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IMPACT OF A MATERNAL HEALTH VOUCHER SCHEME ON FACILITY DELIVERY AMONG LOW INCOME WOMEN IN PAKISTAN

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Greenstar Research Department
Working Paper No. 6
2010

ACKNOWLEDGEMENTS

This study was funded by Greenstar Social Marketing, and by Population Services International through the Innovations Fund. The author is grateful to Nils Gade, Steve Chapman, Chris Conrad and Brian Smith for their comments on an earlier version of the paper and to Shirine Mohagheghpour and Tyjen Tsai for their editorial review.

ABSTRACT

Background:

Performance-based Financing (PBF) schemes are being adopted in many developing countries as a mechanism for increasing facility-based delivery. However, there is limited evidence regarding the impact of PBF on facility delivery.

Methods:

A 12-month demand-side financing voucher scheme was launched in Dera Ghazi Khan City, located in southern Punjab, Pakistan. A pre-test/post-test non-experimental study was conducted to assess the impact of the intervention. Household interviews were conducted with randomly selected women who delivered in the year prior to the implementation of the voucher scheme, and with randomly selected women who delivered in the year the voucher scheme was implemented. Purchase of the voucher booklet was used as a measure of participation in the voucher scheme. Regression analysis was conducted to determine the impact of the voucher scheme on facility delivery, antenatal care (ANC) and postnatal care (PNC). Marginal effects estimated from logistic regression analyses were used to assess the magnitude of the impact of the intervention.

Results:

After adjusting for other variables, participation in the voucher scheme was associated with a 19 percentage point increase in facility delivery. The magnitude of the impact of the voucher intervention on facility delivery was comparable to the magnitude of the impact of women ' s education on facility delivery. Household socio-economic status and neighborhood income levels had significant effects on facility delivery. Several other programmatic factors unrelated to the voucher scheme, including the government ' s Lady Health Worker program, proximity to a health facility, and mass media exposure had significant but relatively modest effects on facility delivery. The largest impact of the voucher scheme was on the use of PNC. Participation in the voucher scheme was associated with a 30 percentage point increase in PNC. No secular trends were observed in the use of health facilities for delivery or in the use of PNC. Secular trends were observed only in the case of ANC use. Independent of other factors, participation in the voucher scheme was associated with a 16 percentage point increase in ANC use.

Conclusions:

A voucher pilot intervention implemented for 12 months was associated with a substantial increase in facility delivery. The lack of a secular trend indicating increasing levels of facility delivery in an urban area of Pakistan is worrisome and underscores the need to expedite efforts to meet Millennium Development Goal (MDG) 5 targets. The strong and persistent effects of economic factors on facility delivery highlight the need to implement interventions that subsidize the cost of delivering at a health facility.

INTRODUCTION

The pace of decline of the Maternal Mortality Ratio (MMR) in Pakistan has been slower than for the rest of South Asia. India, which has experienced a rapid increase in skilled birth attendance in recent years, is driving the decline in the region (Hogan et al., 2010). New approaches to improving maternal health service delivery are needed in Pakistan, if the country is to meet the Millennium Development Goal (MDG) target of reducing the MMR by 75% of its 1990 level, or 135 maternal deaths per 100,000 live births. With many developing countries failing to achieve the level of progress needed to meet their MDG targets, international donors are interested increasingly in linking the financing of health services to the achievement of results, rather than to inputs. Performance-based Financing (PBF), also referred to as Pay for Performance (P4P) or Results-based Financing (RBF), is the use of financing to encourage the achievement of agreed-upon results. An often cited example of PBF is of a provider being paid for outcomes such as an increase in immunization coverage rather than inputs like the number of immunization syringes (Stoltenberg, 2008; Eldridge and Palmer, 2009). PBF has been used widely in the United States and United Kingdom to drive quality improvements in health care service delivery. Other health systems in developed countries are also in the process of adopting this approach (Boxall, 2009). In developing countries, an important focus of PBF schemes is the increased use of health services by vulnerable groups in order to meet MDG targets, and to increase the accountability, efficiency and quality of services (Eldridge and Palmer, 2009). To date, there has been limited research on the effectiveness of PBF schemes in both high and low-income countries. When research has been conducted, it has shown mixed results (Lundberg, 2007; Boxall, 2009) or the research design has not been strong enough to separate the effect of PBF from other, simultaneous changes occurring in the health system at the same time (Kalk et al., 2009). The problem of the lack of an evidence base on PBF initiatives is particularly acute in low-income countries, where there is a lack of clear evidence of the impact of PBF (Eldridge and Palmer, 2009). Reviewers have highlighted the need for systematic research to determine the effectiveness of PBF approaches in less developed health systems. The present study assesses the impact of a PBF project to increase the utilization of maternal health services in a small city in Pakistan. Across Pakistan, about 44% of women living in small urban areas have their babies delivered by skilled birth attendants, and socio-economic differentials in the use of skilled birth attendants are large (National Institute of Population Studies and Macro International Inc., 2008).

Background:

Performance-based Financing (PBF)

PBF is defined as the transfer of money or material goods conditional on taking a measurable action. It includes a wide range of interventions that vary in terms of the level at which the incentives are targeted (e.g. health facility, individual providers, recipients of health care), the targeted results (e.g. improved quality of care, delivery at a health facility), indicators used to measure results (e.g. service statistics, population level outcomes), choice of targets (e.g. payment per immunization, payment by achievement of a certain level of immunization coverage in a population), magnitude of the incentive (e.g. partial subsidy for delivery at a facility, complete subsidy for delivery and reimbursement of transport cost), and type of the incentive (e.g. cash payments, material goods, free services) (Oxman and Fretheim, 2009). PBF approaches may target either the demand- or the supply-side of health service provision (Kalk et al., 2010). In the case of demand-side financing, government or donor money goes directly to low-income consumers in the form of a subsidy that enables them to purchase services. In the case of the supply-side financing, government or donor subsidy goes to the provision of services, traditionally in the public sector (PSP-One, 2006). Supply-side financing approaches are the standard approach used in the provision of maternal care by the public sector in many developing countries, including Pakistan, where providers receive funds for ensuring access to care, either free of charge or at highly subsidized rates (Ahmed and Khan, 2010).

