**Do Employer-Sponsored Health Insurance Schemes affect the Utilization of Medically Trained Providers and Out-of-pocket Payments among Ready-Made Garment Workers? - a Case-Control Study in Bangladesh**

**Authors:** Sayem Ahmed1,2), Abdur Razzaque Sarker1,3,4), Marufa Sultana1,5), Felix Roth6 Rashidul Alam Mahumud 1,7), Md. Kamruzzaman8), Md. Zahid Hasan1), Andrew J. Mirelman9), Ziaul Islam1), Louis W Niessen10,11), Clas Rehnberg2), A K Azad Khan8), Niklaus Gyr12), Jahangir A. M. Khan1,2,10)

**Institutional affiliation of authors:**

1) Health Economics and Financing Research, Health Systems and Population Studies Division, icddr,b, Dhaka, Bangladesh

2) Health Economics and Policy Research Group, Department of Learning, Informatics, Management and Ethics (LIME), Karolinska Institutet, Stockholm, Sweden

3)Health Economics and Financing Research, Bangladesh Institute of Development Studies (BIDS), Dhaka, Bangladesh

4) Department of Management Science, University of Strathclyde, Glasgow G1 1XQ, UK

5) Deakin Health Economics, School of Health and Social Development, Deakin University, Melbourne, Australia

6) Swiss Micro Insurance Consultancy Group (SMCG), Basel, 4000, Switzerland

7) Health Economics and Policy Research, Centre for Health, Informatics and Economic

Research, University of Southern Queensland, Toowoomba, Queensland-4350, Australia

8) Diabetic Association Bangladesh (BADAS), Dhaka, 1000, Bangladesh

9) Centre for Health Economics, University of York, UK

10) Department of Clinical Sciences, Liverpool School of Tropical Medicine, UK

11)Department of International Health, Johns Hopkins School of Public Health, USA

12) University of Basel, Basel, 4001, Switzerland

**\*Corresponding author**

Sayem Ahmed, MHE, MS

Postal address: Health Systems and Population Studies Division, icddr,b,

68 Shahid Tajuddin Ahmed Sharani, Mohakhali, Dhaka-1212,

Bangladesh.

Cell. +8801912522643 Fax +88-02-8811568

E-mail address: [sayemahmed@icddrb.org](mailto:sayemahmed@icddrb.org)

**Keywords:** RMG workers, Employer-Sponsored Health insurance; Difference-in-difference; Medically trained provider; Bangladesh

**Word count:** 3980

**ABSTRACT**

**Objectives**: We estimated the effect of an Employer-Sponsored Health Insurance (ESHI) scheme on the utilization of healthcare from medically trained providers and reduction of out-of-pocket (OOP) expenditure by the ready-made garments (RMG) workers.

**Design:** We used a case-control study design with cross-sectional pre- and post-intervention surveys.

**Settings:** The study was conducted among workers of 7 purposively selected RMG factories in Shafipur, Gazipur of Bangladesh.

**Participants:** In total, 1,924 (480 from the insured and 482 from the uninsured, in each period) RMG workers were surveyed from insured and uninsured RMG factories respectively, in pre- (October 2013) and post-intervention periods (April 2015).

**Interventions:** We tested the effect of a pilot ESHI scheme which was implemented for 1 year.

**Outcome measures:** The outcome measures were the utilization of healthcare from medically trained providers and reduction of OOP expenditure by the RMG workers. We estimated difference-in-difference (DiD) and two-part model to measure the association between healthcare utilization, OOP payments and ESHI scheme membership while controlling for socioeconomic characteristics of the workers.

**Results**: The ESHI scheme increased the healthcare utilization (DiD=26.1; p<0.01) from medically trained providers among the insured workers compared to the uninsured workers. While accounting for covariates, the utilization significantly reduced by 18.4% (p<0.05). The DiD estimate showed that OOP expenditure was reduced for the insured workers compared to the uninsured workers while utilizing healthcare form the medically trained providers (DiD= -3,700 BDT) or any provider (DiD= -1,100.0 BDT), although not significant. The multiple two-part models also reported similar results.

**Conclusion:** The ESHI scheme significantly increased utilization of medically trained providers among RMG workers. However, it has no significant effect on OOP expenditure. It can be recommended that the educational intervention for improving healthcare-seeking behaviour of RMG workers may increase utilization of ESHI designated healthcare providers while keeping OOP payments low.

**Strength and limitations of this study**

* The difference-in-difference estimate was used for evaluating the effect of ESHI scheme on healthcare utilization from the medically trained healthcare provider and out-of-pocket (OOP) payments
* A two-part model was employed to measure the association between OOP payments and ESHI scheme enrollment while controlling for socioeconomic characteristics of the workers
* The self-reported information on healthcare utilization and OOP payments might be influenced by recall bias

**BACKGROUND**

In Bangladesh, 67.0% of the total healthcare expenditure is borne through out-of-pocket (OOP) payments of households [1]. Due to such payments, 15.6% of households face catastrophic health expenditure (CHE) and almost 5 million people fall into poverty every year [2–4]. Further, among those who seek healthcare, about 41.6% of them utilize services from informal (village doctor, drug-sellers) and traditional providers as well as faith-based healers [5], which results in over-utilization of drugs and adverse effects of the treatment in many cases [6–9].

In order to achieve Universal Health Coverage (UHC), the World Health Organization (WHO) urged member states “to ensure that health-financing systems included a method for prepayment of financial contributions for healthcare, with a view to sharing risk among the population and avoiding CHE and impoverishment of individuals as a result of seeking care” [10]. In response to this urgent mission, the government of Bangladesh developed the first-ever healthcare financing strategy for the country in 2012 [11]. This strategy proposed three different prepayment mechanisms to secure healthcare for all population considering their involvement in economic sectors, namely formal sector workers and their dependents (18.8 million or 12.3%); informal sector workers and their dependents (85.7 million or 56.2%), and the below poverty line population and their dependents (48 million or 31.5%) [11]. The mechanisms for financing healthcare include the design and implementation of social health protection scheme for the below poverty line population as well as informal workers, and the strengthening of financing and provision of the public health services [11].

The RMG sector, with 4.2 million workers, has emerged as one of the largest employer pools and foreign currency earner of Bangladesh. This sector has a large contribution to the economy of over USD 34.25 billion export (more than 80% of all exports) per financial year [12]. In spite of their large contribution to the economy, the workers are not receiving enough social protections especially investment in health and education of their children. RMG workers are more vulnerable to suffer from many kinds of occupational illness compared to formal workers [13,14]. A study revealed that diarrhea, cough and breathlessness were predominant symptoms among 38%, 29% and 28% of RMG workers respectively. Such workers have limited access to quality healthcare as observed that about 11% of the RMG workers did not receive any treatment for their illness. The majority of the RMG workers consults with Local Medical Assistant Family Planning (56%) for their illness followed by drug sellers (21%) and traditional healers (10%) [15]. Another study on 300 RMG workers, showed that they did not get any vaccine, health education or workplace health-related knowledge from the garment factories [16]. There was no provision of healthcare centre, doctor, medicine and treatment for fire burn and chronic illness for themselves and their family members. More than half (63%) of the respondents reported working day lost due to illness [16].

