17 (29.67) | 7593 (38.02) | 7610 (38.00) | 0.438 |
| Middle | 12 (20.32) | 4124 (20.65) | 4135 (20.65) |  |
| Rich | 29 (50.01) | 8254 (41.33) | 8283 (41.36) |  |
| **Household family members** | | | | |
| <4 | 13 (22.31) | 4705 (23.56) | 4718 (23.56) | 0.581 |
| 4-5 | 30 (51.87) | 9001 (45.07) | 9031 (45.09) |  |
| >5 | 15 (25.82) | 6264 (31.37) | 6279 (31.35) |  |
| **Number of living children** | | | | |
| 0 | 3 (5.96) | 2165 (10.84) | 2169 (10.83) | 0.516 |
| 1-2 | 37 (62.94) | 11702 (58.60) | 11739 (58.61) |  |
| 3+ | 18 (31.09) | 6103 (30.56) | 6121 (30.56) |  |
| **Exposure to mass media** | | | | |
| Yes | 52 (88.63) | 13283 (66.52) | 13335 (66.58) | <0.001 |
| No | 6 (11.37) | 6687 (33.48) | 6693 (33.42) |  |
| **Total** | **58 (0.29)** | **19970 (99.71)** | **20029 (100.00)** |  |

According to the crude logistic regression model in Table 2, women aged 15-24 years had 42% (COR: 0.58, 95% CI: 0.25–1.31) lower health insurance ownership than the women aged 35-49 years. In addition, women aged 25-34 years had 1.64 times (COR: 1.64, 95% CI: 0.90–2.98) higher health insurance ownership than women aged 35-49 years. Women with higher educational status had 4.08 times (COR: 4.08, 95% CI: 1.14–14.54) higher health insurance ownership than the women with no educational status. In regards to BMI, women who were normal weight had 42% (COR: 0.58, 95% CI: 0.29–1.18) lower health insurance ownership than the women who were obese. Respondents husband aged 45 or above years and 30-44 years had 3.44 times (COR: 3.44, 95% CI: 1.13–10.44) and 4.05 times (COR: 4.05, 95% CI: 1.39–11.82) higher health insurance ownership than the respondents' husband age 15-29 years, respectively. Women from the Dhaka division had 2.44 times (COR: 2.44, 95% CI: 1.15–5.18) higher health insurance ownership than the women from other divisions. In addition, women with mass media exposure had 3.93 times (COR: 3.93, 95% CI: 1.68–9.16) higher health insurance ownership than the women not exposed to mass media.

