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Do employer-sponsored health insurance schemes affect the utilisation of medically trained providers and out-of-pocket payments among ready-made garment workers? A case–control study in Bangladesh

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ABSTRACT

Objective We estimated the effect of an employer-sponsored health insurance (ESHI) scheme on healthcare utilisation of medically trained providers and reduction of out-of-pocket (OOP) expenditure among ready-made garment (RMG) workers.

Design We used a case–control study design with cross-sectional preintervention and postintervention surveys.

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

Participants In total, 1924 RMG workers (480 from the insured and 482 from the uninsured, in each period) were surveyed from insured and uninsured RMG factories, respectively, in the preintervention (October 2013) and postintervention (April 2015) period.

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

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

Results The ESHI scheme increased healthcare utilisation of medically trained providers by 26.1% (DiD=26.1; p<0.01) among insured workers compared with uninsured workers. While accounting for covariates, the effect on utilisation significantly reduced to 18.4% (p<0.05). The DiD estimate showed that OOP expenditure among insured workers decreased by −3700 Bangladeshi taka and -1100 Bangladeshi taka compared with uninsured workers when using healthcare services from medically trained providers or all provider respectively, although not significant. The multiple two-part models also reported similar results.

Conclusion The ESHI scheme significantly increased utilisation of medically trained providers among RMG

Strengths and limitations of this study

► The difference-in-difference estimate was used to evaluate the effect of employer-sponsored health insurance (ESHI) scheme on healthcare utilisation of medically trained healthcare providers and out-of-pocket (OOP) payments.

► A two-part model was employed to measure the association between OOP payments and ESHI scheme enrolment while controlling for the socioeconomic characteristics of workers.

► The self-reported information on healthcare utilisation and OOP payments might be influenced by recall bias.

workers. However, it has no significant effect on OOP expenditure. It can be recommended that an educational intervention be provided to RMG workers to improve their healthcare-seeking behaviours and increase their utilisation of ESHI-designated healthcare providers while keeping OOP payments low.

BACKGROUND

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

In order to achieve the Universal Health Coverage (UHC), the WHO urged its 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 Health Care Financing Strategy 2012-2032 for the country in 2012.[11] This strategy proposed three different prepayment mechanisms to secure healthcare for all populations 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 (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. It also includes the strengthening of financing and provision of public health services.[11]

The ready-made garment (RMG) sector, with 4.2 million workers, has emerged as one of the largest employer pools and foreign currency earners of Bangladesh. This sector has a large contribution to the economy of over US$34.13 billion export (more than 84% of all exports) per financial year.[12] In spite of their large contribution to the economy, the workers are not receiving enough social protection, especially investment in health and education for 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 diarrhoea, 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 RMG workers did not receive any treatment for their illness. The majority of RMG workers consult 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 required vaccine, health education or workplace health-related knowledge from the garment factories.[16] There was no provision of healthcare centres, doctors, medicine and treatment for fire burn and chronic illness both for themselves and for their family. More than half (63%) of the respondents reported working day lost due to illness.[16]

To ensure access to quality healthcare and financial risk protection for organised 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 organisation as part of workers' benefits and compensation package. Considering the inadequate accessibility of RMG workers to healthcare, *Bangladesh Diabetic Samiti* (BADAS), a diabetic association in Bangladesh established in 1956, implemented a research-based pilot ESHI scheme (box 1) from March 2014 to February

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Box 1 Employer-sponsored health insurance (ESHI) scheme

Description of the ESHI scheme.
Target population: workers of the garment industry.
Implementation organisation (third-party payment mechanism):
1. Diabetic Association of Bangladesh (health service provider).
2. United Insurance Company (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 (US$192.8*) per year.
Premium: 487 BDT (US$6.3) per year, which is borne by the employer.
Number of enrollees: 8000 RMG workers from seven garment factories.

*US$1 = 77.8 Bangladeshi taka (BDT).[53]
ESHI, employer-sponsored health insurance; RMG, ready-made garment.

