Title Page

Title: The Bangladesh Maternal Health Voucher Scheme: impact on completeness of antenatal care provision

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Abstract

This study aimed to assess completeness of antenatal care coverage following implementation of a voucher scheme for maternal health in Bangladesh. The investigation used interview findings from a survey of 2,400 randomly selected women aged 15-49 with children 0-23 months in four geographical areas where voucher scheme implementation was under way. Of these, 1,944 had attended at least one antenatal clinic visit so were included in this analysis. A 'completeness index' for antenatal visits was constructed as an outcome variable based on recall of 13 elements of care. Bivariate analysis against independent variables of interest was carried-out and developed multivariate linear regression models to examine the influence of voucher scheme participation on completeness of antenatal care adjusting for socio-demographic characteristics. Voucher scheme membership was associated with higher 'completeness index' scores with a mean score of 185.2±101.0 for members and 139.6±93.3 for non-members ($P<0.001$). Scheme membership reduced differentials associated with health facility type and socioeconomic status. Women from the lowest socioeconomic group who were voucher scheme members received substantially more components of antenatal care (mean score: 159.6±82.1) compared to non-members (mean score: 115.7±83.0). This favourable effect of voucher scheme membership on the most vulnerable socioeconomic group remained significant after adjusting for educational status. The Bangladesh voucher scheme model has the potential to maximize gains in maternal and newborn health through enhancing the completeness of service provision. Studies with sufficient power to assess maternal and newborn morbidity and mortality outcomes are required, as is a focus on women's experience of care as well as coverage.

Introduction

Bangladesh has made substantial progress over the past decade in maternal and child health. Estimates for the maternal mortality ratio declined from 574 per 100,000 live births in 1990 to 176 in 2015, close to the MDG target of 143 (Bangladesh Planning Commission, 2013; NIPORT *et al.,* 2012; MMEIAG, 2015). The under-five mortality rate declined from 151 per 1,000 live births in 1990 to 41 per 1,000 live birth in 2013, thereby achieving the MDG-4 target ahead of the stipulated time (NIPORT *et al.*, 2016). Despite this progress, considerable challenges remain in ensuring comprehensive access to services, with barriers such as out-of-pocket expenses delaying care seeking, resulting in risk of complications. Nationally representative surveys indicate inequities in access to service among the different population sub-groups, such as the poor, less educated and those residing far from the health facilities (NIPORT *et al.,* 2016).

A range of interventions has been tested to overcome barriers to service access among marginalized groups. Voucher schemes for health services have been introduced in a number of low-and-middle income countries to increase demand for services among targeted groups and are used to reduce the burden of out-of-pocket expense. These voucher-based systems are a form of "demand side" financing and contrast with the traditional "supply side" approach to financing service delivery. They include a range of interventions that channel government or donor subsidies to service users rather than to service providers (Talukder *et al.*, 2014). These interventions are intended to incentivize certain positive behaviours such as in-facility childbirth or antenatal care, either through direct cash payments, or by subsidizing providers for offering key services to vulnerable clients. Regular antenatal care that allows screening for risk factors, identification of pre-existing medical conditions, and assessment of current health status has been found to have

significant positive impact on health of the mother and their child. However, while many women visit a health facility during their pregnancy, in many countries few do this at the recommended intervals in the World Health Organization (WHO) 'focused' antenatal care model, widely taken up in national health systems as a standard of care and recently extended to eight contacts. Gaps in utilization contribute to a persistent burden of adverse maternal and newborn outcomes and voucher provision has the potential to encourage women to make use of the full range of services available. Beneficiaries of voucher schemes have been shown to be well aware of the advantage of accessing modern medical facilities and therefore tend to seek care from qualified providers rather than from traditional or unqualified practitioners (Menotti & Farrell, 2016). The scope for voucher schemes to increase access to maternal and newborn care is confirmed in a systematic review of programming in low-and- middle income countries. However, the review also noted that poor behaviour of healthcare staff could deter women from using such demand-side schemes or result in negative experiences of care (Murray *et al.*, 2014).