For ensuring access to quality healthcare and financial risk protection for the organized workers, industry-based ‘Employer-Sponsored Health Insurance (ESHI) has been used in developed countries and recommended for developing countries [17,18]. Such insurance schemes are usually offered by an organization as part of workers’ benefits and compensation package. Considering the inadequate accessibility of RMG workers to healthcare, *Bangladesh Diabetic Somiti* (BADAS), a diabetic association of Bangladesh established in 1956, implemented a research-based pilot ESHI scheme (Box 1) for this informal group of workers from March 2014 to February 2015. United Insurance Company (UIC), Telemedicine Reference Center Ltd. (TRCL), and garments factories of New Asia Group collaborated in the pilot study.

(Box 1 will be inserted here)

It should be noticed here that some diseases and health conditions were excluded mostly due to high and unaffordable costs for services. Such services comprised any congenital infirmity, radiotherapy (X-ray, radium or radioactive isotopes treatment), chemotherapy or any form of treatment when not incidental or necessary to the treatment of the injury/illness which caused the hospitalization, any dental treatment unless it requires hospitalization for reconstructive surgery as a consequence of an accident, Special procedures: transplantation, cardiac, neurosurgery, facosurgery, dialysis, HIV/AIDS etc.

The ESHI scheme offered mandatory health insurance for workers of six garments factories of the New Asia Group (Knit-Asia Ltd, Ashulia; Knit-Asia Ltd, Shafipur; Knit-Asia Ltd, Nichintapur; Malek Spinning Mills Ltd; Salek Textile Ltd and Rahim Textile Mills Ltd) located at Shafipur in Gazipur, Bangladesh. A total of 8,000 workers and supervisors were the beneficiaries of the insurance scheme. We included all of these RMG factories in our evaluation study. It means that no other RMG factories had insurance scheme in that location to our knowledge. It, however, should be noted that a large number of RMG factories are located in the Gazipur district of Bangladesh. Therefore, the generalizability of the study findings should not be remarkably affected by selection of these factories only from Gazipur district. Health services were provided by a newly built hospital by BADAS in Shafipur, located close to the RMG factories. BADAS is one of the largest healthcare chains in Bangladesh after the public sector. It has grown into a nationwide organization having 80 healthcare centres and educational facilities spread all over the country [19]. For the pilot phase only one health facility was contracted by the insurance company. The pilot scheme provided coverage for treatment with a cost up to 15,000 Bangladeshi Taka (BDT) or 192.8 USD annually. The premium for enrollment in the scheme was 487 BDT (6.3 USD) per year, which was borne by the employer. BADAS and UIC have been experimenting with the ESHI scheme on a limited scale and sought a mechanism for scaling-up and technical support to conduct that process in a professional way. The approach was to develop a scalable, ESHI scheme funded by the RMG factories through premium payment. The scheme was linked with the existing health service providers and insurance provider to create a sustainable and scalable health financing model. The premium was set though an actuary analysis conducted by a hired firm. The benefit package was developed through expert consultation on the healthcare need of the RMG workers.

This ESHI scheme was piloted with the aim of providing quality healthcare with financial protection in the long-term to the RMG workers in Bangladesh. The objective of this study was thus to assess the effect of this insurance scheme on the utilization of healthcare services from the medically trained provide (MTP) and on the reduction of OOP healthcare expenditure for such care.

**METHODS**

We used a case-control study design with cross-sectional pre- and post-intervention surveys to assess the healthcare utilization form MTP. Study participants were the RMG workers from the insured group (IG) and uninsured group (UG). IG was comprised of the workers from the six purposively selected RMG factories that offered ESHI. The UG was constituted of the workers from one purposively selected RMG factory without any ESHI scheme; named JM Fabrics. All the factories were located in the same area. Surveys were conducted before and after implementation of the ESHI scheme among workers in both IG and UG.

**Sample size**

We estimated the sample size using the technique proposed by Casagrande and Pike 1978 & Ury and Fleiss 1980 for comparing two independent proportions [20,21]. A study on micro-health insurance showed that the healthcare utilization of insured and uninsured individual was 7.6% and 6.2% respectively [22]. Using these healthcare utilization rates for two groups at a 10% error level and 85% statistical power the estimated sample size for each group was 372. We considered 30% non-response rate in the sample size calculation due to high job switch rate among the garments worker. Therefore, the sample size was increased to 484 for each group to maintain the desired statistical power. Finally, 962 RMG workers (482 from IG and 480 from UG) were included in both pre- and post-intervention periods. Workers who had been working in the selected RMG factories for 6 months prior to the surveys considered as eligible for participation in the survey.

**Data collection**

A complete list of workers was collected from each selected factory. The list contained worker identification number, name, job position, age, and sex. Using simple random sampling approach, the required number of samples was selected from that list. The selected participants were informed about the survey on the day before the survey. The management staff ensured the presence of the RMG workers during the survey to reduce the non-response rate. A structured questionnaire was developed, and necessary modifications and corrections were made through field test before finalizing. Data from the individual worker was collected through face-to-face interviews. The interviews took place in a separate room close to the working place of the workers for ensuring confidentiality. To avoid any bias in response by the factory managers none of them was allowed to accompany the worker during the survey. Twenty trained Field Research Assistants were involved in conducting the survey and four supervisors supervised and coordinated the data collection process. The pre-intervention data collection was performed from October 2013 to March 2014 and the post-intervention data collection was from March to April 2015. The pre-intervention survey took a long time due to the interruption by political and labour unrest in the country [23].

The demographic and socioeconomic characteristics along with illness and related healthcare seeking information for the past 90 days (prior to interview) of the RMG workers were collected. The type of healthcare providers utilized and the associated OOP healthcare expenditure information e.g. consultation, hospital bed, medicine, diagnosis, and transportation were collected.

**Variables**

In this study, the utilization of healthcare from MTPs and related OOP expenditure were the main outcome variables. The enrollment in the ESHI scheme was the main explanatory variable of interest. For adjustment of the confounding a number of demographic characteristics (e.g. age, sex, marital status and education), socioeconomic characteristics (e.g., household size, household income), employment level and type of illness suffered (e.g. chronic illness) were used. Generally, the RMG workers sought healthcare from both MTP (e. g., doctors, private clinics, medical colleges and district hospitals, sub-district health complexes, factory doctors and NGO clinics) and medically non-trained provider (e. g, village doctors, drug-sellers, traditional healers) [15]. The OOP healthcare expenditure includes medical fees or user fees for public care, medicines expenditure (whether prescribed or not), insurance co-payments, and expenditure for transportation, diagnostic tests, hospital beds, and foods [3].

**Data analysis**

We estimated the percentage of socio-demographic characteristics, healthcare utilization and average of OOP healthcare expenditure along with their corresponding confidence interval of the RMG workers in IG and UG. Effect of the ESHI scheme on healthcare utilization from the MTPs and the reduction of OOP payments were estimated using difference-in-difference (DiD) estimates and two-part model. Data cleaning, validation and all statistical analysis were performed using STATA 13.0 software [24].