Vouchers

Vouchers are a specific demand-side financing mechanism that can be used to target essential health services to vulnerable populations such as poor, pregnant women and to protect them from catastrophic expenditures such as emergency obstetric care (Ahmed and Khan, 2010).

In a voucher scheme, the consumer receives a booklet or token that covers all or part of the price of a package of services (PSP-One, 2006). Because they are highly targeted, voucher interventions are expected to improve health outcomes among the poor.

Development of the Voucher Intervention

The context

The Pakistan Demographic and Health Survey data collected in 2006-07 (PDHS 2006-07) showed that despite an increase in ANC visits during the last two decades, only one-third of women in cities outside major urban centers (hereafter referred to as "small urban areas") made the four antenatal visits recommended by WHO. Moreover, the quality of care received during an ANC visit was low: only 34% of women who received ANC were weighed (National Institute of Population Studies and Macro International Inc., 2008). In small urban areas, only half of all pregnant women prepared for childbirth by discussing with their husbands the place of delivery or by setting aside money in the case of an emergency. And only 40% delivered in a health facility. The consequences of delivering outside a health facility were potentially quite severe for these women: 74% of women in small urban areas who delivered at home reported that an unboiled thread was used to tie the cord; 40% reported the use of a pair of scissors, knives, or old razor blades to cut the umbilical cord (National Institute of Population Studies and Macro International Inc., 2008).

Obstacles to the utilization of maternal health services

A range of factors contribute to the low levels of utilization of maternal health services in small urban areas of Pakistan. The PDHS 2006-07 showed that awareness of the importance of ANC was low: more than three out of four women who did not make an ANC visit thought it unnecessary; and one out of four women reported the cost of ANC being prohibitive (National Institute of Population Studies and Macro International Inc., 2008). The two most common reasons cited by women for not delivering in a health facility were the lack of perceived benefit of doing so (65%) and the prohibitive cost (29%). Nearly half of women in small urban areas reported that dais (traditional birth attendants lacking formal health training) assisted them in home deliveries (National Institute of Population Studies and Macro International Inc., 2008). Dais are informal providers who are members of the community and are easily accessible to poor women. In some cases, they may have delivered babies for a family for several generations. Home deliveries are consistent with conservative values in many parts of Pakistan that emphasize the importance of purdah (the practice of preventing women from being seen by men who are not immediate kin). Because dais are local women from a similar social background, low-income women find it easier to communicate with them than with medical practitioners.

Using vouchers to address the barriers to utilization of maternal health services

Planners of the voucher project felt that a demand-side strategy that removed social and cultural barriers associated with obtaining care from a medical facility, and also lowered the monetary cost associated with utilizing these services would likely succeed in increasing the use of maternal health services (Bashir et al., 2010). To achieve this, a behavior change strategy to increase awareness of the benefits of ANC, facility delivery, and PNC combined with a PBF mechanism allowing low-income women to overcome financial obstacles to seeking care was implemented.

The Setting: Dera Ghazi Khan

Located in southern Punjab, Dera Ghazi Khan (D.G. Khan) is one of the poorest districts in Pakistan with a poverty incidence of 70% (Asian Development Bank, 2008). In 2008, it had an estimated population of 2.2 million. Approximately, 15% of the population of D.G. Khan district is urban and is located in two towns: D.G. Khan and Taunsa Sharif. A representative household survey of D.G. Khan district conducted in 2005 showed that 57% of pregnant women living in urban areas of the district delivered at a health facility.

About 48% of urban women in D.G. Khan had made three or more ANC visits during their last pregnancy, and 25% had made a PNC visit (Population Council, 2005). In October 2008, a PBF intervention of 12-month duration was launched with funds from the USAID-supported PAIMAN project. The objectives of the project were to increase the use of ANC, PNC and facility delivery.

The Intervention

The scope of the pilot project was to provide a package of maternal health services to 2,000 pregnant low-income women in D.G. Khan city. D.G. Khan city had an estimated population of 258,000 in 2008. Based on the crude birth rate of 30 per 1,000 population for small urban areas of Pakistan (National Institute of Population Studies and Macro International Inc., 2008) about 7,700 births were expected in D.G. Khan city in 2008. Hence, if all 2,000 women who participated in the voucher scheme were to use their coupon for facility delivery, 26% coverage could be expected. The package of services available to study participants included three ANC visits, normal delivery or referral for caesarian-section, and a PNC visit. In addition, clients could get their complete blood picture and an ultrasound examination.

The services were available during the 12-month period, beginning October 1 2008 through September 30, 2009 from private providers who were part of a network managed by the NGO, Greenstar Social Marketing. Under the Goodlife brand, Greenstar has a national network of approximately 7,500 private providers who have been trained in the provision of ANC, PNC, emergency obstetric care, neonatal care, child care, and family planning services. Quality assurance visits to network providers are made by the Greenstar medical team on a quarterly basis. Based on an assessment of their capacity to provide quality maternal and child health services, 22 Goodlife providers located in D.G. Khan city were preapproved for provision of services under this scheme.

No cash payments were made by voucher recipients to providers. Instead, voucher recipients made a one-time payment of US $1.25 to Greenstar outreach workers who sold them the voucher booklet. The voucher booklet contained coupons for services that clients were entitled to receive upon purchase of the booklet. After providing a particular service, the provider would tear off the relevant coupon and submit it to Greenstar for reimbursement. Greenstar would reimburse providers at an agreed-upon rate for individual services within 35 days of submission of a coupon for a particular service. Providers were reimbursed US $1.25 for each ANC, PNC and family planning visit, US $31 for a normal delivery, and US $125 for a caesarian delivery. After the approval of individual claims, the Greenstar finance department transferred funds directly to provider bank accounts.