Bangladesh introduced the Maternal Health Voucher Scheme (MHVS) in 2007. The scheme was initiated as a pilot in 21 sub-districts and currently operates in 53 of 556 sub-districts. Targeted so as to serve poor pregnant women, the MHVS covers three antenatal care (ANC) visits, delivery at a health facility, one postnatal check, management of maternal complications including Caesarean delivery where required, free medicines, cash allowances for transportation and a cash incentive to deliver at a health facility. The voucher can be used at both public hospitals and at designated private and non-government facilities. Provider facilities and individual staff also receive a payment for each service delivered to the scheme participants (Ahmed S & Khan MM, 2010; Anwar I *et al.,* 2014). This study aimed to examine the impact of implementation of the maternal

health voucher scheme on the completeness of antenatal care received, against the context of differentials of socioeconomic status and utilization of different facility types.

Materials and methods

Study design and study site

A cross-sectional survey was carried out in two of the low-performing divisions of Bangladesh—Chattogram and Sylhet during January to June 2017, that allowed differences in the content of antenatal care (ANC) received during visits to be assessed between voucher recipients and non-recipients. These areas are considered low-performing in terms of maternal and reproductive health indicators in the country. For instance, compared to national estimates (46 per 1,000 live births) under-five mortality is higher in Sylhet (50 per 1,000 live births) and Chattogram (67 per 1,000 live births) divisions (NIPORT et al., 2016). About twenty-three per cent (22.6%) of births in Sylhet division and 35.2% births in Chattogram division took place at a health facility which is lower than the national estimates (37.4%) (NIPORT et al., 2016). Moreover, fewer births were attended by professional staff in these two divisions, 15.7% in Sylhet and 28.7% in Chattogram compared to the national rate of 30.9% (NIPORT et al., 2016). Thus, from Chattogram district two sub-districts, *Ramu* and *Teknaf,* were selected from the total 11 voucher areas and from Sylhet district, two sub districts *Srimongal* and *Shulla* were randomly chosen from the five voucher areas.

Sample size and respondents

A listing of women aged 15-49 years who had given birth in the previous two years was made. Based on the criteria, 1,446 women in Chattogram and 1,502 women in Sylhet were eligible. From

this listing 600 women in each study sub-districts were interviewed, total 2,400. Voucher recipient status was not identified prior to selection.

Data collection

A team of 20 female interviewers, two experienced supervisors and one statistician undertook and supervised the data collection process. A quality control team consisting of a quality control officer and three re-interviewers re-visited 5% of the households, chosen randomly, within 2 days of data collection by the field workers. Subsequently the supervisors and the relevant field workers together resolved any inconsistencies. Completed questionnaires were checked for completeness and for any inconsistencies. Subsequently, computer-based data editing procedures were applied to ensure the quality of data.

Definition of variables

Dependent variable

An antenatal care (ANC) completeness index was constructed for use as a dependent variable. This index was computed from the 13 items relating to elements of care received at the last visit in the most recent pregnancy using principal component analysis (PCA). The inclusion of items took into account WHO and Bangladesh national guidelines and services available at the study sites (Heredia PI et al., 2016). Items included were clinical procedures such as blood pressure measurement, provision of advice regarding delivery dates and danger signs, blood tests, treatment given and whether the spouse was encouraged to attend clinics with the client (table 1). In PCA, the first component (a linear combination of the items weighted by the coefficient or factor loading) that possesses maximum variability in the data was used to calculate the score or index.

In the 13 items, clinical assessment regarding collection of a blood sample showed the highest unique variance (0.3667) and communication of the expected delivery date had the lowest unique variance (0.1284). Standardized values for each item were calculated producing positive scores for those who received the service and negative scores for those who did not. Finally, the completeness index ranged between 0 and 4.02 where higher scores indicated greater completeness of antenatal care.

Independent variable

Socioeconomic and demographic characteristics of the women were considered as independent variables. These included voucher recipient status (recipients, non-recipients), age, education, access to mass media (yes/ no), health services used (home, hospital, clinic) and asset quintile (lowest, second, middle, fourth, highest) using principal component analysis of housing characteristics such as roof and wall materials, and the number of rooms, and ownership of durable assets observed by the interviewers (Filmer D & Pritchett LH, 2001). The assets score was then used to categorize respondents into five equal groups (quintiles) where the first quintile is the poorest 20% of households and the fifth quintile is the wealthiest 20% of households.