**Difference-in-difference**

The DiD method was employed for estimating observed changes in the outcome variables for ESHI scheme enrollees. The outcomes of the scheme were reflected on differences and changes over times (pre- and post-implementation) and between the study groups (IG and UG) in terms of illness or symptoms, inpatient care, utilization of healthcare from MTPs, and OOP healthcare expenditure. It implies that the estimate of the counterfactual was obtained by computing the changes in outcomes for the UG. This counterfactual change is then subtracted from the change in outcomes for the IG [25]. DiD statistic was estimated using a regression model [26] where two dummy variables- Si (1= Treatment, 0= Control) and Ti (1=post-intervention and 0=pre-intervention) were created and entered into a regression model with the outcome variable (Yi). The regression model was specified as follows,

Yi=β0+ β1Ti+ β2Si+ β3(T×S)it + εi….. (1)

The estimated regression coefficient- β3 in equation 1represents the DiD statistic of the outcome variable.

While accounting for covariates for utilization of healthcare, a separate model was used considering a number of control variables (e.g., age, sex, education, marital status, household income, household size, job-position, and type of illness suffered) were included in multiple regression models for an adjusted estimate of DiD. The multiple regression model was specified as follows,

Yi=β0+ β1Ti+ β2Si+ β3(T×S)it + εi….. (2)

Where, β0 was the constant, T was the study period, S was the study group, *X1it, X2it* were control variables (e.g. age, sex, marital status, education, occupation, income, and household size), and β4, β5 were the associatedcoefficients. The β3 was the DiD estimate while accounting for covariates.

**Two-part model**

Since it was observed in data that many individuals did not consume any healthcare service during the intervention period, reporting of zero OOP expenditure was quite common. Therefore, participation in expenditure and the magnitude of OOP healthcare expenditure may not be statistically independent [27]. Application of an ordinary least square approach for estimating the coefficient of the regression model to only among who spent for healthcare raises the possibility of sample selection bias [28]. To avoid this problem, we included both individual’s decision to participate in expenditure and the magnitude of OOP healthcare expenditure into the regression model adopting a two-part regression model. The two-part model allows to assess the relationship between the participation decision and magnitude of OOP healthcare expenditure while controlling for covariates (e.g. socioeconomic and demographic characteristics) [29,30]. In this model, the first part involves a decision about whether or not to participate in healthcare expenditure using probit function and the second part determines the level of healthcare expenditure through a regression model [31,32]. Thus, the two-part model uses the information on both the probability and the magnitude of expenditure simultaneously in assessing predictors of OOP healthcare expenditure. The dependent variable for the probit model is a dichotomous variable that indicates whether OOP healthcare expenditure incurred (the participation decision). The regression model analyzed the natural logarithm of OOP payments as a function of the covariates. The two-part regression model can be specified as below [32],

Observed OOP payments are assumed to be related to a latent value by the following (4),

… (4)

Where, Yi denotes the OOP healthcare expenditure and X1i represent the participation in ESHI scheme and X2i, X3i other control variables (e.g. sex, age, marital status, education level, job position, income, chronic illness, inpatient care, healthcare provider). Two models were applied for OOP healthcare expenditures. In the first model (model 4) dependent variable was OOP expenditure for utilizing healthcare form any provider and in another model (model 5) the dependent variable was the OOP expenditures for utilizing healthcare from MTP. The inpatient control variable was added only in the second part as all inpatient care incurred OOP healthcare expenditure and no variation with a participation decision. Pre- and post-intervention period were included in the model as dummy variable i.e. time dummy (1= post-intervention period and 0 = pre-intervention period) for adjustment. The patients admitted to the inpatient care were often referred from the outpatient or emergency department of the health facility. We, therefore, classified these patients as ‘inpatient care users’ which was used as a control variable in the two-part model. Those who utilized only outpatient or emergency care were classified as ‘outpatient users’.

**Ethical consideration**

Written informed consent was obtained from each RMG worker after explaining the aims of the study. They were also informed that participation in the interview was voluntary and they can withdraw at any time if they are not comfortable. The Institutional Review Board of icddr,b reviewed and approved the study.

**Patient and public involvement**

Patient and public were not involved in in the design or planning of the study. Study findings will be shared with the stakeholders, including owner’s association of the RMG factories in meetings/seminars and at national or regional conferences.

**RESULTS**

**Sample characteristics**

Table 1 presents the socioeconomic and demographic characteristics of the study participants. The majority of the workers were 20 to 30 years old. The participants in IG and UG were mostly at the worker level job position. The largest number of RMG workers had less than 3 household members. The workers mostly had primary level education. Average monthly income of UG workers (9,140.0 BDT; 176 USD) was higher than IG workers (7,945.0 BDT; 102 USD) in the pre-intervention period. However, in the post-intervention period, there was no significant difference in monthly income between IG and UG.

(Table 1 will be inserted here)

**Effect on healthcare utilization**

The effect of ESHI scheme on the utilization of healthcare is presented in Table 2. We found illness among the IG workers increased by 2.1% and for UG workers 0.8%. The DiD estimate showed that healthcare utilization from the MTPs (DiD=26.1.6; p<0.01) increased by about 26.0% among the IG workers compared to the UG workers as a result of the ESHI scheme. While accounting for covariates the DiD estimate seeking healthcare form the MTPs reduced to 18.4 and remained significant (p<0.05). However, after this adjustment, healthcare seeking among those who suffered from illness became significant (DID=7.4; p<0.1). Among the three categories of providers, utilization of healthcare from the private provider was the highest in both IG workers and UG workers.

(Table 2 will be inserted here)

**Effect on out-of-pocket healthcare payment**

Table 3 summarizes the OOP payment for the healthcare of RMG workers in IG and UG. The descriptive statistics showed that at pre-intervention IG and UG spend 1,197.7 BDT or 15.4 USD (CI=483.5–1,911.9) and 817.8 BDT or 10.5 USD (CI=531.2–1,104.4) for healthcare respectively. It reduced to 951.3 BDT or 12.2 USD (CI=567.5–1,335.1) among IG and increased to 1,681.1 BDT or 21.6 USD (611.0–2,751.2) in the UG workers. In sum, the DiD estimate showed that the difference in OOP healthcare expenditure for any provider between IG and UG was not statistically significant. A similar result was observed for OOP spending on healthcare utilization from MTPs.

(Table 3 will be inserted here)

Results from the two-part regression model are presented in Table 4. These models (model 4 and 5) showed that there was no effect of the ESHI scheme on the reduction of OOP healthcare expenditure for seeking care from all types of the provider or from MTPs. However, OOP expenditure for seeking healthcare from all types of provider was positively associated with inpatient care and chronic illness. For such care, female workers were spending less as OOP for healthcare compared to male workers. The supervisor/administrative staff spent less on healthcare than other workers. OOP expenditure due to the utilization of MTP was positively associated with inpatient care only.