**Table 2: Factors Influencing Health Insurance Ownership Among Ever-Married Women of Reproductive Age Using Bivariable and Multivariable Logistic Regression**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **COR (95% CI)** | **P-value** | **AOR (95% CI)** | **P-value** |
| **Age (in years)** | | | | |
| 15-24 | 0.58 (0.25-1.31) | 0.188 | 0.81 (0.35-1.87) | 0.622 |
| 25-34 | 1.64 (0.90-2.98) | 0.105 | 3.04 (1.34-6.89) | 0.008 |
| 35-49 | Reference |  | Reference |  |
| **Education** | | | | |
| Higher | 4.08 (1.14-14.54) | 0.030 | 3.53 (0.84-14.80) | 0.084 |
| Secondary | 1.89 (0.53-6.69) | 0.323 | 1.93 (0.48-7.71) | 0.350 |
| Primary | 1.72 (0.45-6.59) | 0.431 | 1.64 (0.40-6.76) | 0.493 |
| No education | Reference |  | Reference |  |
| **Women currently working** | | | | |
| Yes | 1.33 (0.73-2.43) | 0.350 |  |  |
| No | Reference |  |  |  |
| **Body Mass Index** | | | | |
| Underweight | 1.09 (0.32-3.75) | 0.892 | 1.88 (0.59-6.01) | 0.289 |
| Normal weight | 0.58 (0.29-1.18) | 0.135 | 0.68 (0.34-1.37) | 0.282 |
| Overweight | 1.03 (0.51-2.09) | 0.934 | 0.90 (0.43-1.85) | 0.766 |
| Obese | Reference |  | Reference |  |
| **Husband age** | | | | |
| 45 or above | 3.44 (1.13-10.44) | 0.029 | 1.40 (0.34-5.79) | 0.638 |
| 30-44 | 4.05 (1.39-11.82) | 0.011 | 2.71 (0.83-8.85) | 0.098 |
| 15-29 | Reference |  | Reference |  |
| **Husband education** | | | | |
| Higher | 1.55 (0.61-3.92) | 0.355 |  |  |
| Secondary | 1.34 (0.58-3.12) | 0.493 |  |  |
| Primary | 0.69 (0.24-1.96) | 0.487 |  |  |
| No education | Reference |  |  |  |
| **Residence** | | | | |
| Urban | 1.15 (0.58-2.27) | 0.689 |  |  |
| Rural | Reference |  |  |  |
| **Division** | | | | |
| Dhaka | 2.44 (1.15-5.18) | 0.016 | 2.08 (0.96-4.50) | 0.062 |
| Others | Reference |  | Reference |  |
| **Religion** | | | | |
| Islam | 1.60 (0.65-3.96) | 0.302 |  |  |
| Others | Reference |  |  |  |
| **Wealth index** | | | | |
| Rich | 1.55 (0.76-3.18) | 0.231 |  |  |
| Middle | 1.26 (0.56-2.83) | 0.573 |  |  |
| Poor | Reference |  |  |  |
| **Household family members** | | | | |
| <4 | 1.15 (0.50-2.66) | 0.744 |  |  |
| 4-5 | 1.40 (0.74-2.65) | 0.303 |  |  |
| >5 | Reference |  |  |  |
| **Number of living children** | | | | |
| 0 | 0.54 (0.17-1.71) | 0.295 |  |  |
| 1-2 | 1.06 (0.56-1.98) | 0.865 |  |  |
| 3+ | Reference |  |  |  |
| **Exposure to mass media** |  |  |  |  |
| Yes | 3.93 (1.68-9.16) | <0.001 | 2.99 (1.27-7.04) | 0.012 |
| No | Reference |  | Reference |  |

COR = Crude Odds Ratio, AOR = Adjusted Odds Ratio, CI= Confidence Interval

According to the adjusted logistic regression model, women aged 25-34 years had 3.04 times (AOR: 3.04, 95% CI: 1.34–6.89) higher health insurance ownership than the women aged 35-49 years. Women with higher, secondary and primary educational status had 3.53 times (AOR: 3.53, 95% CI: 0.84–14.80), 1.93 times (AOR: 1.93, 95% CI: 0.48–7.71) and 1.64 times (AOR: 1.64, 95% CI: 0.40–6.76) higher health insurance ownership than the women with no educational status, respectively. Respondents' husbands aged 45+ years had 1.40 times (AOR: 1.40, 95% CI: 0.34–5.79) higher health insurance ownership than the respondents' husbands aged 15-29 years. Women from the Dhaka division had 2.08 times (AOR: 2.08, 95% CI: 0.96–4.50) higher health insurance ownership than the women from other divisions. In addition, women with mass media exposure had 2.99 times (AOR: 2.99, 95% CI: 1.27–7.04) higher health insurance ownership than the women not exposed to mass media (Table 2).

All the variables were included in the multivariable logistic regression model because the VIF values of each variable were less than 4.00, which means no multicollinearity in this model (Table3).

**Table 3: Variance Inflation Factor (VIF) of Multivariable Logistic Regression**

|  |  |
| --- | --- |
| **Variables** | **VIF Value** |
| Age (in years) | 2.55 |
| Education | 1.23 |
| Body Mass Index | 1.01 |
| Husband age | 2.50 |
| Division | 1.01 |
| Exposure to mass media | 1.11 |
| **Mean VIF** | 1.57 |

The Hosmer-Lemeshow chi-square test and associated p-value indicate that the model fits the data well **(Table 4)**. The multivariable model achieved a classification accuracy of 99.67%. The area under the ROC curve for the model was 72.31% (95% CI: 66.00%–78.61%, Asymptotic p-value: <0.001), demonstrating its robustness **(Table 4 and Figure 3)**.