Clients were reimbursed by providers a standard amount for the cost of transportation to the facility. For most types of visits the reimbursement was US 62 cents. For a delivery, the transport reimbursement was US $3. Providers, in turn, were reimbursed by Greenstar for transportation costs at the same time as payments for relevant services were made. Ten percent of coupons were validated by outreach workers who checked with voucher recipients to ensure that they had indeed utilized services. Clients were asked about the care received from providers during this validation. Random checks of voucher coupons were also conducted by the project supervisor. Voucher recipients were identified through door-to-door visits by project outreach workers. Three criteria were used for respondent selection: physical appearance of neighborhood where a potential recipient ' s house was located (including the lack of presence of basic amenities such as sanitation), household income below the national poverty line, and no prior experience of delivery in a health facility. The third criterion was developed in order for the project to have optimal public health impact. After potential recipients had been identified, local elected officials serving on the union council were consulted for verification of recipients ' eligibility. Data collected at the time of voucher sales showed that median monthly household income was US $45. Less than 1% of voucher recipients reported a monthly income greater than the government ' s poverty line (US $75). Ninety-seven percent of voucher recipients who had had at least one birth reported that a dai had delivered their last child. Sixty-five percent of voucher recipients reported that their husbands were daily wage laborers.

METHODS

Study Design

A pre-test/post-test non-experimental design was used to assess the pilot. The assessment aimed to compare women who gave birth during the voucher scheme implementation period to women who gave birth in the period just prior to the intervention. The study was designed to compare the use of ANC, delivery at a health facility, and the use of PNC between these two groups of women.

In all seven union councils in D.G. Khan city, household survey data was collected from a random sample of mothers who had delivered prior to the PBF intervention and from a random sample of mothers who had delivered during the intervention period. A union council is the smallest administrative unit in Pakistan. Informed consent was obtained from female respondents prior to interviewing them, consistent with IRB procedures approved by Tulane University Medical Center IRB.

The household survey was conducted over an 18-day period, from March 27, 2010 to April 13, 2010. From each union council of D.G. Khan city, 100 mothers who had delivered in the period January 2008 to August 2008 (pre-intervention period) and 100 mothers who had delivered in the period January 2009 to August 2009 (intervention period) were randomly selected.

Within each union council, multiple random starting points were chosen, and households listed prior to the selection of eligible respondents. At the household level, a listing was done of married women 15-49 years who had children 36 months or younger. After the woman ' s name and age were listed, the name and age of her youngest child (in case the woman had more than one child born in the last three years) was determined. A calendar method was used to determine the age of the youngest child. Women were first asked about the year in which their youngest child was born. They were then asked about the month of the year in which their youngest child was born. A woman who gave birth between January 2008 and August 2008 was eligible to be sampled for the study and represented women who had delivered prior to implementation of the voucher scheme. A woman who gave birth between January 2009 and August 2009 was also eligible to be sampled for the study and represented women who delivered during the voucher scheme implementation period.

The above methodology was pre-tested in February 2010 in Taunsa Sharif, another city in D.G. Khan district, with a sample of 30 women. A child ' s year and month of birth obtained using the calendar method was compared to information obtained from their birth certificates or immunization cards. The comparison showed a high level of comparability between children ' s ages obtained from the calendar method and children ' s ages from birth or immunization records.

The final sample consisted of 681 mothers who delivered during 2008 and 741 mothers who delivered during 2009. There was little variation in the population sizes of the seven union councils (populations ranged from 25,999 to 27,928). Accordingly, no weights were attached to the data. The data were collected by AcNielsen Pakistan (Pvt.) Ltd. who have been conducting household surveys in Pakistan since 1991.

Measures

Dependent variables

Three dependent variables were used for this analysis –ANC, facility delivery and PNC. For ANC, women were coded ' 1 ' if they made at least three ANC visits, and ' 0 ' if they made fewer visits. For facility delivery, women were coded as ' 1 ' if they delivered at a health facility and coded ' 0 ' if they delivered at home. For PNC, women were coded ' 1 ' if they made a PNC visit, and ' 0 ' if they did not.

Participation in the voucher scheme

To identify women who participated in the voucher scheme, respondents to the survey were asked if a health worker had visited their house to tell them about a voucher scheme for pregnant women. Respondents who answered in the affirmative were asked if they had purchased a voucher booklet from the health worker. Purchase of the voucher booklet was used as a measure of participation in the voucher scheme.

Independent variables

All independent variables included in the analysis are supported by prior literature on the determinants of ANC, facility delivery and PNC use. Variables included in the analysis of ANC, facility delivery, and PNC are mother ' s age (categorized as 16-24 years, 25-29 years, 30-34 years and 35+ years), parity (number of living children), mother ' s education (none, any primary, middle, secondary, matriculate or higher), mother ' s autonomy (low, middle, high), socio-economic status (A, B, C, D, E), residence in high-, middle- or low-income neighborhood, home visit by health worker in the last 12 months, travel time to the nearest health facility (within 5 minutes), mode of travel to the nearest health facility (motorized, on foot, other), and exposure to mass media (daily television viewership). A recent analysis found the above variables to be important determinants of the use of maternal health services in Pakistan (Agha and Carton, 2010).

The socio-economic status variable was based on the empirical work done by AcNielsen (Pvt.) Ltd. Pakistan to determine meaningful socio-economic gradation in Pakistan. According to extensive analysis of household data in Pakistan, AcNielsen has developed a socio-economic gradation for urban Pakistan based on the occupation and education of chief earner in the household: A (secondary, matriculate, intermediate or post-graduate education in combination with being a medium or large businessman or a higher level executive): B (matriculate or higher education but less than post-graduate education in combination with being a supervisor, shopkeeper or lower level executive): C (secondary or matriculate education in combination with being a small shopkeeper or lower level executive): D (secondary, matriculate or intermediate education in combination with being a skilled worker, non-executive staff or supervisor): and E (no education, primary education, secondary education or matriculate education in combination with being an unskilled worker, petty trader, skilled worker, or non-executive staff). This socio-economic gradation is held as the gold-standard among market research firms for determining socio-economic status in Pakistan.

The variable measuring mother ' s autonomy was created using factor analysis. First, mothers were coded ' 1 ' if decisions regarding the following were made by her alone or by the couple together and ' 0 ' otherwise: small household expenditures (e.g. toothpaste, batteries, etc.); large household expenditures (e.g. television, refrigerator, etc.); expenditures on women ' s clothes and jewelry; woman ' s employment outside the home; purchase or sale of property; children ' s clothes; where to take children in the case of illness; where to take the mother in case of illness; purchase of medicine; children ' s education; use of contraception; and visits to relatives. Factor analysis was used to create a female autonomy score, which was divided into terciles. The approach is similar to the approach used to create wealth quintiles for the Demographic and Health Surveys (Rutstein and Johnson, 2004).