(Table 4 will be inserted here)

**DISCUSSION**

This study, based on the representative surveys of the pre- and post-intervention period among the RMG workers, is the first to consider the effect of the ESHI scheme on the utilization of MTP in Bangladesh and on OOP expenditure. We found the utilization of healthcare from the MTPs significantly increased among the IG compared to the uninsured workers in UG (DiD= 26.1; p<0.01). While accounting for the effects of covariates (e.g. age, sex, education, marital status, household income, household size, job-position, and type of illness suffered) the DiD estimate changed to 18.4 (p<0.05) and remained significant. Healthcare from MTP became more accessible to the RMG workers when they enrolled in the ESHI scheme. RMG workers have limited access to healthcare. Therefore, increasing utilization of MTPs was an important achievement of the ESHI scheme [15]. However, we did not find any statistically significant effect of the ESHI scheme on the reduction of OOP healthcare expenditure. We found that the RMG workers utilized healthcare providers or facilities (e.g. drug sellers, traditional healers and private healthcare providers) which was not covered by the ESHI scheme. This might be due to their continued healthcare utilization behaviour prior to enrolment in the insurance scheme. It was observed in other studies that the insured workers utilized healthcare from service providers than the designated ones [33]. Behaviour change communication intervention or educational intervention can be conducted for ESHI scheme members to aware them about the benefits of the scheme and importance of utilizing MTP [33]. A standard treatment protocol was employed for the ESHI scheme to minimize the supplier induced healthcare utilization. Further, chances overutilization of health services by RMG workers or moral hazard was limited for RMG workers since this workers generally significantly under-utilize healthcare services as evident from other studies [15,16].

Health insurance is warranted in many low- and middle-income countries (LMICs) since reliance on OOP payments for healthcare services leads to the catastrophic burden for many households in LMICs Approximately, 4.2 million workers are involved in the RMG industry of Bangladesh, who lack adequate healthcare [15]. Health insurance for this specific group of RMG workers can increase accessibility and utilization of healthcare at an affordable price [34,35].

The findings from this study were similar to a number of studies that have examined the effects of health insurance/micro health insurance schemes on healthcare utilization and financial outcomes among members [22,36–40]. Four studies have found higher utilization of healthcare services among the insured individuals in different settings such as Congo [41]; Senegal [42]; India [43]; and Philippines [22,36]. In addition, Hamid et al. 2011, found that micro-health insurance improves the health status of insured members, which increases productivity, and labour supply [44]. Such positive effects of the studied ESHI scheme on utilization may also increase the production of RMG sectors. However, the International Labor Organization found that only 14 out of 24 studies that examined the healthcare utilization effects of health insurance observed positive outcomes [40]. Jakab and Krishnan 2014, in a review, showed that 13 out of 16 studies reported that the insured members were likely to use more healthcare services than non-members; two studies found no difference while one found a slight decrease in healthcare use [45]. Another study conducted by Raza et.al (2016) on community-based health insurance in India reported that the health insurance scheme had no significant effect on any utilization outcome and there was no significant evidence of reducing financial hardship [46].

The statistically non-significant effect of the ESHI scheme on reducing OOP healthcare expenditure could be explained by healthcare seeking behaviour of the insured workers. We observed that a proportion of the insured workers continued to utilize health services from formal and informal providers (drug store, traditional healers etc.) out of the scheme at their own payments, despite their access to the designated providers of the insurance scheme at no-cost. Consequently, OOP payment of the insured workers remained high. Such healthcare seeking behaviour of the workers during their first and one-year of enrolment might have influenced our findings considerably. Our study did not analyze the health outcomes of the enrollees in this study and was limited within the investigation of healthcare utilization and OOP payment. It, therefore, might be useful to note here that the utilization of the informal care providers by insured workers might have contributed to their health outcome. The impact of health insurance on health outcomes should be studied for better estimation and understanding about value for money of such intervention. We, however, believe that educational intervention about health-seeking behaviour and financial literacy of the workers and their enrolment in the scheme for a longer period might be useful for changing their behaviour towards utilization of designated healthcare providers of the insurance scheme. We found the average OOP payments of RMG workers were 1,329.4 BDT and 3,567.7 BDT in UG and IG respectively. Khan et al. 2017 estimated that the OOP payment of Bangladeshi in the last 30 days was 644.6 BDT (or 1933.8BDT for 3 months) using nationwide household income expenditure survey 2010 [47]. Though this estimate was not directly comparable with our estimate because of difference in study population, the average OOP spending we estimated for three months period was more or less similar.

The limited maximum coverage i.e. 15,000 BDT per year per worker by insurance scheme might have adversely affected healthcare utilization and related OOP healthcare expenditure of the scheme enrollees. However, this low maximum coverage per member per year was kept for securing financial sustainability of the scheme specially in the pilot phase where prior knowledge about expenditure of health insurance scheme was limited in Bangladesh in general and for RMG workers in particular [48]. The insurance scheme management should revise this annual ceiling amount to meet the high cost of treatment (e.g. multiple inpatient care utilization) based on the experience from this pilot phase. Another limitation of the ESHI scheme that may be affected by the healthcare seeking behavior of the insured RMG workers was few numbers of contracted healthcare facilities. We found a number of RMG workers were utilizing healthcare services from drug sellers and traditional providers while they are covered through this scheme this may obscure the effect of this scheme on reducing the OOP healthcare expenditure. The scheme management can include more healthcare service delivery points based on the opinion of the RMG workers. The initiative should be taken by the scheme manager to better inform the RMG workers about the available services under the ESHI scheme and motivate them to utilize such services. This scheme has potential to be scaled-up in the existing RMG factories and other industries in Bangladesh. The political will of the government and willingness of the RMG factory owners will be fundamental for large scale implementation of ESHI schemes and their sustainability. However, before scaleup of the scheme financial sustainability should be tested which was beyond the scope of this current study.

One possible limitation of the study is that we were unable to follow up the same workers during the pre-and post-intervention period. This was not possible due to the high dropout rate of the RMG workers. However, the RMG workers were randomly selected from the list of workers for both IG and UG in the pre-and post-intervention period and no significant difference was observed in demographic characteristics of the workers (Table 1). Another limitation was that the ESHI scheme was implemented for a one-year period which may be a short time for assessing the OOP healthcare expenditure effect of this scheme. Several studies reported findings without pre-intervention for assessing utilization effect of health insurance [22,37,43,49]. However, this study used a pre-post intervention design considering two groups that give an opportunity to obtain DiD estimate, which is a standard approach for assessing the effects of any intervention [25]. There are possibilities to have recall bias and bias in self-reported information about the illness, healthcare utilization, and OOP healthcare expenditure of RMG workers who have poor knowledge about medical conditions and the healthcare services [50,51]. However, we used a 90-day recall period to minimize such biases. We were unable to test the parallel trends assumption of DiD approach in this study. We did not include a midline survey in this evaluation study considering the short period of the ESHI pilot scheme (1-year) and budgetary constraint for data collection which is a potential limitation of this study.

**CONCLUSIONS**

The ESHI scheme had a significant effect on the increasing the utilization of healthcare from MTP and non-significant effect on reduction in the OOP healthcare expenditure. Education intervention on health-seeking behaviour and related financial literacy can be recommended for increasing healthcare utilization of the RMG workers from the insurance scheme designated healthcare providers which consequently would reduce the OOP payments. The employers, therefore, should promote ESHI scheme for RMG workers to address the challenge of UHC. For a better understanding about value for money impact of ESHI scheme on health outcomes would be required in future studies.

This kind of scheme can generate new resources for providing healthcare to the low-income RMG workers through the contribution from the employer in LMICs. The healthcare financing strategy of the Government of Bangladesh, as well as the World Health organization, prioritize such a scheme for workers [11,52]. This study contributes to the concepts of initiating such schemes at a broader scale and aware the policymakers in considering the key issues while designing such scheme in future.