Statistical analyses:

Among the interviewed women (2,400), 81% (1,944) reported attending at least one antenatal care visit. Consequently, 456 women were excluded from the analysis as service components received could not be estimated. Both bivariate and multivariable analyses were performed. The analyses examined the distributions of elements of care received by socioeconomic status quintiles and facility among voucher recipients and non-recipients. Chi-square tests were used to assess

statistical significance. In addition, mean ANC completeness scores by asset quintile; *t*-tests and one-way variance (ANOVA) *F*-tests were performed to assess the statistical significance of associations between completeness scores with the socioeconomic status and health service used of the respondents. To examine the crude and net effect of voucher membership, multivariable linear regression models were applied with 95% confidence interval (CI), adjusting for other socio-demographic characteristics. For simplicity of presentation, mean index values were multiplied by 100. All analyses were undertaken in STATA software for Windows (STATA/SE version 14.2; StataCorp, 4905 Lakeway Drive, College Station, Texas 77845 USA).

Results

Table 1 shows the elements of care recalled as received during the last antenatal care consultation. In each element of care, voucher members (23.3%) reported receiving a higher percentage of mandated services than their counterpart non-members (76.7%).

*Table 1 insert here

Antenatal consultations took place at home through outreach visits organized by service providers (15.9%), at clinics (63.1%) and in hospitals (20.9%). Voucher recipients were more likely to receive antenatal consultations at hospital/clinic (94%) than non-recipients (81.1%). About 32% of voucher recipients reported receiving 10 or more mandated elements of antenatal care compared to 16.4% of non-recipients (Table 2).

*Table 2 insert here

Voucher membership was associated with more complete ANC with a mean score of 185.2±101.0 for members and 139.6±93.3 for non-members (P<0.001). More complete ANC was received by those in higher asset quintiles, with a mean score of 125.3±84.7 in the lowest and 180.7±105.1 in the highest asset quintiles (P<0.001). ANC was the most complete among those receiving clinic-based services (159.4±99.4) followed by hospital-based services (142.2±96.3), with home-based outreach services the least complete (124.7±81.9). For each asset quintile and for each type of health service voucher membership was associated with greater completeness of ANC. The mean completeness score for voucher members in the lowest asset quintile (159.6±82.1) was higher than for all non-members up to the fourth asset quintile (141.9±96.3 for non-members in fourth quintile). Voucher recipients received more complete ANC regardless of women's socioeconomic status compared to non-members. However, women in the highest quintile received relatively complete ANC irrespective of their membership status. Voucher members in the lowest quintile experienced a similar level of completeness irrespective of type of health facility used, whereas significant differentials were observed among non-members (P<0.001) (Table 3).

*Table 3 insert here

In multiple linear regression analysis, the favourable effect of voucher membership on completeness of ANC was confirmed after adjusting for covariates (table 4).

*Table 4 insert here

Discussion

The adoption and scaling-up of demand-side financing (DSF) models has become popular among policy makers in less-developed countries of the world as an instrument to improve access to maternal and child health services. Studies from different countries confirm higher utilization of healthcare services as a result of DSF (Anwar *et al.*, 2008; Bhatia & Gorter, 2007; Bhatia *et al.*, 2006; Mahmood et al., 2019). This study evaluates the effect of a voucher scheme programme as a tool of DSF on access and utilization of antenatal care (ANC) with special emphasis on completeness of access to different components of care considered medically necessary and useful. Consistent with results reported in similar settings, voucher membership increases access and completeness of antenatal care based on women's recollection of components they have received (Ahmed S and Khan MM, 2011; Lim *et al.*, 2010; Målqvist *et al.*, 2013).