Statistical Analysis

Model development

A multistage process was used to create a base model for the three dependent variables: the use of ANC; delivery at a health facility; and the use of PNC. Bivariate relationships between each independent variable and outcome were investigated using a binary logistic regression model. Those independent variables found to be significant at the bivariate level were included in a multivariate regression model for each dependent variable. Each independent variable was tested using an improvement chi-square test to determine if the independent variable improved the fit of the model. If an independent variable did not improve the fit of the model, it was dropped. Thus, the most parsimonious model was built for each outcome variable. In order to make the models comparable, however, any variable that remained in the final model for any of the three dependent variables was retained in all models.

Impact analysis

To determine the impact of the voucher scheme on the three outcomes, the 2008 and 2009 data were pooled. A dummy variable was created to indicate the year in which women had a birth. The key independent variable of interest was purchase of the voucher booklet. The independent effects of purchase of the voucher booklet were estimated after controlling for other potential confounding factors. The multi-stage design of the survey was taken into account in the statistical analysis. STATA 10 was used for the statistical analysis (StataCorp, 2007).

RESULTS

Characteristics of Women Sampled in 2008 and 2009

TABLE 1 *(Please see pages 22 - 23)*

Table 1 shows the characteristics of mothers who gave birth during 2008 and 2009 in D.G. Khan city. As expected, by 2010, women who gave birth during 2008 were older than women who gave birth in 2009: 18% of women who delivered in 2008 were 35 years or older, compared to 10% of women in 2009. There were no significant differences by parity or education. Slightly more than one-fifth of women in each sample delivered their first child and another one-fifth had a fifth or higher order birth. Approximately one-third of women had no education and about one-fifth had matriculate or higher education.

In terms of household factors, levels of maternal autonomy were higher in the 2008 sample: 31% of women who gave birth in 2008 had high autonomy compared to 24% of women who gave birth in 2009. This is consistent with the older ages of women who delivered in 2008. There was no difference in socio-economic status: sixty percent of women in both samples were in socio-economic strata D and E, about one-fifth were in socio-economic strata C and about one-fifth were in strata A or B. At the community level, a larger proportion of women who delivered in 2009 were from a middle-income neighborhood: 68% of women sampled in 2009 were from middle-income neighborhoods compared to 62% of women sampled in 2008.

There were no differences between the two samples in terms of programmatic factors unrelated to the voucher scheme: about 85% of women in both samples reported knowing a health worker assigned to their area; two-thirds of women had been visited by a health worker during the last 24 months. The Lady Health Worker program of government of Pakistan has 100,000 paid female community health workers providing basic primary health care to communities where they live (Oxford Policy Management, 2009). The high rates of health worker visits to women ' s homes in D.G. Khan city is consistent with data on Lady Health Workers ' performance: data show that two-thirds of households in D.G. Khan district were visited by Lady Health Workers in 2005 (Population Council, 2005). Other programmatic factors unrelated to the voucher scheme also showed no difference between women who gave birth during 2008 and 2009: one-third of women lived within five minutes of the nearest health facility; two-thirds of women traveled to the nearest facility on foot; and two-thirds of the sample watched television daily.

In 2009, about 23% of women were visited by a worker who provided them information about a voucher scheme for pregnant women. About 13% of pregnant women purchased voucher booklets. There were significant differences in use of maternal health services between women who gave birth in 2008 and 2009: ANC use increased from 61% in 2008 to 75% in 2009; facility delivery increased from 61% in 2008 to 67% in 2009; and PNC use increased from 30% in 2008 to 40% in 2009.

Figure 1 *(Please see pages 26)*

Socio-economic Profile of Women Who Purchased Vouchers

Figure 1 shows the socio-economic (SES) profiles of women who purchased vouchers, women who were visited by an outreach worker from the voucher scheme but were not sold a voucher, and women who were not reached by a voucher outreach worker.

Women who purchased vouchers were significantly different from women who were visited by outreach workers but not sold vouchers ($p<0.01$). About 78% of women who purchased vouchers were from SES D or E. By comparison 52% of women who were visited by voucher outreach workers but not sold vouchers were from SES D or E.

TABLE2 *(Please see pages 24 - 25)*

Characteristics of Voucher Purchasers

Characteristics of voucher purchasers are further explored in this section. Table 2 shows purchase of vouchers by maternal, household and community characteristics, and program factors unrelated to the voucher scheme. Overall, thirteen percent of pregnant women in D.G. Khan city purchased vouchers during 2009. Voucher purchase varied by maternal, household, and community characteristics, and program factors unrelated to the voucher scheme.

Women with five or more children were more likely to purchase vouchers: 24% of women with five or more children purchased vouchers during their last birth, compared to 14% of women with four children and 8% of women with one child. Voucher purchase was higher among women with low education: 24% of women with any primary education compared to 6% of women with matriculate education purchased vouchers.

Purchase of vouchers was higher among women in the lower socio-economic strata: 20% of women in socio-economic stratum E, 10% of women in stratum C and 2% of women in stratum A purchased vouchers. Purchase of vouchers was concentrated in lower and middle-income neighborhoods.

Women who usually traveled to the nearest health facility on foot were more likely to purchase vouchers: 16% of women who usually traveled on foot to the nearest health facility purchased vouchers, compared to 8% of women who traveled to the nearest health facility in some form of motorized transportation.

TABLE3 *(Please see pages 27)*

Changes in Use of Maternal Health Services by Socio-economic Status

Table 3 shows changes in the use of ANC, facility delivery, and PNC by socio-economic status (SES). Columns 1 and 2 in Table 3 show the use of maternal health services by SES in 2008 and 2009, respectively. With the exception of women in socio-economic status A, 90% of whom made three or more ANC visits by 2008, ANC use increased in all SES groups. The use of a health facility for delivery increased in SES groups B, D, and E. The use of PNC increased in all groups, but was particularly large in SES group D.