**Acknowledgement**

This research study was funded by the Swiss Agency for Development and Cooperation (SDC) through the Swiss Tropical and Public Health Institute (Swiss TPH). icddr,b acknowledges with gratitude the commitment of Swiss TPH to its research efforts. icddr,b is also grateful to the Governments of Bangladesh, Canada, Sweden and the UK for providing core/unrestricted support. We thank the Bangladesh Diabetic Somiti (BADAS) for their cordial cooperation for conducting this study. Gratitude goes to all data collectors for their hard work during data collection. Finally, we are thankful to RMG factory owners and workers for their time and cooperation in this study.

**Authors contribution**

JAMK, AKAK, NG and SA conceptualized the research idea, study design, literature search, data extraction and analysis, data interpretation, and writing the manuscript. ARS, MS, FR, MK, RAM, MZH, AJM, ZI, CR and LWN contributed in writing, reviewing and revising the manuscript. All authors read and approved the final manuscript.

**Funding**

This work was supported by the Swiss Agency for Development and Cooperation (SDC) through the Swiss Tropical and Public Health Institute (Swiss TPH).

**Competing interest**

None declared.

**Data sharing statement**

The study used primary data and can be shared upon request.

**REFERENCES**

1 MoHFW. Bangladesh National Health Accounts 1997 - 2012. Dhaka: 2015. doi:10.13140/RG.2.1.3951.6247

2 Van Doorslaer E, O’Donnell O, Rannan-Eliya RP, *et al.* Catastrophic payments for health care in Asia. *Heal Econ* 2007;**16**:1159–84.

3 van Doorslaer E, O’Donnell O, Rannan-Eliya RP, *et al.* Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. *Lancet* 2006;**368**:1357–64.

4 Khan JAM, Ahmed S, Evans TG. Catastrophic healthcare expenditure and poverty related to out-of-pocket payments for healthcare in Bangladesh—an estimation of financial risk protection of universal health coverage. *Health Policy Plan* 2017;:1–9. doi:10.1093/heapol/czx048

5 BBS. Household Income and Expenditure Survey 2010. Dhaka: 2011.

6 Ashraf A, Chowdhury S, Streefland P. Health, disease and health-care in rural Bangladesh. *Soc Sci Med* 1982;**16**:2041–54.

7 Guyon AB, Barman A, Ahmed JU, *et al.* A baseline survey on use of drugs at the primary health care level in Bangladesh. *Bull World Health Organ* 1994;**72**:265–71.http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2486537&tool=pmcentrez&rendertype=abstract (accessed 6 Dec 2014).

8 Ahmed SM, Islam QS. Availability and rational use of drugs in primary healthcare facilities following the national drug policy of 1982: is Bangladesh on right track? *J Health Popul Nutr* 2012;**30**:99–108.http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3312366&tool=pmcentrez&rendertype=abstract (accessed 6 Dec 2014).

9 Ahmed SM, Hossain MA, Chowdhury MR. Informal sector providers in Bangladesh: how equipped are they to provide rational health care? *Health Policy Plan* 2009;**24**:467–78. doi:10.1093/heapol/czp037

10 WHO. Sustainable health financing, universal coverage and social health insurance. Geneva: : Geneva: World Health Organisation 2005.

11 MoHFW. Expanding Social Protection for Health: Towards Universal Coverage. Dhaka: 2012.

12 BGMEA. Bangladesh Garment Manufacturers and Exporters Association. 2016.

13 Akhter S, Salahuddin A, Iqbal M, Malek A JN. Health and occupational safety for female workforce of garment industries in Bangladesh. *J Mech Eng* 2010;**41**:65–70.

14 Alamgir H, Cooper SP, Delclos GL. Garments fire: history repeats itself. *Am J Ind Med* 2013;**56**:1113–5. doi:10.1002/ajim.22196

15 Rahman A, Rahman M. Sickness and Treatment : A Situation Analysis among the Garments Workers. *Anwer Khan Mod Med Coll J* 2013;**4**:10–4.

16 Begum H, Fahmida H. *Supply-Side Effect of Health Care Facilities on Productivity Amongst the Female Workers in the Readymade Garment Sector*. 2009. doi:10.3329/imcj.v2i1.2923

17 Gould E. Employer-sponsored health insurance coverage continues to decline in a new decade. *Int J Health Serv* 2013;**43**:603–38.http://www.ncbi.nlm.nih.gov/pubmed/24397230 (accessed 15 Jan 2014).

18 Kutzin J. Health Insurance for the Formal Sector in Africa: Yes, But…. In: Beattie A, Doherty J, Gilson L, *et al.*, eds. *Sustainable health care financing in Southern Africa: World Bank Institute Resources*. Washington, DC: 1998. 61–73. doi:10.1596/0-8213-4145-6

19 Uddin KN. Contribution of Bangladesh Diabetic Samity ( BADAS ) to Health Care Management. *Birdem Med J* 2012;**2**:1–2.

20 Casagrande J, Pike MC, Smith PG. An Improved Approximate Formula for Calculating Sample Sizes for Comparing Two Binomial Distributions. *Biometrics* 1978;**34**:483–6.

21 Ury HK, Fleiss JL. On Approximate Sample Sizes for Comparing Two Independent Proportions with the Use of Yates ’ Correction. *Biometrics* 1980;**36**:347–51.

22 Dror DM, Soriano ES, Lorenzo ME, *et al.* Field based evidence of enhanced healthcare utilization among persons insured by micro health insurance units in Philippines. *Health Policy (New York)* 2005;**73**:263–71. doi:10.1016/j.healthpol.2004.11.018

23 Khatun F. Economic implications of political instability. Dly. Starlystar. 2014.

24 StataCorp. Stata Statistical Software: Release 13. 2013.

25 Gertler PJ, Martinez S, Premand P, *et al.* *Impact Evaluation in Practice*. 2011. doi:10.1596/978-0-8213-8541-8

26 Meyer BBD, Viscusi WKIP, Durbin DL. Workers ’ Compensation and Injury Duration : Evidence from a Natural Experiment Author ( s ): Bruce D . Meyer , W . Kip Viscusi and David L . Durbin Source : The American Economic Review , Vol . 85 , No . 3 ( Jun ., 1995 ), p. 1995;**85**:322–40.

27 Jones AM. A double-hurdle model of cigarette consumption. *J Appl Econom* 1989;**4**:23–39. doi:10.1002/jae.3950040103

28 Jones AM. *Health Econometrics. In Handbook of Health Economics*. Amsterdam: : Elsevier North-Holland 2000.

29 Okunade AA, Suraratdecha C, Benson DA. Determinants of Thailand household healthcare expenditure: the relevance of permanent resources and other correlates. *Health Econ* 2010;**19**:365–76. doi:10.1002/hec.1471

30 Rahman MM, Gilmour S, Saito E, *et al.* Health-related financial catastrophe, inequality and chronic illness in Bangladesh. *PLoS One* 2013;**8**:e56873. doi:10.1371/journal.pone.0056873

31 Cragg J. Some statistical models for limited dependent variables with application to the demand for durable goods. *Econom J Econom Soc* 1971;**39**:829–44.http://www.jstor.org/stable/10.2307/1909582 (accessed 10 Jan 2014).