2015. United Insurance Company (UIC), Telemedicine Reference Center Ltd (TRCL) and the New Asia Group (RMG factories) collaborated in the pilot study.

It should be noted that some diseases and health conditions were excluded mostly due to the high and unaffordable costs of 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 for treatment of the injury/illness which caused the hospitalisation, any dental treatment unless it requires hospitalisation for reconstructive surgery as a consequence of an accident, and special procedures (transplant, cardiac surgery, neurosurgery, phaco surgery, dialysis, HIV/AIDS and so on).

The ESHI scheme offered mandatory health insurance for workers of six garment factories of the New Asia Group (Knit-Asia, Ashulia; Knit-Asia, Shafipur; Knit-Asia, Nichintapur; Malek Spinning Mills; Salek Textile; and Rahim Textile Mills) located at Shafipur in Gazipur, Bangladesh. A total of 8000 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 generalisability of the study findings should not be remarkably affected by selection of these factories only from the 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 organisation having 80 healthcare centres and educational facilities spread all over the country.[19] For the pilot phase one newly built hospital of BADAS was contracted by the insurance company. The pilot scheme provided coverage for treatment with a cost of up to 15 000 Bangladeshi taka (BDT) or US$192.8 annually. The premium for enrolment in the scheme was 487

BDT (US$6.3) 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 through an actuarial analysis conducted by a hired firm. The benefit package was developed through expert consultation on the healthcare needs of RMG workers.

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

METHODS
We used a case–control study design with cross-sectional preintervention and postintervention surveys to assess healthcare utilisation of MTPs. Study participants were RMG workers from the insured group (IG) and uninsured group (UG). IG comprised workers from the six purposively selected RMG factories that offered ESHI. UG comprised workers from one purposively selected RMG factory without any ESHI scheme, namely JM Fabrics. All 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 et al[20] and Ury and Fleiss[21] for comparing two independent proportions. A study on micro-health insurance showed that the healthcare utilisation of insured and uninsured individuals was 7.6% and 6.2%, respectively.[22] Using these healthcare utilisation 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 garment workers. Therefore, the sample size was increased to 484 for each group to maintain the desired statistical power. Finally, 962 RMG workers (480 from IG and 482 from UG) were included in both the preintervention and postintervention period. Workers who had been working in the selected RMG factories for 6 months prior to the surveys were considered 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 non-response rate. A structured questionnaire was developed, and necessary modifications and corrections were made through field test before finalising. Data from individual workers were collected through face-to-face interviews. The interviews took place in a separate room close to the working place of the workers to ensure confidentiality. To avoid any bias in response by 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 preintervention data collection was performed from October 2013 to March 2014, and the postintervention data collection was from March to April 2015. The preintervention survey took a long time due to an interruption caused by a 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 RMG workers were collected. The type of healthcare providers used and the associated OOP healthcare expenditure information, for example, consultation, hospital bed, medicine, diagnosis, and transportation, were collected.

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

Data analysis
We estimated the proportion of healthcare utilisation and average of OOP healthcare expenditure, along with their corresponding 95% confidence interval (CI), of RMG workers in IG and UG. Effects of the ESHI scheme on healthcare utilisation of MTPs and the reduction of OOP payments were estimated using difference-in-difference (DiD) estimates and a two-part regression model. Data

cleaning, validation and all statistical analyses were performed using STATA V.13.0 software.[24]

Difference-in-difference

The DiD method was employed to estimate the observed changes in the outcome variables for ESHI scheme enrollees. The outcomes of the scheme were reflected on differences and changes over time (preimplementation and postimplementation) and between the study groups (IG and UG) in terms of illness or symptoms, inpatient care, utilisation of 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 statistics were estimated using a regression model,[26] where two dummy variables, S_i (1=IG, 0=UG) and T_i (1=postintervention and 0=preintervention), were created and entered into a regression model with the outcome variable (Y_i). The regression model was specified as follows:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 S_i + \beta_3 (T \times S)_{it} + \epsilon_i \qquad (1)$$

The estimated regression coefficient β_3 in equation 1 represents the DiD statistics of the outcome variable.