Figure 2 *(Please see pages 34)*

Unadjusted Effects of Voucher Purchase on Use of Maternal Health Services

Figure 2 shows the bivariate relationship between purchase of vouchers and use of ANC, delivery in a facility, and use of PNC among women who delivered a baby in 2009. There was no significant relationship between the use of ANC and purchase of vouchers. Participation in the voucher scheme was, however, significantly associated with the use of a facility for delivery and with the use of PNC. Bivariate findings show that the purchase of the voucher booklet was associated with a 15 percentage point increase in facility delivery and a 24 percentage point increase in PNC.

TABLE4 *(Please see pages 28 - 29)*

Effects of Participation in Voucher Scheme on ANC Use

Data on women who delivered in 2008 or 2009 was pooled for the impact analysis shown in Table 4. Column 2 of Table 4 shows adjusted odds ratios associated with a woman making at least three ANC visits during her last pregnancy. After adjusting for other variables, participation in the voucher scheme was associated with a higher odds of ANC use (odds ratio=2.89). Marginal effects estimated from a logistic regression analysis (Column 3, Table 4) show that participation in the voucher scheme was associated with a 16 percentage point increase in ANC use between 2008 and 2009. Independent of participation in the voucher scheme and other variables in the model, women who delivered in 2009 were more likely to deliver in a health facility than women who delivered in 2008. In other words, there was a secular trend of increasing ANC use among women in urban D.G. Khan. Marginal effects estimated from a logistic regression analysis (Column 3, Table 4) show that the secular trend was associated with an 11 percentage point increase in ANC use. Other, non-voucher, programmatic variables such as travel time to a health facility and frequency of mass media exposure were also associated with ANC use. Being within five minutes of a health facility was associated with a 10 percentage point increase in ANC use (Table 4, column 3). Daily exposure to the mass media was associated with a seven percentage point increase in ANC use. Surprisingly, after adjusting for other variables, a visit by a health worker from the government ' s Lady Health Worker program was associated with lower use of ANC.

Variables that had an impact on ANC use of a similar or higher magnitude as participation in the voucher scheme were parity, mother ' s education and SES. Higher parity lowered the likelihood of ANC use. A woman ' s being at parity three was associated with a 13 percentage point decline in ANC use, while being at parity five or higher was associated with a 22 percentage point decline in ANC use. Mother ' s education and household SES were associated with a higher likelihood of ANC use. The use of at least three ANC visits was 11 percentage points higher among women with any primary education, 18 percentage points higher among women with secondary education and 24 percentage points higher among women with matriculate or higher education. The use of at least three ANC visits was nine percentage points higher among women from SES B households and 17 percentage points higher among women from SES A households.

Women ' s age and autonomy were also associated with ANC use. Ages 30 and older were associated with a nine or 10 percentage point increase in ANC use. Women with high levels of autonomy were more likely to make three or more ANC visits: a six percentage point increase in ANC use was associated with high autonomy.

TABLE5 *(Please see pages 30 - 31)*

Effects of Participation in Voucher Scheme on Facility Delivery

Column 2 of Table 5 shows adjusted odds ratios associated with delivery in a health facility. After adjusting for other variables, voucher purchase had a powerful impact on facility delivery: a woman who purchased the maternal health voucher was more likely to deliver in a health facility (odds ratio=3.27). Marginal effects estimated from a logistic regression analysis (Column 3, Table 5) show that participation in the voucher scheme was associated with a 19 percentage point increase in facility delivery.

After taking into account the effect of voucher purchase, non-voucher programmatic variables, and social and demographic characteristics of respondents, there was no significant increase in the likelihood of facility delivery between 2008 and 2009. In other words, there was no secular increase in facility delivery in D.G. Khan city between 2008 and 2009.

The effects of several non-voucher program factors on facility delivery were significant, although the magnitude of their impact was considerably smaller than that of the voucher scheme. The use of a health facility for delivery was four percentage points higher among women who were visited by a health worker from the Lady Health Worker program. The use of a health facility for delivery was five percentage points higher among women who lived within five minutes of a health facility, and four percentage points higher among women who watched television daily.

Two variables had an impact on facility delivery of the same order of magnitude as participation in the voucher scheme: parity and maternal education. Women at higher parities were less likely to deliver at a health facility: being at parity two was associated with a seven percentage point lower use of facility delivery; being at parity five or higher was associated with a 23 percentage point lower use of facility delivery. Compared to women with no education, facility delivery was seven percentage points higher among women with any primary education, 12 percentage points higher among women with secondary education and 28 percentage points higher among women with matriculate or higher education.

Older ages were associated with an increased likelihood of facility delivery: women ages 30 and older were more likely to deliver at a health facility than women ages 16-24. After controlling for other factors, women from SES B and SES C were more likely to deliver at a health facility than women from SES E. Neighborhood type was also associated with facility delivery: compared with women from low-income neighborhoods, facility delivery was nine percentage points higher among women from middle- and upper-income neighborhoods.

Women ' s autonomy was associated with facility delivery. Women with greater autonomy were more likely to deliver at a health facility. The use of a health facility for delivery was four percentage points higher among women at a medium level of autonomy and 10 percentage points higher among women with high autonomy.

TABLE6 *(Please see pages 32 - 33)*

Effects of Participation in Voucher Scheme on PNC Use

Column 2 of Table 6 shows the adjusted odds ratios associated with PNC use. After adjusting for other variables, voucher purchase increased the odds of PNC use (odds ratio=4.43). Marginal effects estimated from a logistic regression analysis (Column 3, Table 6) show that participation in the voucher scheme was associated with a 30 percentage point increase in PNC. After taking into account the effect of voucher purchase and other variables in the model there was no significant increase in the likelihood of PNC use between 2008 and 2009. In other words, there was no secular increase in PNC use between 2008 and 2009.