32 O’Donnell O, van Doorslaer E, Wagstaff A, *et al.* *Analyzing health equity using household survey data: A guide to techniques and their implementation*. Washington DC: : The World Bank 2008.

33 Ahmed S, Sarker AR, Sultana M, *et al.* The impact of community-based health insurance on the utilization of medically trained healthcare providers among informal workers in Bangladesh. *PLoS One* 2018;**13**:e0200265. doi:10.1371/journal.pone.0200265

34 ICPL. Study on Willingness to Pay for Social Health Insurance in RMG sector. Dhaka: 2015.

35 Vargas V, Begum T, Ahmed S, *et al.* Fiscal Space for Health in Bangladesh. Washington D.C.: 2016. doi:10.13140/RG.2.1.1153.3040

36 Dror D, Armstrong J. Do Micro Health Insurance Units Need Capital or Reinsurance? A Simulated Exercise to Examine Different Alternatives&ast. *Geneva Pap* 2006;**31**:739–61.

37 Gnawali DP, Pokhrel S, Sié A, *et al.* The effect of community-based health insurance on the utilization of modern health care services: evidence from Burkina Faso. *Health Policy* 2009;**90**:214–22. doi:10.1016/j.healthpol.2008.09.015

38 Aggarwal A. Impact evaluation of India’s ‘Yeshasvini’ community-based health insurance programme. *Health Econ* 2010;**19 Suppl**:5–35. doi:10.1002/hec.1605

39 Ekman B. Community-based health insurance in low-income countries: a systematic review of the evidence. *Health Policy Plan* 2004;**19**:249–70.

40 ILO. Extending social protection in health through community based health organizations: evidence and challenges. Geneva: 2002.

41 Criel B, Waelkens MP. Declining subscriptions to the Maliando Mutual Health Organisation in Guinea-Conakry (West Africa): what is going wrong? *Soc Sci Med* 2003;**57**:1205–19.http://www.ncbi.nlm.nih.gov/pubmed/12899905 (accessed 23 Jul 2015).

42 Jütting J. Do community-based health insurance schemes improve poor people’s access to health care? Evidence from rural Senegal. *World Dev* 2003;**32**:273–88.

43 Ranson MK. Reduction of catastrophic health care expenditures by a community-based health insurance scheme in Gujarat, India: current experiences and challenges. *Bull World Health Organ* 2002;**80**:613–21.

44 Hamid SA, Roberts J, Mosley P. Can Micro Health Insurance Reduce Poverty? Evidence From Bangladesh. *J Risk Insur* 2011;**78**:57–82. doi:10.1111/j.1539-6975.2010.01402.x

45 Jakab M, Krishnan C. Review of the strengths and weaknesses of community financing. In: *Health Financing for Poor People: Resource Mobilization and Risk Sharing*. Washington DC: : The World Bank 2004. 53–117.

46 Raza WA, Van De Poel E, Bedi A, *et al.* Impact of community-based health insurance on access and financial protection: Evidence from three randomized control trials in rural India. *Health Econ* 2016;**25**:675–87. doi:10.1002/hec.3307

47 Khan JAM, Ahmed S, Evans TG. Catastrophic healthcare expenditure and poverty related to out-of-pocket payments for healthcare in Bangladesh-an estimation of financial risk protection of universal health coverage. *Health Policy Plan* 2017;**32**:1102–10. doi:10.1093/heapol/czx048

48 Khan J, Ahmed S, Sultana M, *et al.* The effect of a Community-Based Health Insurance for Informal Workers on the Out-of-pocket Payments for Utilizing Healthcare from Medically Trained Providers in Bangladesh. *Int Health* 2019;**(accepted**.

49 Wagstaff A, Lindelow M, Jun G, *et al.* Extending health insurance to the rural population: An impact evaluation of China’s new cooperative medical scheme. *J Health Econ* 2009;**28**:1–19.

50 Chakraborty N, Islam MA, Chowdhury RI, *et al.* Determinants of the use of maternal health services in rural Bangladesh. *Heal Promot Int* 2003;**18**:327–37.

51 Bonfrer I, van de Poel E, Grimm M, *et al.* Does the distribution of healthcare utilization match needs in Africa? *Health Policy Plan* 2014;**29**:921–37. doi:10.1093/heapol/czt074

52 WHO. The world health report: health systems financing: the path to universal coverage. Geneva: : World Health Organisation 2010.

53 Bangladesh Bank. Annual Report 2014-2015. Dhaka: 2015. doi:10.1017/CBO9781107415324.004

**Tables**

Box 1. ESHI scheme

|  |
| --- |
| Description of the ESHI scheme |
| **Target population:** Workers of garments industry  **Implementation organization: (Third party payment mechanism)**  1) Diabetic Association of Bangladesh (BADAS) (Health Service Provider)  2) United Insurance Company Limited (Insurance company)  3) The New Asia Group (Garments factory)  **Benefit package:**  1) Inpatient and outpatient treatment covered by the insurance scheme with a maximum coverage of 15,000 BDT (192.8 USD\*) per year  **Premium:** 487 BDT (6.3 USD) per year, which is borne by the employer.  **Number of enrollees:** 8,000 RMG workers from 7 garments factories |

\*1 USD = 77.8 BDT [53]

Table 1. Sample characteristics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Pre-intervention** | |  | **Post-intervention** | |
| **Insured (IG)** | **Uninsured (UG)** |  | **Insured (IG)** | **Uninsured (UG)** |
| **% (95% CI)** | **% (95% CI)** |  | **% (95% CI)** | **% (95% CI)** |
| **Age group** |  |  |  |  |  |
| < 20 years | 23.1  (19.3 - 26.9) | 21.8  (18.1 -25.5) |  | 11.3  (8.4 - 14.1) | 18.8  (15.3 -22.3) |
| 20-30 years | 49.2  (44.7 - 53.6) | 62.2  (57.9 -66.6) |  | 54.1  (49.6 -58.5) | 58.0  (53.6 - 62.5) |
| 30-40 years | 18.5  (15.1 - 22.0) | 12.0  (9.1 - 14.9) |  | 26.5  (22.6 - 0.5) | 18.2  (14.7 - 1.6) |
| 40+ years | 9.2  (6.6 - 11.8) | 3.9  (2.2 - 5.7) |  | 8.1  (5.7 - 10.6) | 5.0  (3.1 - 7.0) |
| **Sex** |  |  |  |  |  |
| Male | 40.6  (36.2 - 45.0) | 52.5  (48.0 - 57.0) |  | 31.3  (27.2 - 35.5) | 47.8  (43.3 -52.3) |
| Female | 59.4  (55.0 - 63.8) | 47.5  (43.0 - 52.0) |  | 68.7  (64.5 - 72.8) | 52.2  (47.7 -56.7) |
| **Marital status** |  |  |  |  |  |
| Married | 69.0  (64.8 - 73.1) | 73.2  (69.3 - 77.2) |  | 78.5  (74.8 - 82.2) | 75.4  (71.5 - 79.2) |
| Unmarried | 27.1  (23.1 - 31.1) | 24.5  (20.6 - 28.3) |  | 18.4  (14.9 - 21.8) | 22.8  (19.0 - 26.5) |
| Others (Widowed, Divorced and Separated) | 4.0  (2.2 - 5.7) | 2.3  (0.9 - 3.6) |  | 3.1  (1.6 - 4.7) | 1.9  (0.7 - 3.1) |
| **Job position** |  |  |  |  |  |
| Worker | 87.7  (84.8 - 90.6) | 85.1  (81.9 - 88.2) |  | 78.7  (75.0 - 82.4) | 83.1  (79.7 - 86.5) |
| Supervisor/admin level worker | 12.3  (9.4 - 15.2) | 14.9  (11.8 - 18.1) |  | 21.3  (17.6 - 25.0) | 16.9  (13.5 - 20.3) |
| **Household size** |  |  |  |  |  |
| 3 persons or less | 69.8  (65.7 - 73.9) | 75.5  (71.7 - 79.4) |  | 70.6  (66.5 - 74.6) | 76.0  (72.2 - 79.8) |
| 4-5 persons | 25.4  (21.5 - 29.3) | 22.2  (18.5 - 25.9) |  | 22.3  (18.6 - 26.1) | 20.0  (16.5 - 23.6) |
| 6 persons or more | 4.8  (2.9 - 6.7) | 2.3  (0.9 - 3.6) |  | 7.1  (4.8 - 9.4) | 4.0  (2.2 - 5.7) |
| **Level of education** |  |  |  |  |  |
| Primary level ( years 1-5) | 67.5  (63.3 - 71.7) | 62.9  (58.5 - 67.2) |  | 59.7  (55.3 -64.1) | 62.4  (58.1 - 66.8) |
| Secondary level ( years 9-10) | 28.3  (24.3 - 32.4) | 33.6  (29.4 - 37.8) |  | 34.9  (30.6 - 39.1) | 33.6  (29.4 - 37.8) |
| Higher Secondary level and above ( years 11+) | 4.2  (2.4 - 6.0) | 3.5  (1.9 - 5.2) |  | 5.4  (3.4 - 7.5) | 4.0  (2.2 - 5.7) |
| **Mean income per-month** | 7,945  (7,606 – 8,284) | 9,140  (8,737 – 9,542) |  | 12,945  (12,310 – 13,580) | 11,298  (10,884 – 11,711) |