While accounting for covariates for utilisation of healthcare, a separate model was used considering a number of control variables (eg, age, sex, education, marital status, income, 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:

$$Y_i = \beta_0 + \beta_1 T_1 + \beta_2 S_i + \beta_3 (T \times S)_{it} + \\ \beta_4 \varkappa_{1it} + \beta_5 \varkappa_{2it} + \ldots + \epsilon_i \qquad (2)$$

where β_0 was the constant, T was the study period, S was the study group, X_{1it}, X_{2it},… were the control variables (eg, age, sex, marital status, education, occupation, and income), and β_4, β_5 were the associated coefficients. β_3 was the DiD estimate while accounting for covariates.

Two-part model

Since it was observed in the data that many individuals did not utilise 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 to estimate 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 individuals' 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 assessment of the relationship between the participation decision and the magnitude of OOP healthcare expenditure while controlling for covariates (eg, 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 analysed the natural logarithm of OOP payments as a function of the covariates. The two-part regression model was specified as follows[32]:

$$y_i^* = \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \ldots + \varepsilon_i; \qquad \varepsilon_i \sim IN\left(0, \sigma^2\right) \ldots (3)$$

Observed OOP payments are assumed to be related to a latent value as below:

$$y_i = \begin{cases} y_i, & if\, y_i > 0 \\ 0, & otherwise \end{cases} \qquad (4)$$

where Y_i denotes the OOP healthcare expenditure and X_{1i} represents the participation in ESHI scheme and X_{2i}, X_{3i},… other control variables (eg, sex, age, marital status, education level, job position, income, chronic illness, inpatient care, healthcare provider type). Two models were applied for OOP healthcare expenditures. In the first model (model 1) the dependent variable was OOP expenditure for using healthcare from any provider, and in another model (model 2) the dependent variable was the OOP expenditure for using 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. Preintervention and postintervention periods were included in the model as dummy variable, that is, time dummy (1=postintervention and 0=preintervention) 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 regression model. Those who used only outpatient or emergency care were classified as 'outpatient users'.

Patient and public involvement

Patients and the public were not involved in the design or planning of the study. Study findings will be shared with stakeholders, including owners association of the RMG factories, in meetings/seminars and in 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 20–30 years old. The participants in IG and UG were mostly at the worker-level job position.