**Table 4: Hosmer-Lemeshow Test, Area under ROC Curve and classification accuracy for final logistic regression model**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hosmer-Lemeshow Test** | | **Area Under ROC Curve** | | **Correctly classified** |
| Chi- square | P-value | AUC | P-value | 99.67% |
| 357.04 | 0.976 | 72.31 (66.00-78.61) | <0.001 |

|  |
| --- |
|  |
| **Figure 3: Area Under ROC curve** |

**Discussion**

This research aims at the factors that influence women's ownership of health insurance in Bangladesh and shows that health insurance ownership among women who are aged between 15–49 years and its sociodemographic factors have some significant correlations. The results demonstrate the existence of greater disparities in the percentage of insurance ownership among women in Bangladesh and descriptive statistics show women belonging to Dhaka division, the city of the capital, own a greater percentage of health insurance ownership among all which is in line with findings of (Kimani et al., 2014). In addition to that, the relationship of sociodemographic factors with health ownership is supported by Shao et al. (2022). Furthermore, it can be noted that findings revealed insignificant urban-rural disparity, however, which is inconsistent with Shao et al. (2022) where disparity in urban-rural in terms of insurance ownership found significant.

According to multivariate regression analysis, insurance ownership by women of age 15-49 age is influenced by the sociodemographic differences. More specifically, women’s age, education, their husband’s age and division were found significantly associated with the ownership of insurance. These results are consistent with earlier research that demonstrated positive relationship between insurance ownership and socioeconomic factors (Amu et al., 2018; Kirigia et al., 2005)

Table 1 revealed that Individuals with higher age tend to have more investments in health insurance to get financial security and consistency found in the findings of (Grossman et al., 1972). He mentioned in the study that it was expected that there will be higher tendency of aged people in making larger investments in health than the class of young, because the health stock depreciation rate increases with age, Moreover, Insurance ownership is significantly affected by the education level, such as women with no education possess the least percentage of insurance ownership and this is significantly associated with the insurance ownership of women due to lack of awareness about their expected or potential expenditure related to their health and inability for taking health insurance policies. However, women who have obtained secondary education hold the highest percentage ownership of insurance among all, which is in line with the existing evidence that uneducated women are severely at a disadvantage phase in terms of insurance ownership and this finding is supported by (Liu & Chen, 2002; Kimani et al., 2014). As one's household wealth index rises, the likelihood of having insurance also goes up. This result is in line with earlier research that indicated wealthier households were more likely to have insurance (Kumi-Kyereme et al., 2013; Sarpong et al., 2010).

Wang et al. (2021) found that the percentage of women who reported that they had health insurance ownership was strikingly lower across all countries (Five Countries)) studied. Furthermore, the findings from the multivariate analyses suggest that the true extent of the issue is likely more severe, as considerable socioeconomic disparities influence the distribution of health insurance coverage among women, with those in lower-income and marginalized groups being particularly underrepresented and this finding supports our study. There are several noteworthy advantages, e.g., the datasets are nationwide representative and have large sample size. Consequently, the study’s results can be applied to the whole population (women).

In addition to that, the findings of Laksono et al. (2021) reveal that pregnant women with the category of higher education were 3.349 times more likely than individuals without education to be issued health insurance. In contrast, pregnant women with a middle wealth status were 0.679 times as likely to have health insurance as the poorest women. On the other hand, the wealthiest pregnant women had a 1.358 times greater likelihood of having health insurance than the poorest. Therefore, their research findings are largely consistent with our study results.

**Limitations and Future Direction**

One of the study's limitations is that, lacked information on respondents' health condition (such as the frequency and existence of diseases), and inability in order to examine the association between health status and health insurance coverage. Moreover, the status of health is a significant predictor of health insurance ownership, according to prior research (Dong et al., 2009). Additionally, no information on health care usage or out-of-pocket expenses was gathered, making it impossible to investigate how having health insurance affected these two outcomes.