The effects of non-voucher programmatic factors were relatively modest. After adjusting for other factors, the only programmatic variable that had a significant association with PNC was travel time to the nearest facility: marginal effect estimates showed that living within five minutes of a health facility increased the use of PNC by six percentage points. Visits by a health worker from the Lady Health Worker program, or daily television viewership had no effect on PNC use. The only variable that had an effect of the same order of magnitude as participation in the voucher scheme was maternal education: middle level education was associated with an increase in PNC use of 12 percentage points, secondary education with an increase of 21 percentage points and matriculate or higher education with an increase of 27 percentage points. Other variables that had important effects on PNC were parity and the wealth level of the neighborhood in which the woman lived. Higher parity mothers were less likely to obtain PNC: the use of PNC was seven percentage points lower among women at parity two and 16 percentage points lower among women at parity five or higher. After adjusting for other factors, women living in middle- or upper-income neighborhoods were more likely to use PNC: compared to women living in low-income neighborhoods, the use of PNC was 13 percentage points higher among women living in middle-income neighborhoods and eight percentage points higher among women living in upper-income neighborhoods.

DISCUSSION

PBF is a relatively new approach being adopted in developing countries to lower maternal mortality by increasing the use of maternal health services, particularly delivery at a health facility. A voucher scheme implemented through medical providers in Gujarat state, India, may have contributed to a large increase in facility deliveries: over a 14-month period, the Gujarat scheme covered 160,000 deliveries and coverage of deliveries increased by 21 percentage points during the period that the voucher intervention was implemented (Gorter and Bellows, 2008). However, there remains a lack of convincing evidence regarding the impact of PBF schemes on changes in population levels outcomes. This study adds to the evidence base on the effects of demand-side financing schemes to increase the use of health facilities for deliveries and other maternal health services.

The D.G. Khan voucher scheme assessed in this study was intended to cover 2,000 deliveries, and ANC and PNC associated with those deliveries. The findings of the assessment showed that pregnant women reached by the voucher scheme were largely the poorest women in the city. Their participation in the voucher scheme was associated with a 19 percentage point increase in facility delivery in D.G. Khan city. The substantial increase in facility delivery associated with the voucher scheme is particularly important given that there was no secular trend showing an increase in facility delivery. In other words, in the absence of the voucher scheme, there may have been no increase in facility delivery in D.G. Khan city. The overall rate of facility delivery in D.G. Khan city (61%) in 2008 seems hardly to have changed from the rate of facility delivery in all urban areas of D.G. Khan in 2005 (55%) (Population Council, 2005). This is particularly evident considering that D.G. Khan city is much more developed than Taunsa Sharif (the only other city in D.G. Khan district) and that the 2005 estimate of facility delivery across all of urban D.G. Khan probably underestimated the facility delivery rate in D.G. Khan city. No secular trend was observed for PNC use either. In other words, independent of the effect of other variables, there was no increase in PNC. Use of PNC remains low in Pakistan overall (National Institute of Population Studies and Macro International Inc., 2008). In D.G. Khan city, only 30% of women who delivered during 2008 used PNC services. Possibly because of its low use prior to the intervention, the voucher scheme ' s effect on PNC was particularly dramatic: participation in the voucher scheme was associated with a 30 percentage point increase in PNC. The only maternal health service for which a secular trend was observed was ANC. The findings indicate an 11 percentage point increase in ANC independent of other factors. Findings from other studies also suggest that ANC use has been increasing in urban Pakistan in recent years. A study of clients at private health facilities in Pakistan showed that one-third of Pakistani women who visit private providers in urban Pakistan do so to obtain ANC (Agha, 2010). The voucher scheme had an independent effect on ANC use: participation in the scheme was associated with a 16 percentage point increase in ANC. Non-voucher programmatic variables had generally small effects on facility delivery and PNC. However, one programmatic variable was associated with a substantial increase in ANC: having a travel time to the nearest health facility of five minutes or less increased the use of ANC by 10 percentage points.

The findings of the study show a persistent effect of socio-economic factors on the use of maternal health services in Pakistan. Moreover, the socio-economic factors identified as having an effect on facility delivery had independent effects at three levels: individual, household and community. The D.G. Khan intervention addressed all three levels: it informed women regarding the benefits of delivering at a health facility; it provided households with the means to utilize medical care for delivery; it enabled the supply of medical care through private health professionals who were compensated for conducting deliveries of poor women. Interventions that address all three levels are likely to have the largest impact on the use of maternal health services. The findings of the study suggest that vouchers can help overcome some of these substantial socio-economic barriers to the utilization of maternal health services in Pakistan. This study was based on a pre-test/post-test design. The lack of a control area with which to compare the findings of the project is a major limitation of the study. The wide range of variables controlled for in the regression analysis should diminish or eliminate the effects of selectivity on observed variables. However, unobserved variables cannot be taken into account with the design used in this study. Quasi-experimental pre-test/post-test designs with control areas are stronger designs that should be adopted for the evaluation of large-scale voucher interventions. Two such studies with quasi-experimental designs to estimate the effects of maternal health voucher interventions using a strengthened version of the D.G. Khan voucher project are currently being implemented in two rural districts of Pakistan: Charsadda and Jhang (Agha and Carton, 2010). The findings from those studies should help collect stronger evidence regarding the impact of voucher interventions in increasing the rate of facility delivery and the use of other maternal health services in Pakistan.

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TABLE 1

Table 1. Characteristics of mothers who gave birth in 2008 and 2009 in D.G. Khan city

	2008 % (n=681) (1)	2009 % (n=745) (2)
Maternal Factors		
Mother ' s Age***		
16-24	22.9	33.7
25-29	36.0	36.0
30-34	23.1	20.5
35 plus	18.1	9.8
Parity/Living children		
1	21.0	23.0
2	20.6	22.1
3	15.6	18.7
4	17.0	14.6
5 or more	25.8	21.6
Mother ' s Education		
None	34.7	31.1
Any primary	17.3	15.8
Middle	14.8	14.4
Secondary	13.2	18.3
Matriculate or higher	20.0	20.4
Household Factors		
Mother ' s Autonomy*		
Low	26.4	30.2
Medium	42.1	45.4
High	31.4	24.4
Socio-economic Strata		
A	9.0	6.1
B	9.5	10.2
C	21.0	22.8
D	21.0	24.3
E	39.5	36.7
Community Level Factors Type of neighborhood		
Upper-income	5.1	3.9
Middle-income	61.8	68.3
Low-income	33.0	27.8

TABLE 1

Table 1. Characteristics of mothers who gave birth in 2008 and 2009 in D.G. Khan city (continued)