Table 1 Sample characteristics

Characteristics	Preintervention		Postintervention	
	Insured group	Uninsured group	Insured group	Uninsured group
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Age group (years)				
<20	23.1 (19.3 to 26.9)	21.8 (18.1 to 25.5)	11.3 (8.4 to 14.1)	18.8 (15.3 to 22.3)
20–30	49.2 (44.7 to 53.6)	62.2 (57.9 to 66.6)	54.1 (49.6 to 58.5)	58.0 (53.6 to 62.5)
30–40	18.5 (15.1 to 22.0)	12.0 (9.1 to 14.9)	26.5 (22.6 to 0.5)	18.2 (14.7 to 1.6)
40+	9.2 (6.6 to 11.8)	3.9 (2.2 to 5.7)	8.1 (5.7 to 10.6)	5.0 (3.1 to 7.0)
Sex				
Male	40.6 (36.2 to 45.0)	52.5 (48.0 to 57.0)	31.3 (27.2 to 35.5)	47.8 (43.3 to 52.3)
Female	59.4 (55.0 to 63.8)	47.5 (43.0 to 52.0)	68.7 (64.5 to 72.8)	52.2 (47.7 to 56.7)
Marital status				
Married	69.0 (64.8 to 73.1)	73.2 (69.3 to 77.2)	78.5 (74.8 to 82.2)	75.4 (71.5 to 79.2)
Unmarried	27.1 (23.1 to 31.1)	24.5 (20.6 to 28.3)	18.4 (14.9 to 21.8)	22.8 (19.0 to 26.5)
Others (widowed, divorced and separated)	4.0 (2.2 to 5.7)	2.3 (0.9 to 3.6)	3.1 (1.6 to 4.7)	1.9 (0.7 to 3.1)
Job position				
Worker	87.7 (84.8 to 90.6)	85.1 (81.9 to 88.2)	78.7 (75.0 to 82.4)	83.1 (79.7 to 86.5)
Supervisor/admin-level worker	12.3 (9.4 to 15.2)	14.9 (11.8 to 18.1)	21.3 (17.6 to 25.0)	16.9 (13.5 to 20.3)
Household size				
3 persons or fewer	69.8 (65.7 to 73.9)	75.5 (71.7 to 79.4)	70.6 (66.5 to 74.6)	76.0 (72.2 to 79.8)
4–5 persons	25.4 (21.5 to 29.3)	22.2 (18.5 to 25.9)	22.3 (18.6 to 26.1)	20.0 (16.5 to 23.6)
6 persons or more	4.8 (2.9 to 6.7)	2.3 (0.9 to 3.6)	7.1 (4.8 to 9.4)	4.0 (2.2 to 5.7)
Level of education				
Primary level (years 1–5)	67.5 (63.3 to 71.7)	62.9 (58.5 to 67.2)	59.7 (55.3 to 64.1)	62.4 (58.1 to 66.8)
Secondary level (years 9–10)	28.3 (24.3 to 32.4)	33.6 (29.4 to 37.8)	34.9 (30.6 to 39.1)	33.6 (29.4 to 37.8)
Higher secondary level and above (years 11+)	4.2 (2.4 to 6.0)	3.5 (1.9 to 5.2)	5.4 (3.4 to 7.5)	4.0 (2.2 to 5.7)
Mean income per month (Bangladeshi taka)	7945 (7606 to 8284)	9140 (8737 to 9542)	12 945 (12 310 to 13 580)	11 298 (10 884 to 11 711)

The largest number of RMG workers had less than three household members. The workers mostly had primary level education. The average monthly income of UG workers (9140.0 BDT; US$176) was higher than IG workers (7945.0 BDT; US$102) in the preintervention period. However, in the postintervention period, there was no significant difference in monthly income between IG and UG.

Effect on healthcare utilisation

The effect of ESHI scheme on the utilisation of healthcare is presented in table 2. We found self-reported illness among the IG workers increased by 2.1% and among UG workers 0.8%. The DiD estimate showed that healthcare utilisation of MTPs (DiD=26.10.6; 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 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, utilisation of healthcare from private providers was the highest in both IG and UG workers.

Effect on OOP healthcare payment

Table 3 summarises the OOP payments for healthcare of RMG workers in IG and UG. The descriptive statistics showed that at preintervention IG and UG spent 1197.7 BDT or US$15.4 (CI 483.5 BDT to 1911.9 BDT) and 817.8 BDT or US$10.5 (CI 531.2 BDT to 1104.4 BDT) for healthcare, respectively. It reduced to 951.3 BDT or US$12.2 (CI 567.5 BDT to 1335.1 BDT) among the IG workers and increased to 1681.1 BDT or US$21.6 (CI 611.0 BDT to 2751.2 BDT) among 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 spendings on healthcare utilisation of MTPs.