Table 2. Utilization of healthcare among insured and uninsured RMG workers during baseline and end line survey

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Pre-intervention** | | | |  | **Post-intervention** | | | | **DiD a)** | **DiD accounting for covariates** |
| **Insured (IG)** | | **Uninsured (UG)** | |  | **Insured (IG)** | | **Uninsured (UG)** | |
| **N** | **% (95% CI)** | **N** | **% (95% CI)** |  | **N** | **% (95% CI)** | **N** | **% (95% CI)** | **%** | **%** |
| **Suffered any illness or symptoms** | | | | | | | | | | |  |
| No | 249 | 51.9  (47.4-56.3) | 299 | 62.0  (57.6-66.3) |  | 239 | 49.8  (45.3-54.3) | 295 | 61.2  (56.8-65.5) | 1.3 | 2.5 |
| Yes | 231 | 48.1  (43.7-52.6) | 183 | 38.0  (33.7-42.4) |  | 241 | 50.2  (45.7-54.7) | 179 | 38.8  (34.4-43.2) |
| **Seek healthcare among those who suffered illness** | | | | | | | | | | |  |
| No | 21 | 9.1  (6.0-13.6) | 20 | 10.9  (7.1-16.4) |  | 19 | 7.9  (5.1-12.0) | 8 | 4.3  (2.1-8.3) | 5.4 | 7.4\* |
| Yes | 210 | 90.9  (86.4-94.0) | 163 | 89.1  (83.6-92.9) |  | 222 | 92.1  (88.0-94.9) | 179 | 95.7  (91.7-97.9) |
| **Seek healthcare among total sample** | | | | | | | | | | |  |
| No | 270 | 56.3  (51.8 -60.6) | 319 | 66.2  (61.8 -70.3) |  | 258 | 53.8  (49.3 -58.2) | 303 | 62.9  (58.4 -67.1) | -0.8 | -0.2 |
| Yes | 210 | 43.8  (39.4 -48.2) | 163 | 33.8  (29.7 -38.2) |  | 222 | 46.3  (41.8 -50.7) | 179 | 37.1  (32.9 -41.6) |
| **Seek healthcare from MTP among the ill workers** | | | | | | | | | | |  |
| No | 159 | 75.7  (69.4-81.1) | 80 | 49.1  (41.5-56.8) |  | 124 | 55.9  (49.2-62.3) | 99 | 55.3  (47.9-62.5) | 26.1\*\*\* | 18.4\*\* |
| Yes | 51 | 24.3  (18.9-30.6) | 83 | 50.9  (43.2-58.5) |  | 98 | 44.1  (37.7-50.8) | 80 | 44.7  (37.5-52.1) |
| **Self-reported illness/symptoms** | | | | | | | | | | |  |
| Communicable  diseases | 68 | 29.4  (23.9-35.7) | 53 | 29.0  (22.8-36.0) |  | 77 | 32.0  (26.4-38.1) | 52 | 27.8  (21.8-34.7) |  |  |
| Non-communicable  diseases | 14 | 6.1  (3.6-10.0) | 4 | 2.2  (0.8-5.7) |  | 13 | 5.4  (3.2-9.1) | 2 | 1.1  (0.3-4.2) |  |  |
| Accident and Injuries | 2 | 0.9  (0.2-3.4) | 2 | 1.1  (0.3-4.3) |  | 2 | 0.8  (0.2-3.3) | 2 | 1.1  (0.3-4.2) |  |  |
| Female reproductive  health problem and  delivery care | 1 | 0.4  (0.1-3.0) | 2 | 1.1  (0.3-4.3) |  | 3 | 1.2  (0.4-3.8) | 10 | 5.3  (2.9-9.7) |  |  |
| Symptoms of illness | 130 | 56.3  (49.8-62.6) | 100 | 54.6  (47.4-61.7) |  | 131 | 54.4  (48.0-60.6) | 103 | 55.1  (47.9-62.1) |  |  |
| Others | 16 | 6.9  (4.3-11.0) | 22 | 12.0  (8.0-17.6) |  | 15 | 6.2  (3.8-10.1) | 18 | 9.6  (6.1-14.8) |  |  |
| **Healthcare provider utilized** | | | | | | | | | | |  |
| Public | 4 | 1.9  (0.7-5.0) | 5 | 3.1  (1.3-7.2) |  | 4 | 1.8  (0.7-4.7) | 9 | 5.0  (2.6-9.4) |  |  |
| Private | 198 | 94.3  (90.2-96.7) | 155 | 95.1  (90.5-97.5) |  | 209 | 94.1  (90.2-96.6) | 162 | 90.5  (85.2-94.0) |  |  |
| Others (e. g. traditional) | 8 | 3.8  (1.9-7.5) | 3 | 1.8  (0.6-5.6) |  | 9 | 4.1  (2.1-7.6) | 8 | 4.5  (2.2-8.7) |  |  |
| **Inpatient care utilized** | | | | | | | | | | |  |
| No | 201 | 95.7  (92.0-97.8) | 153 | 93.9  (88.9-96.7) |  | 217 | 97.7  (94.7-99.1) | 175 | 97.8  (94.2-99.2) | 1.9 | -0.1 |
| Yes | 9 | 4.3  (2.2-8.0) | 10 | 6.1  (3.3-11.1) |  | 5 | 2.3  (0.9-5.3) | 4 | 2.2  (0.8-5.8) |