Future studies should examine the reasons why some populations have lower insurance coverage and evaluate how well health insurance programs work to promote MHS across various socioeconomic categories.

**Implication of the study**

This research can provide insights into the socio-economic, demographic factors or characteristics influencing health insurance ownership. Moreover, decision makers and researchers can develop proper policies which will improve health insurance ownership.

In addition to that, this study will be beneficial for Governments and service providers related to healthcare as they attempt to design, redesign, modify the insurance schemes which aim to address various needs of women of reproductive age. Better health outcomes could be reached for women through the findings of the study.

**Conclusion**

Socioeconomic disparity in health insurance ownership persists despite the growing number of people who hold health insurance and use necessary maternity healthcare services. The purpose of this cross-sectional study of health and demographic surveys was to determine the percentage of adult women aged 15–49 who had health insurance as well as the sociodemographic correlates of such ownership. It is recommended that by considering the elements which are unique to each nation, health authorities should adopt proactive measures to reduce the sociodemographic disparities in women's health insurance ownership. Since it is essential to expedite the accomplishment of the Millennium Development Goals (MDGs), addressing inequalities in access to healthcare facilities among the impoverished and disadvantaged groups of demographics is a top priority in the world health discussion.

**Funding:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Author Contribution**

**Sabrin Sultana:** data curation, formal analysis, investigation, methodology, project administration, validation, writing–original draft.

**Taslima Akther:** data curation, formal analysis, investigation, methodology, writing–original draft.

**Mohammad Nayeem Hasan:** data curation, methodology, project administration, validation, writing–review, and editing.

**Data Availability**

The datasets were accessible to the public free of charge (https://dhsprogram.com/data/available-datasets.cfm).

**Conflicts of interest**

No potential conflict of interest was reported by the authors.

**Transparency Statement**

The lead author Mohammad Nayeem Hasan affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

**References**

Acharya, M. (2015). Universal Health Coverage as a Distinct Sustainable Development Goals Target: Dispelling Doubts and Underlining Implications. *Frontiers in Public Health*, *3*. https://doi.org/10.3389/FPUBH.2015.00238/FULL

Acharya, S., Lin, V., Health, N. D.-B. of the W., & 2018, undefined. (n.d.). The role of health in achieving the sustainable development goalsQ1Bulletin of the World Health Organization; H-Index: 177 SJR: Q1  CORE: NA  ABDC: NA  FT50: NA  43B1Bulletin of the World Health Organization; H-Index: 177 VHB: NA  FNEGE: 4  CoNRS: 3  HCERE: B  CCF: NA  BFI: 1  AJG: NA  +. *Ncbi.Nlm.Nih.Gov*. Retrieved 6 December 2024, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6154063/

Amu, H., Dickson, K. S., Kumi-Kyereme, A., & Maafo Darteh, E. K. (2018). Understanding variations in health insurance coverage in Ghana, Kenya, Nigeria, and Tanzania: Evidence from demographic and health surveys. *PLOS ONE*, *13*(8), e0201833. https://doi.org/10.1371/JOURNAL.PONE.0201833

Chapman, A. R. (2016). Assessing the universal health coverage target in the Sustainable Development Goals from a human rights perspective. *BMC International Health and Human Rights*, *16*(1). https://doi.org/10.1186/S12914-016-0106-Y

Cook, J. A., & Rajbhandari, A. (2018). Heckroccurve: ROC Curves for Selected Samples. *Https://Doi.Org/10.1177/1536867X1801800110*, *18*(1), 174–183. https://doi.org/10.1177/1536867X1801800110

Dong, H., Allegri, M. De, Gnawali, D., policy, A. S.-H., & 2009, undefined. (n.d.). Drop-out analysis of community-based health insurance membership at Nouna, Burkina Faso. *Elsevier*. Retrieved 22 October 2024, from https://www.sciencedirect.com/science/article/pii/S0168851009000815