The results from the two-part regression model are presented in table 4. These models (models 4 and 5)

Table 2 Utilisation of healthcare among insured and uninsured ready-made garment workers during baseline and endline survey

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

Continued

Table 2 Continued

Characteristics	Preintervention Insured group		Preintervention Uninsured group		Postintervention Insured group		Postintervention Uninsured group		DiD	DiD accounting for covariates
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	%	%
No	201	95.7 (92.0 to 97.8)	153	93.9 (88.9 to 96.7)	217	97.7 (94.7 to 99.1)	175	97.8 (94.2 to 99.2)	1.9	−0.1
Yes	9	4.3 (2.2 to 8.0)	10	6.1 (3.3 to 11.1)	5	2.3 (0.9 to 5.3)	4	2.2 (0.8 to 5.8)		

*P<0.1, **P<0.05, ***P<0.01.
DiD, difference-in-difference; MTP, medically trained provider; RMG, ready-made garment.

showed that the ESHI scheme has no effect on reduction of OOP healthcare expenditure for those seeking care from all types of providers or from MTPs. However, OOP expenditure for seeking healthcare from all types of providers was positively associated with inpatient care and chronic illness. For such care, female workers were spending less as OOP for healthcare compared with male workers. The supervisor/administrative staff spent less on healthcare than other workers. OOP expenditure due to utilisation of MTP was positively associated with inpatient care only.

DISCUSSION

This study, based on representative surveys of preintervention and postintervention periods among RMG workers, is the first to consider the effect of the ESHI scheme on the utilisation of MTP in Bangladesh and on OOP expenditure. We found healthcare utilisation of MTPs significantly increased among the insured compared with the uninsured workers (DiD=26.1; p<0.01). While accounting for the effects of covariates (eg, age, sex, education, marital status, household income, 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 RMG workers when they enrolled in the ESHI scheme. Generally, the RMG workers have limited access to quality healthcare services. Therefore, increasing utilisation 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 RMG workers used healthcare providers or facilities (eg, drug sellers, traditional healers and private healthcare providers) which were not covered by the ESHI scheme. This might be due to their continued healthcare utilisation behaviour prior to enrolment in the insurance scheme. It has been observed in other studies that insured workers used healthcare from service providers those are not designated under their insurance schemes.[33] Behaviour change communication intervention or educational intervention can be conducted among ESHI scheme members to inform them about the benefits of the scheme and the importance of using MTP.[33] A standard treatment protocol was employed for the ESHI scheme to minimise supplier-induced healthcare utilisation. Further, the chances of overutilisation of healthcare services by RMG workers or moral hazard was limited since generally these workers significantly underuse healthcare services, as evidenced by 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 catastrophic burden for many households. Approximately 4.2 million people are workers of the RMG industry in Bangladesh, however, the industry lacks adequate healthcare facilities for them.[15] Health insurance for this specific group of

Table 3 Out-of-pocket payments (BDT) for healthcare among insured and uninsured ready-made garment workers during the preintervention and postintervention period

| Items | Preintervention | | | | Postintervention | | | | DiD |
| | Insured group | | Uninsured group | | Insured group | | Uninsured group | | |
	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 to 344.5)	38	227.5 (179.8 to 275.2)	41	528.8 (154.4 to 903.1)	30	448 (237.1 to 658.9)	
Medicine cost	204	634.5 (334.4 to 934.6)	129	523.3 (383.1 to 663.5)	156	555.8 (401.8 to 709.9)	155	971.6 (445.6 to 1497.7)	
Accommodation cost	3	2033.3 (−1281.2 to 5347.8)	0	0	4	1950.0 (−216.8 to 4116.8)	5	4460.0 (−2442.3 to 11 362.3)	
Diagnostic cost	13	2111.5 (505.5 to 3717.5)	17	515.3 (346.4 to 684.2)	15	2216.7 (711.3 to 3722.0)	22	2261.4 (903.7 to 3619.0)	
Transport cost	46	199.7 (−20.5 to 419.9)	36	220.0 (84.1 to 355.9)	38	291.11 (80.06 to 502.2)	52	215.7 (95.2 to 336.2)	
Other cost	5	266.0 (24.9 to 507.1)	4	3725.0 (−3292.3 to 10 742.3)	11	339.5 (86.2 to 592.9)	19	678.9 (−432.9 to 1790.7)	
Total OOP payments for care-seeking from all providers	204	1197.7 (483.5 to 1911.9)	131	817.8 (531.2 to 1104.4)	165	951.3 (567.5 to 1335.1)	158	1681.1 (611.0 to 2751.2)	−1100.0 (0.132)
Total OOP payments for care-seeking from MTP	47	3567.7 (633.9 to 6501.5)	51	1329.4 (928.9 to 1729.9)	42	2268.7 (896.1 to 3641.3)	59	3689.7 (880.7 to 6498.7)	−3700 (0.114)

BDT, Bangladeshi taka; DiD, difference-in-difference; MTP, medically trained provider; OOP, out-of-pocket; RMG, ready-made garment.