Results from this study shows that the voucher scheme significantly improved the utilization of ANC and enabled women to receive more components of care among women from all socioeconomic groups. The mean ANC completeness score among poorer voucher recipients was higher than that for women non-recipients up to the fourth asset quintile. This favourable effect remains after adjusting for other variables, notably educational status that may influence how women are treated by clinical staff during consultations. Around 32% of voucher members, double the percentage of non-members, report receiving at least 10 out of 13 elements of ANC care included in the analysis. Differentials in the mean ANC quality score are also observed to be lower among voucher members by antenatal service types, indicating an increase in the equity of provision associated with voucher membership. The findings are also consistent with the recent 2014 Bangladesh Demographic and Health Survey (BDHS) with regard to typical elements of

antenatal care reportedly received by women, although as the latter uses a longer recall period and does not specifically ask about the last antenatal visit for a particular pregnancy(NIPORT *et al.,* 2016; *NIPORT et al.,* 2012). The BDHS reported that during pregnancy blood pressure was measured in 88.2% and a urine sample was collected in 64.6% of the cases: here the rates were found of 83.3% and 37.9% respectively. Regular monitoring of blood pressure is essential as screening for pre-eclampsia and this is especially important in late pregnancy. The findings depicted from the study indicate that there is scope for further improvement in ensuring complete adherence to clinical best practice.

It has been observed that under current conditions voucher membership does tend to increase the components of care received. Voucher receipt also shows an association with access to more components of care across all asset quintiles. There may be reservations regarding the fidelity of the targeting process used for enrolment in the voucher scheme, as membership is noted across the range of asset indices. Notwithstanding such reservations there is good evidence for a favourable impact across all asset quintiles in terms of components of antenatal care. In a setting where previous low utilization and highly restricted access has been overcome through both demand and supply side initiatives, a new focus on quality of provision is of critical importance, so that maximal gains in maternal and newborn health are realized from these investments.

WHO has recently advocated extension of the range of antenatal components of care within a framework of eight contacts. This approach may be too ambitious for countries that still struggle to attain coverage with four visits with an adequate level of quality and there is a risk that extending the number of contacts without a large-scale increase in resources could compromise quality. In

Bangladesh, a currently attainable enhancement of antenatal care provision could be to increase the number of visits covered by the voucher scheme from three to four.

It will be necessary in future research to cross check women's recollections of care received with exit interviews, observation of care and feedback from health care professionals to obtain a fully rounded picture of the provision and experience of care. There are however sufficient pointers from the current findings to propose testing of demand side initiatives aimed at enhancing women's knowledge about their care and their ability to engage effectively with health care professionals. The scheme should aim towards a care model that represents a partnership between client or patient and provider based on mutual understanding. Studies of sufficient scale with power to detect differences in maternal and neonatal outcomes are also required, alongside health economic analyses to identify optimal targeting approaches, appropriate levels of voucher benefits and cost effectiveness of the scheme.

The current study is among a few studies conducted in Bangladesh that assess the quality of antenatal care and the influence on a conditional cash transfer intervention. Despite this, some limitations must be recognized. Implementation of voucher schemes has been restricted to certain districts, so it was not possible to examine voucher related effects on coverage or quality at national level. Women may have difficulty recalling the details of previous antenatal consultations during interviews but the inclusion of pregnancies leading to births within the previous two years and reporting on last ANC attended may have aided accurate recall. However, the current study was not able to cross-check reported elements of care received against clinical records such as blood pressure or blood test results or undertake contemporaneous exit interviews.

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Conflicts of interest. The authors declare that there are no competing interests to declare for this study.

Ethical approval. The study was approved by the Ethical Review Committee (ERC) of the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) (NIH reference number 0000182). Informed written consent was taken from all respondents, and confidentiality and anonymity of respondents were ensured.

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Tables

Table 1: Items relating to elements of care received at the last ANC visit by voucher recipient status.