Program Factors Unrelated to the Scheme	2008	2009
Knows health worker assigned to the area		
No	13.4	15.5
Yes	86.6	84.5
Health worker visited during last 24 months		
No	35.2	34.8
Yes	64.8	65.2
Travel time to nearest health facility		
More than five minutes	66.7	66.4
Five minutes or less	33.3	33.6
Mode of travel to nearest facility		
Motorized	29.3	27.0
Foot	67.4	69.8
Other	3.2	3.2
Mass Media Exposure		
Do not watch television daily	33.3	34.2
Watch television daily	66.7	65.8
A worker provided information about a voucher		
scheme for pregnant women		77.2
No	-	22.8
Yes	-	
Purchase of voucher		
No	-	86.5
Yes	-	13.5
Use of Services		
At least three ANC visits during last pregnancy***		
No	38.6	24.8
Yes	61.4	75.2
Delivered last child at a health facility*		
No	39.2	32.7
Yes	60.8	67.3
Visited health facility for PNC after last delivery***		
No	70.2	60.4
Yes	29.8	39.6
Total	100.0	100.0

TABLE2

Table 2. Purchase of vouchers by maternal, household, community and program characteristics

	2009 % (n=742)
Maternal Factors	
Mother ' s Age	
16-24	11.2
25-29	12.4
30-34	19.1
35 plus	13.7
Parity/Living children***	
1	8.2
2	12.2
3	9.4
4	13.9
5 or more	23.8
Mother ' s Education**	
None	14.7
Any primary	23.9
Middle	13.1
Secondary	11.0
Matriculate or higher	6.0
Household Factors	
Socio-economic Strata***	
A	2.2
B	5.3
C	10.1
D	13.3
E	19.9
Community Level Factors	
Type of neighborhood*	
Upper-income	0.0
Middle-income	14.2
Low-income	13.6
Program Factors Unrelated to the Scheme	
Travel time to nearest health facility	
More than five minutes	14.2
Five minutes or less	12.0

TABLE2

Table 2. Purchase of vouchers by maternal, household, community and program characteristics (continued)

	2009 % (n=742)
Mode of travel to nearest facility*	
Motorized	8.5
Foot	15.6
Other	8.3
Mass Media Exposure	
Do not watch television daily	15.4
Watch television daily	12.5
Total	13.5

FIGURE 1

Figure 1. Socio-economic profile of pregnant women to whom vouchers were sold compared to other women

TABLE3

Table 3. Changes in ANC, facility delivery, and PNC use, by socio-economic status

	2008 % (n=681) (1)	2009 % (n=742) (2)	Change (3)
ANC			
Socio-economic Strata			
A	91.8	91.1	-0.7
B	73.8	90.8	+17.0
C	69.2	79.3	+10.1
D	59.4	80.6	+21.2
E	48.3	62.1	+13.8
Overall	61.4	75.2	+13.8
Facility Delivery			
Socio-economic Strata			
A	82.0	84.4	+2.4
B	76.9	86.8	+9.9
C	69.9	71.0	+1.1
D	62.2	71.7	+9.5
E	46.5	53.7	+7.2
Overall	60.8	67.3	+6.5
PNC			
Socio-economic Strata			
A	55.7	62.2	+6.5
B	38.5	50.0	+11.5
C	35.0	40.8	+5.8
D	26.6	45.0	+18.4
E	20.8	28.7	+7.9
Overall	29.8	39.6	+9.8

TABLE4

Table 4. Changes in ANC associated with purchase of vouchers

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Purchase of voucher			
No			
Yes	1.00	1.00	
	2.35**	2.89**	15.9
Year of survey			
2008	1.00	1.00	
2009	1.91***	1.87***	10.9
Program Factors Unrelated to the			
Scheme			
Health worker visited during last 24			
months			
No	1.00	1.00	
Yes	0.97	0.80*	-3.7
Travel time to nearest health facility			
More than five minutes	1.00	1.00	
Five minutes or less	2.00***	1.86***	10.5
Mode of travel to nearest facility			
Motorized/other	1.00	1.00	
Foot	0.94	1.08	
Mass Media Exposure			
Do not watch television daily	1.00	1.00	
Watch television daily	2.06***	1.46***	6.7
Maternal Factors			
Mother ' s Age			
16-24	1.00	1.00	
25-29	1.08	1.25	
30-34	0.99	1.72**	8.8
35 plus	0.80	1.92*	10.4
Parity/Living children			
1	1.00	1.00	
2	0.83	0.69	
3	0.66	0.48***	12.9
4	0.52***	0.42***	15.3
5 or more	0.33***	0.30***	21.8

TABLE4

Table 4. Changes in ANC associated with purchase of vouchers (continued)

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Mother ' s Education			
None	1.00	1.00	
Any primary	2.21***	1.94***	10.8
Middle	2.22***	1.66	
Secondary	5.40***	3.31***	18.5
Matriculate or higher	10.18***	5.14***	24.2
Household Factors			
Mother ' s Autonomy*			
Low	1.00	1.00	
Medium	1.32	1.11	
High	1.71**	1.47*	6.5
Socio-economic Strata			
A	8.72***	3.30*	17.4
B	3.94***	1.76*	9.2
C	2.39***	1.45	
D	2.00***	1.34	
E	1.00	1.00	
Community Level Factors			
Type of neighborhood			
Upper-income	2.30**	0.96	
Middle-income	1.87***	1.14	
Low-income	1.00	1.00	
R-squared		17.38%	

TABLE5

Table 5. Changes in facility delivery associated with purchase of vouchers

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Purchase of voucher			
No	1.00	1.00	
Yes	2.35*	3.27***	19.5
Year of survey			
2008	1.00	1.00	
2009	1.32***	1.14	
Program Factors Unrelated to the Scheme			
Health worker visited during last 12 months			
No	1.00	1.00	
Yes	1.35*	1.21*	3.7
Travel time to nearest health facility			
More than five minutes	1.00	1.00	
Five minutes or less	1.43**	1.33**	5.3
Mode of travel to nearest facility			
Motorized/other	1.00	1.00	
Foot	0.75*	0.91	
Mass Media Exposure			
Do not watch television daily	1.00	1.00	
Watch television daily	1.77***	1.21*	3.6
Maternal Factors			
Mother ' s Age			
16-24	1.00	1.00	
25-29	1.07	1.10	
30-34	1.09	1.61**	8.6
35 plus	0.82	1.55*	7.9
Parity/Living children			
1	1.00	1.00	
2	0.88	0.70**	-6.6
3	0.71*	0.53***	-12.1
4	0.55***	0.43***	-15.9
5 or more	0.34***	0.30***	-23.4