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

Characteristics	Description	Model 1: seek care from all providers		Model 2: seek care from MTPs	
		First stage (participation logit equation)	Second stage (expenditure log regression)	First stage (participation logit equation)	Second stage (expenditure log regression)
		OR (95% CI)	Coefficient (95% CI)	OR (95% CI)	Coefficient (95% CI)
Health insurance status	Insured (ref=matched uninsured)	1.276*** (1.131 to 1.439)	−0.122 (−0.354 to 0.109)	0.889 (0.757 to 1.044)	−0.143 (−0.556 to 0.270)
Time dummy	Postintervention (ref=preintervention)	1.049 (0.919 to 1.197)	0.0173 (−0.238 to 0.273)	0.942 (0.792 to 1.121)	0.189 (−0.258 to 0.636)
Sex	Male (ref=female)	0.770*** (0.67 to 0.884)	−0.294** (−0.569 to 0.0192)	0.687*** (0.57 to 0.826)	−0.262 (−0.771 to 0.247)
Age (years)	20–30 (ref=<20)	1.249** (1.049 to 1.486)	0.146 (−0.186 to 0.477)	1.234* (0.969 to 1.571)	0.305 (−0.349 to 0.960)
	30–40 (ref=<20)	1.083 (0.865 to 1.355)	0.332 (−0.0971 to 0.761)	1.226 (0.909 to 1.654)	−0.0261 (−0.811 to 0.759)
	40+ (ref=<20)	1.157 (0.863 to 1.55)	0.164 (−0.399 to 0.727)	1.108 (0.74 to 1.659)	0.334 (−0.775 to 1.443)
Marital status	Married (ref=unmarried)	1.068 (0.908 to 1.255)	0.168 (−0.147 to 0.484)	1.225* (0.974 to 1.54)	−0.223 (−0.861 to 0.415)
	Others (ref=unmarried)	1.251 (0.855 to 1.833)	−0.113 (−0.790 to 0.564)	1.415 (0.879 to 2.275)	−0.953 (−2.135 to 0.229)
Education	Secondary (ref=primary)	1.206** (1.037 to 1.401)	0.0323 (−0.258 to 0.322)	1.106 (0.905 to 1.354)	−0.0412 (−0.566 to 0.483)
	Higher secondary and above (ref=primary)	1.020 (0.737 to 1.411)	−0.197 (−0.871 to 0.477)	1.066 (0.699 to 1.626)	0.0805 (−1.036 to 1.197)
Job position	Supervisor/admin-level worker (ref=other worker)	1.038 (0.862 to 1.251)	−0.302* (−0.656 to 0.0528)	1.086 (0.852 to 1.384)	−0.160 (−0.783 to 0.463)
Income	Logged income per month	0.78*** (0.649 to 0.939)	0.246 (−0.111 to 0.603)	1.225 (0.959 to 1.565)	−0.0365 (−0.742 to 0.669)
Chronic illness	Suffered chronic illness (ref=other illness)	5.244*** (2.784 to 9.875)	0.699** (0.127 to 1.272)	2.886*** (1.804 to 4.618)	0.540 (−0.306 to 1.386)
Inpatient care	Sought inpatient care (ref=outpatient care)	–	1.717*** (1.160 to 2.274)	–	2.071*** (1.335 to 2.807)
Healthcare provider	Private (ref=public)	–	−1.013*** (−1.635 to 0.390)	–	–
	Others (ref=public)	–	−0.344 (−1.172 to 0.484)	–	–
Constant		4.816* (0.952 to 24.337)	4.360*** (1.155 to 7.566)	0.039*** (0.004 to 0.334)	7.094** (0.880 to 13.31)
n		1924	658	1924	199
Pseudo-R-squared/adjusted R-squared		0.070	0.099	0.07	0.119

*P<0.1, **P<0.05, ***P<0.01.
MTPs, medically trained providers; OOP, out-of-pocket; ref, reference.