Ehrhardt, A. A., Sawires, S., McGovern, T., Peacock, D., & Weston, M. (2009). Gender, empowerment, and health: What is it? How does it work? *Journal of Acquired Immune Deficiency Syndromes*, *51*(SUPPL. 3). https://doi.org/10.1097/QAI.0B013E3181AAFD54

Fagerland, M. W., & Hosmer, D. W. (2012). A generalized Hosmer-Lemeshow goodness-of-fit test for multinomial logistic regression models. *Stata Journal*, *12*(3), 447–453. https://doi.org/10.1177/1536867X1201200307

Gera, R., Narwal, R., Jain, M., Taneja, G., & Gupta, S. (2018). Sustainable development goals: Leveraging the global agenda for driving health policy reforms and achieving universal health coverage in India. *Indian Journal of Community Medicine*, *43*(4), 255–259. https://doi.org/10.4103/IJCM.IJCM\_41\_18

Giedion, U., Alfonso, E., & Díaz, Y. (2013). *The impact of universal coverage schemes in the developing world: a review of the existing evidence*. http://hsrii.org/wp-content/uploads/2014/04/IMPACTofUHCSchemesinDevelopingCountries-AReviewofExistingEvidence.pdf

Grossman, M., Grossman, & Michael. (1972). On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy*, *80*(2), 223–255. https://doi.org/10.1086/259880

Hasan, M. N., Abdul Baker Chowdhury, M., Jahan, J., Jahan, S., Ahmed, N. U., & Uddin, M. J. (2020). Cesarean delivery and early childhood diseases in Bangladesh: An analysis of Demographic and Health Survey (BDHS) and Multiple Indicator Cluster Survey (MICS). *PLOS ONE*, *15*(12), e0242864. https://doi.org/10.1371/JOURNAL.PONE.0242864

Hasan, M. N., Babu, M. R., Chowdhury, M. A. B., Rahman, M. M., Hasan, N., Kabir, R., & Uddin, M. J. (2023). Early childhood developmental status and its associated factors in Bangladesh: a comparison of two consecutive nationally representative surveys. *BMC Public Health*, *23*(1), 1–13. https://doi.org/10.1186/S12889-023-15617-8/TABLES/4

Hasan, M. N., Tambuly, S., Trisha, K. F., Haque, M. A., Chowdhury, M. A. B., & Uddin, M. J. (2022). Knowledge of HIV/AIDS among married women in Bangladesh: analysis of three consecutive multiple indicator cluster surveys (MICS). *AIDS Research and Therapy*, *19*(1), 1–10. https://doi.org/10.1186/S12981-022-00495-8/TABLES/3

Khan, J., Ahmed, S., planning, T. E.-H. policy and, & 2017, undefined. (2017). Catastrophic healthcare expenditure and poverty related to out-of-pocket payments for healthcare in Bangladesh—an estimation of financial risk protection of. *Academic.Oup.ComJAM Khan, S Ahmed, TG EvansHealth Policy and Planning, 2017•academic.Oup.Com*, *32*(8), 1102–1110. https://doi.org/10.1093/heapol/czx048

Kim, J. H. (2019). Multicollinearity and misleading statistical results. *Korean Journal of Anesthesiology*, *72*(6), 558. https://doi.org/10.4097/KJA.19087

Kimani, J. K., Ettarh, R., Warren, C., & Bellows, B. (2014). Determinants of health insurance ownership among women in Kenya: Evidence from the 2008-09 Kenya demographic and health survey. *International Journal for Equity in Health*, *13*(1), 1–8. https://doi.org/10.1186/1475-9276-13-27/TABLES/3

Kumi-Kyereme, A., research, J. A.-A.-B. health services, & 2013, undefined. (2013). Effects of spatial location and household wealth on health insurance subscription among women in Ghana. *SpringerA Kumi-Kyereme, J Amo-AdjeiBMC Health Services Research, 2013•Springer*, *13*(1). https://doi.org/10.1186/1472-6963-13-221