*a)DiD= Difference in difference; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01*

Table 3. OOP payments (BDT) for healthcare among insured and uninsured RMG workers during pre- and post-intervention period

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Items** | **Pre-intervention** | | | |  | **Post-intervention** | | | | **DiDb)** |
| **Insured (IG)** | | **Uninsured (UG)** | |  | **Insured (IG)** | | **Uninsured (UG)** | |
| **N** | **Mean (BDT)**  **(95% CI)** | **N** | **Mean (BDT)**  **(95% CI)** |  | **N** | **Mean (BDT)**  **(95% CI)** | **N** | **Mean (BDT)**  **(95% CI)** | **Mean (BDT)**  **(P-value)** |
| Consultation fee | 48 | 292.2  (239.9-344.5) | 38 | 227.5  (179.8-275.2) |  | 41 | 528.8  (154.4-903.1) | 30 | 448  (237.1-658.9) |  |
| Medicine cost | 204 | 634.5  (334.4-934.6) | 129 | 523.3  (383.1-663.5) |  | 156 | 555.8  (401.8-709.9) | 155 | 971.6  (445.6-1497.7) |  |
| Accommodation cost | 3 | 2,033.3  (-1,281.2-5,347.8) | 0 | 0 |  | 4 | 1,950.0  (-216.8-4116.8) | 5 | 4,460.0  (-2442.3-11362.3) |  |
| Diagnostic cost | 13 | 2,111.5  (505.5-3,717.5) | 17 | 515.3  (346.4-684.2) |  | 15 | 2,216.7  (711.3-3,722.0) | 22 | 2,261.4  (903.7-3,619.0) |  |
| Transport cost | 46 | 199.7  (-20.5-419.9) | 36 | 220.0  (84.1-355.9) |  | 38 | 291.11  (80.06-502.2) | 52 | 215.7  (95.2-336.2) |  |
| Other cost | 5 | 266.0  (24.9-507.1) | 4 | 3,725.0  (-3292.3-1,0742.3) |  | 11 | 339.5  (86.2-592.9) | 19 | 678.9  (-432.9-1,790.7) |  |
| Total OOP payments for care seeking from all providers | 204 | 1,197.7  (483.5-1,911.9) | 131 | 817.8  (531.2-1,104.4) |  | 165 | 951.3  (567.5-1,335.1) | 158 | 1,681.1  (611.0-2,751.2) | -1,100.0 (0.132) |
| Total OOP payments for care seeking from MTP *a)* | 47 | 3,567.7  (633.9-6,501.5) | 51 | 1,329.4  (928.9-1,729.9) |  | 42 | 2,268.7  (896.1-3,641.3) | 59 | 3,689.7  (880.7-6,498.7) | -3,700  (0.114) |

*a)MTP= medically trained provider  
b)DiD= Difference in difference; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01*

Table 4. Two-part regression analysis of OOP healthcare expenditure (natural logged) for seeking care from all types of providers and from MTPs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Description** | **Model 1: Seek care from all provider** | | | **Model 2: Seek care from MTP** | |
| **1st stage**  **(Participation logit equation)** |  | **2nd stage (Expenditure log regression)** | **1st stage (Participation logit equation)** | **2nd stage (Expenditure log regression)** |
| **Odds ratio**  **(95% CI)** |  | **Coefficient**  **(95% CI)** | **Odds ratio (95% CI)** | **Coefficient (95% CI)** |
| Health insurance status | Insured (Ref= Matched Uninsured) | 1.276\*\*\* (1.131,1.439) |  | -0.122  (-0.354,0.109) | 0.889 (0.757,1.044) | -0.143  (-.556,0.270) |
| Time-dummy | Post-intervention (Ref= pre-intervention) | 1.049  (0.919,1.197) |  | 0.0173  (-0.238,0.273) | 0.942 (0.792,1.121) | 0.189  (-0.258,0.636) |
| Sex | Male (Ref= Female) | 0.770\*\*\*  (0.67,0.884) |  | -0.294\*\*  (-0.569,-0.0192) | 0.687\*\*\* (0.57,0.826) | -0.262  (-0.771,0.247) |
| Age | 20-30 years (Ref= < 20 years) | 1.249\*\*  (1.049,1.486) |  | 0.146  (-0.186,0.477) | 1.234\* (0.969,1.571) | 0.305  (-0.349,0.960) |
| 30-40 years (Ref= < 20 years) | 1.083  (0.865,1.355) |  | 0.332  (-0.0971,0.761) | 1.226 (0.909,1.654) | -0.0261  (-0.811,0.759) |
| 40+ years (Ref= < 20 years) | 1.157  (0.863,1.55) |  | 0.164  (-0.399,0.727) | 1.108 (0.74,1.659) | 0.334  (-0.775,1.443) |
| Marital status | Married (Ref= Unmarried) | 1.068  (0.908,1.255) |  | 0.168  (-0.147,0.484) | 1.225\* (0.974,1.54) | -0.223  (-0.861,0.415) |
| Others (Ref= Unmarried) | 1.251  (0.855,1.833) |  | -0.113  (-0.790,0.564) | 1.415 (0.879,2.275) | -0.953  (-2.135,0.229) |
| Education | Secondary (Ref= Primary) | 1.206\*\*  (1.037,1.401) |  | 0.0323  (-0.258,0.322) | 1.106 (0.905,1.354) | -0.0412  (-0.566,0.483) |
| Higher secondary and above (Ref= Primary) | 1.020  (0.737,1.411) |  | -0.197  (-0.871,0.477) | 1.066 (0.699,1.626) | 0.0805  (-1.036,1.197) |
| Job position | Supervisor/Admin level worker (Ref= Other worker) | 1.038  (0.862,1.251) |  | -0.302\* (-0.656,0.0528) | 1.086 (0.852,1.384) | -0.160  (-0.783,0.463) |
| Income | logged income per month | 0.78\*\*\*  (0.649,0.939) |  | 0.246  (-0.111,0.603) | 1.225 (0.959,1.565) | -0.0365  (-0.742,0.669) |
| Chronic illness | Suffered chronic illness (Ref= Other illness) | 5.244\*\*\* (2.784,9.875) |  | 0.699\*\* (0.127,1.272) | 2.886\*\*\* (1.804,4.618) | 0.540  (-0.306,1.386) |
| Inpatient care | Sought inpatient care  (Ref=Outpatient care) | - |  | 1.717\*\*\* (1.160,2.274) | - | 2.071\*\*\*  (1.335,2.807) |
| Healthcare provider | Private (Ref=Public) | - |  | -1.013\*\*\*  (-1.635,-0.390) | - | - |
| Others (Ref=Public) | - |  | -0.344  (-1.172,0.484) | - | - |
| Constant |  | 4.816\*  (0.952,24.337) |  | 4.360\*\*\* (1.155,7.566) | 0.039\*\*\* (0.004,0.334) | 7.094\*\* (0.880,13.31) |
| N |  | 1924 |  | 658 | 1924 | 199 |
| **Pseudo R-square/ Adjusted R-square** | | 0.070 |  | 0.099 | 0.07 | 0.119 |

*Note: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01*