RMG workers can increase healthcare accessibility and utilisation 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 utilisation and financial outcomes among members.[22 36–40] Four studies have found higher utilisation 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[44] found that micro-health insurance improves the health status of insured members, which increases productivity and labour supply. Such positive

effects of the studied ESHI scheme on utilisation may also increase the production of RMG sectors. However, the International Labour Organization found that only 14 out of 24 studies that examined the healthcare utilisation effects of health insurance observed positive outcomes.[40] Jakab and Krishnan,[45] 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; 2 studies found no difference while 1 study found a slight decrease in healthcare use. Another study conducted by Raza et al[46] on community-based health insurance in India reported that the health insurance scheme had no

significant effect on any utilisation outcome and there was no significant evidence of reducing financial hardship.

The statistically non-significant effect of the ESHI scheme on reducing OOP healthcare expenditure could be explained by the healthcare-seeking behaviour of the insured workers. We observed that a proportion of the insured workers continued to use health services from formal and informal providers (drug store, traditional healers and so on) out of the scheme at their own payments, despite their access to providers designated by the insurance scheme at no cost. Consequently, OOP payments of the insured workers remained high. Such healthcare-seeking behaviour of workers during their first and 1 year of enrolment might have influenced our findings considerably. Our study did not analyse the health outcomes of the enrollees in this study and was limited within the investigation of healthcare utilisation and OOP payment. It, therefore, might be useful to note here that the utilisation of informal care providers by insured workers might have contributed to their health outcome. The impact of health insurance on health outcomes should be studied to better estimate and understand the value for money of such interventions. We, however, believe that an educational intervention on health-seeking behaviour and financial literacy of workers and their enrolment in the scheme for a longer period might be useful in changing their behaviour towards utilisation of healthcare providers designated by the insurance scheme. We found the average OOP payments of RMG workers were 1329.4 BDT and 3567.7 BDT in UG and IG, respectively in preintervention period. Khan *et al*[47] estimated that the OOP payment of Bangladeshis was 644.6 BDT for 30 days (or 1933.8 BDT for 3 months) using nationwide household income expenditure survey of 2010. Although this estimate was not directly comparable with our estimate due to the difference in study population, the average OOP spending we estimated for a 3-month period was more or less similar.

The limited maximum coverage, that is, 15 000 BDT per year per worker, by the insurance scheme might not be adequate to cover the OOP healthcare expenditure of the scheme enrollees. However, this low maximum coverage per member per year was kept to secure the scheme's financial sustainability, especially during the pilot phase where prior knowledge about the expenditure of health insurance schemes 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 (eg, multiple inpatient care utilisation) based on the experience of this pilot phase. Another limitation of the ESHI scheme was that the scheme contracted a few healthcare facilities that may affect the healthcare-seeking behaviour of the insured RMG workers. We found a number of RMG workers were using healthcare services from drug sellers and traditional providers while they are covered by the scheme, and 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 use 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 the willingness of the RMG factory owners will be fundamental to the large-scale implementation of ESHI schemes and their sustainability. However, before the scale-up of the scheme, financial sustainability should be tested, and this was beyond the scope of the current study.

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

CONCLUSIONS

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

This kind of scheme can generate new resources for providing healthcare to low-income RMG workers in

LMICs through employer contribution. The healthcare financing strategy of the government of Bangladesh as well as the WHO should prioritise such schemes for workers.[11 52] This study contributes to the concept of initiating such schemes at a broader scale and informing policymakers on the key issues to consider while designing such schemes in the future.