Laksono, A. D., Wulandari, R. D., & Matahari, R. (2021). The determinant of health insurance ownership among pregnant women in Indonesia. *BMC Public Health*, *21*(1), 1–7. https://doi.org/10.1186/S12889-021-11577-Z/TABLES/3

Liu, T. C., & Chen, C. S. (2002). An analysis of private health insurance purchasing decisions with national health insurance in Taiwan. *Social Science & Medicine*, *55*(5), 755–774. https://doi.org/10.1016/S0277-9536(01)00201-5

Mahumud, R. A., Sarker, A. R., Sultana, M., Islam, Z., Khan, J., & Morton, A. (2017). Distribution and determinants of out-of-pocket healthcare expenditures in Bangladesh. *Journal of Preventive Medicine and Public Health*, *50*(2), 91–99. https://doi.org/10.3961/JPMPH.16.089

Moonzwe Davis, L., Schensul, S. L., Schensul, J. J., Verma, R. K., Nastasi, B. K., & Singh, R. (2014). Women’s empowerment and its differential impact on health in low-income communities in Mumbai, India. *Global Public Health*, *9*(5), 481–494. https://doi.org/10.1080/17441692.2014.904919

Nattino, G., Lemeshow, S., Phillips, G., Finazzi, S., & Bertolini, G. (2017). Assessing the calibration of dichotomous outcome models with the calibration belt. *The Stata Journal*, *17*(4), 1003–1014.

Sarpong, N., Loag, W., Fobil, J., Meyer, C. G., Adu-Sarkodie, Y., May, J., & Schwarz, N. G. (2010). National health insurance coverage and socio-economic status in a rural district of Ghana. *Tropical Medicine & International Health*, *15*(2), 191–197. https://doi.org/10.1111/J.1365-3156.2009.02439.X

Shao, L., Wang, Y., Wang, X., Ji, L., & Huang, R. (2022). Factors associated with health insurance ownership among women of reproductive age: A multicountry study in sub-Saharan Africa. *PLOS ONE*, *17*(4), e0264377. https://doi.org/10.1371/JOURNAL.PONE.0264377

Spaan, E., Mathijssen, J., … N. T.-B. of the W., & 2012, undefined. (n.d.). The impact of health insurance in Africa and Asia: a systematic review. *SciELO Public HealthE Spaan, J Mathijssen, N Tromp, F McBain, A Have, R BaltussenBulletin of the World Health Organization, 2012•SciELO Public Health*. Retrieved 6 December 2024, from https://www.scielosp.org/article/ssm/content/raw/?resource\_ssm\_path=/media/assets/bwho/v90n9/a13v90n9.pdf

Stata. (2022). *Survey Data Analysis in Stata*. https://stats.oarc.ucla.edu/stata/seminars/svy-stata-8/

Tallon, J. R., & Block, R. (1988). Changing Patterns of Health Insurance Coverage: *Women &amp; Health*, *12*(3–4), 119–136. https://doi.org/10.1300/J013V12N03\_07

*Universal Health Coverage*. (n.d.). Retrieved 18 September 2024, from https://www.who.int/health-topics/universal-health-coverage#tab=tab\_1

Wang, Y., Wang, X., Ji, L., & Huang, R. (2021). Sociodemographic Inequalities in Health Insurance Ownership among Women in Selected Francophone Countries in Sub-Saharan Africa. *BioMed Research International*, *2021*(1), 6516202. https://doi.org/10.1155/2021/6516202

Wong, Y. S., Allotey, P., & Reidpath, D. D. (2016). Sustainable development goals, universal health coverage and equity in health systems: the Orang Asli commons approach. *Global Health, Epidemiology and Genomics*, *1*, e12. https://doi.org/10.1017/GHEG.2016.8

Yaya, S., Uthman, O. A., Ekholuenetale, M., & Bishwajit, G. (2018). Women empowerment as an enabling factor of contraceptive use in sub-Saharan Africa: A multilevel analysis of cross-sectional surveys of 32 countries. *Reproductive Health*, *15*(1). https://doi.org/10.1186/S12978-018-0658-5