Care element reported as received	Recipient n (%)	Non-recipient n (%)	All n (%)	*P-value*
Clinical Assessment				
Blood pressure checking	378 (83.6)	1,242 (83.2)	1,620 (83.3)	0.732
Abdominal examination	447 (98.9)	1,450 (97.2)	1,897 (97.6)	0.038
Listening to the fetal heart	344 (76.1)	1,055 (70.7)	1,399 (72.0)	0.025
Collection of a blood sample	193 (42.7)	431 (28.9)	624 (32.1)	<0.001
Collection of a urine sample	219 (48.5)	517 (34.7)	736 (37.9)	<0.001
Advice elements				
Expected delivery date	373 (82.5)	1,103 (73.9)	1,476 (75.9)	0.001
Where to deliver	307 (67.9)	619 (41.5)	926 (47.6)	<0.001
What to do in case of bleeding	136 (30.1)	226 (17.8)	402 (20.7)	<0.001
What to do if baby stops moving	254 (56.2)	590 (39.5)	844 (43.4)	<0.001
What kind of food to take while pregnant	308 (68.1)	899 (59.6)	1,197 (61.6)	0.001
Items to bring for the birth	58 (12.8)	104 (7.0)	162 (8.3)	<0.001
Treatment provision				
Was given iron/ folic acid tablets	356 (78.8)	1,077 (72.2)	1,433 (73.7)	0.005
Male participation				
Encourage to attend the ANC with husband	133 (29.4)	455 (30.5)	588 (30.3)	0.664

Table 2: Socioeconomic status, place of delivery, number of care elements received at the last antenatal visit by voucher scheme membership status, Chattogram and Sylhet, Bangladesh 2017

	Member n (%)	Non-member n (%)	All n (%)	*P-value*
Asset index				
Lowest	76 (16.8)	272 18.2	348 17.9	
Second	73 (16.2)	289 (19.4)	362 (18.6)	
Middle	97 (21.5)	288 19.3	385 19.8	0.042
Fourth	112 (24.8)	286 (19.2)	398 (20.5)	
Highest	94 (20.8)	357 (23.9)	451 (23.2)	
ANC visit by place of service delivery				
Home	27 (6.0)	282 (18.9)	309 (15.9)	
Hospital	187 (41.4)	219 (14.7)	406 (20.9)	<0.001
Clinic	238 (52.7)	988 (66.4)	1,226 (63.2)	
No. of ANC components received				
0-4	65 (14.4)	359 (24.1)	424 (21.8)	
5-9	241 (53.3)	888 (59.5)	1,129 (58.1)	<0.001
10-13	146 (32.3)	245 (16.4)	341 (20.1)	
Number of women	452 (100.0)	1492 (100.0)	1944 (100.0)	

Table 3: Mean ANC content score by asset quintile and health services used

	Member			**Non-member**			**All**		
	Mean (SD)	IQR	p-value	Mean (SD)	IQR	p-value	Mean (SD)	IQR	p-value
Asset quintile									
Lowest	159.6 (82.1)	124.1		115.7 (83.0)	103.1		125.3 (84.7)	117.4	
Second	164.5 (103.5)	151.2		123.1 (83.1)	121.7		131.4 (89.0)	146.2	
Middle	186.1 (96.1)	171.0	0.007	134.6 (85.7)	124.5	<0.001	147.6 (90.8)	138.5	<0.001
Fourth	196.0 (101.5)	156.1		141.9 (96.3)	147.4		157.2 (100.7)	147.2	
Highest	208.2 (111.9)	224.9		173.4 (102.2)	162.1		180.7 (105.1)	181.3	
Health services used									
Home	162.8 (113.8)	174.0		121.1 (77.4)	99.7		124.7 (81.9)	107.8	
Hospital	183.5 (97.3)	159.3	0.422	106.9 (80.2)	96.0	<0.001	142.2 (96.3)	147.7	<0.001
Clinic	189.1 (102.4)	174.0		152.2 (97.4)	155.4		159.4 (99.4)	159.4	

All	185.2 (101.0)	177.0		139.6 (93.3)	141.5		150.2 (97.0)	151.7	<0.001

SD= Standard Deviation

IQR= Interquartile range

Table 4: Unadjusted and adjusted measure of associations for voucher membership status and respondents' socio-demographic and health characteristics with ANC completeness score

	Crude		**Multivariable-adjusted***	
	Coefficient 95% CI	*P-value*	Coefficient 95% CI	*P-value*
Voucher membership				
No	0		0	
Yes	0.46 (0.35 to 0.56)	<0.001	0.37 (0.27 to 0.47)	<0.001
Constant	1.40 (1.35 to 1.44)	<0.001	0.68 (0.46 to 0.91)	<0.001

*All results adjusted for women socioeconomic status, age, education, number of antenatal visits, access to mass media and household NGO membership.