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REFERENCES
1. MoHFW. *Bangladesh National Health Accounts 1997 - 2015*. Dhaka, 2018.
2. van Doorslaer E, O'Donnell O, Rannan-Eliya RP, *et al*. Catastrophic payments for health care in Asia. *Health 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. *The 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.
5. BBS. *Household income and expenditure survey 2010*. Dhaka, 2011.
6. Ashraf A, Chowdhury S, Streefland P. Health, disease and healthcare 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.
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
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.
10. WHO. *Sustainable health financing, universal coverage and social health insurance*. Geneva: World Health Organisation, 2005.
11. MoHFW. *Expanding social protection for health: s universal coverage*. Dhaka, 2012.
12. BGMEA. *Bangladesh garment manufacturers and exporters association*. Dhaka, 2016.
13. Akhter S, Salahuddin AFM, Iqbal M, *et al*. 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.
15. Rahman MA, Rahman MM, Sickness RM. Sickness and treatment: a situation analysis among the garments workers. *Anwer Khan Mod Med Coll J* 2013;4:10–14.
16. Begum H, Fahmida H. Supply-Side effect of health care facilities on productivity amongst the female workers in the Readymade garment sector 2009.
17. Gould E. Employer-Sponsored health insurance coverage continues to decline in a new decade. *Int J Health Serv* 2013;43:603–38.
18. Kutzin J. Health Insurance for the Formal Sector in Africa: Yes, But…. In: Beattie A, Doherty J, Gilson L, eds. *Sustainable health care financing in southern Africa: world bank Institute resources*. Washington, DC, 1998: 61–73.
19. Uddin KN. Contribution of Bangladesh diabetic Samity (BADAS) to health care management. *Birdem Med J* 2012;2:1–2.
20. Casagrande JT, 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* 2005;73:263–71.
23. Khatun F. *Economic implications of political instability. Dly. Starlystar*, 2014.
24. Stata statistical software: release 13 2013.
25. Gertler PJ, Martinez S, Premand P, *et al*. Impact evaluation in practice 2011.
26. Meyer BBD, Viscusi W, Durbin DLBruce D, Meyer W, Viscusi K, *et al*, eds. *Workers ' Compensation and Injury Duration : Evidence from a Natural Experiment Author (s*. Durbin Source : The American Economic Review, 1995: 322–40.
27. Jones AM. A double-hurdle model of cigarette consumption. *J. Appl. Econ.* 1989;4:23–39.

28   Jones AM, Econometrics H. *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.

30   Rahman MM, Gilmour S, Saito E, *et al*. Health-Related financial catastrophe, inequality and chronic illness in Bangladesh. *PLoS One* 2013;8:e56873.

31   Cragg JG. Some statistical models for limited dependent variables with application to the demand for durable goods. *Econometrica* 1971;39:829–44 http://www.jstor.org/stable/

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.

34   ICPL. *Study on willingness to pay for social health insurance in RMG sector*. Dhaka, 2015.

35   Vargas V, Begum T, Ahmed S. *Fiscal space for health in Bangladesh*. Washington D.C, 2016.

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.

38   Aggarwal A. Impact evaluation of India's 'Yeshasvini' community-based health insurance programme. *Health Econ* 2010;19 Suppl:5–35.

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.

42   Jütting JP. Do community-based health insurance schemes improve poor people's access to health care? Evidence from rural Senegal. *World Dev* 2004;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.

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.

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.

48   Khan JAM, Ahmed S, Sultana M, *et al*. The effect of a community-based health insurance on the out-of-pocket payments for utilizing medically trained providers in Bangladesh. *Int Health* 2019;16.

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*et al*. Determinants of the use of maternal health services in rural Bangladesh. *Health 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.

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

53   Bangladesh Bank. *Bangladesh bank. annual report 2014-2015*. Dhaka, 2015.