TABLE5

Table 5. Changes in facility delivery associated with purchase of vouchers (continued)

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Mother ' s Education			
None	1.00	1.00	
Any primary	1.84***	1.94***	7.2
Middle	1.82**	1.24	
Secondary	3.50***	1.93*	11.9
Matriculate or higher	11.87***	5.53***	28.1
Household Factors			
Mother ' s Autonomy*			
Low	1.00	1.00	
Medium	1.51*	1.26*	4.4
High	1.85*	1.71**	9.9
Socio-economic Strata A	4.87***	1.64	
B	4.62***	1.96*	11.9
C	2.38***	1.48**	7.3
D	2.07***	1.51	
E	1.00	1.00	
Community Level Factors			
Type of neighborhood			
Upper-income	3.52***	1.63***	8.8
Middle-income	2.26***	1.58***	8.7
Low-income	1.00	1.00	
R-squared		15.45%	

TABLE6

Table 6. Changes in PNC associated with purchase of vouchers

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Purchase of voucher			
No	1.00	1.00	
Yes	3.18**	4.43**	30.1
Year of survey			
2008	1.00	1.00	
2009	1.54**	1.24	
Program Factors Unrelated to the Scheme			
Health worker visited during last 12 months			
No	1.00	1.00	
Yes	1.26	1.06	
Travel time to nearest health facility			
More than five minutes	1.00	1.00	
Five minutes or less	1.50**	1.35*	5.7
Mode of travel to nearest facility			
Motorized/other	1.00	1.00	
Foot	0.76	0.81	
Mass Media Exposure			
Do not watch television daily	1.00	1.00	
Watch television daily	1.51**	1.11	
Maternal Factors			
Mother ' s Age			
16-24	1.00	1.00	
25-29	1.10	1.16	
30-34	1.08	1.46	
35 plus	0.85	1.61	
Parity/Living children			
1	1.00	1.00	
2	0.79	0.66*	-7.5
3	0.59***	0.46***	-13.6
4	0.49**	0.44**	-14.1
5 or more	0.39***	0.42***	-15.6

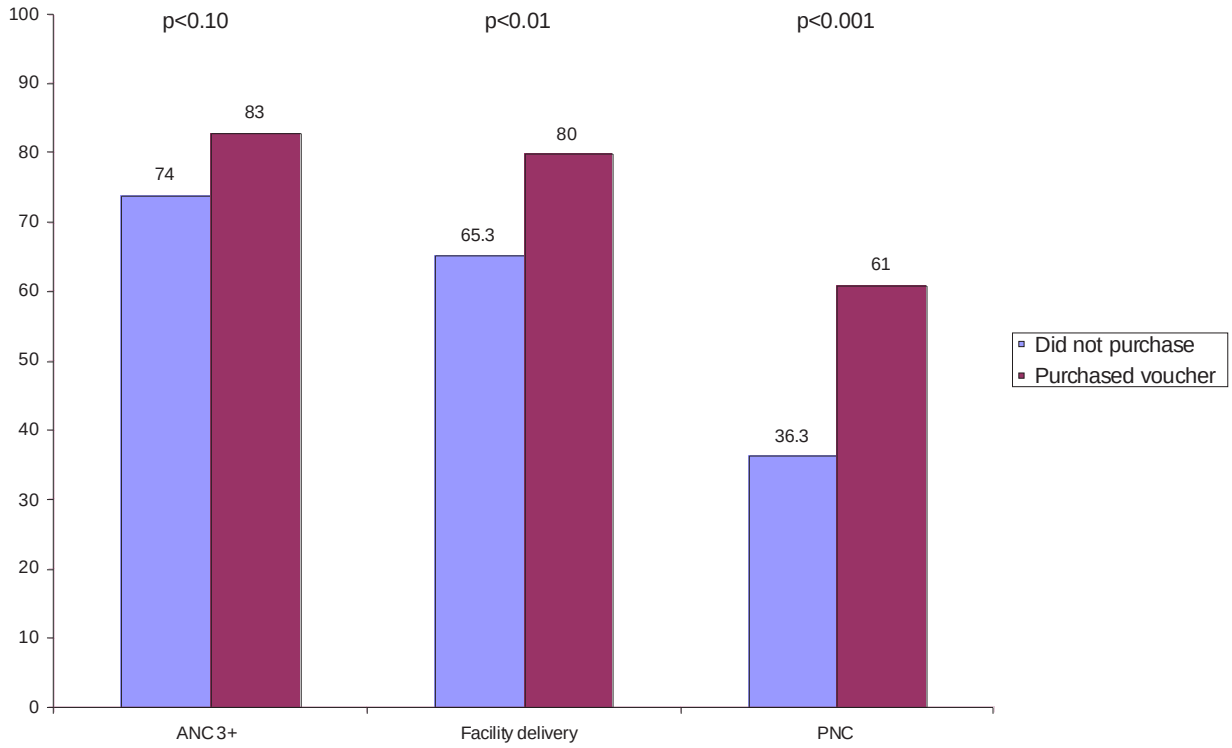
TABLE6

Table 6. Changes in PNC associated with purchase of vouchers (continued)

	Unadjusted odds ratios (n=1,423) (1)	Adjusted odds ratios (n=1,423) (2)	Marginal effects % (3)
Mother ' s Education			
None	1.00	1.00	
Any primary	1.62***	1.37	
Middle	2.25***	1.89***	12.2
Secondary	3.89***	2.88***	21.0
Matriculate or higher	5.58***	3.72***	27.1
Household Factors			
Mother ' s Autonomy*			
Low	1.00	1.00	
Medium	1.33	1.13	
High	0.94	0.79	
Socio-economic Strata			
A	4.28***	2.02	
B	2.45***	1.15	
C	1.87***	1.15	
D	1.77**	1.28	
E	1.00	1.00	
Community Level Factors			
Type of neighborhood			
Upper-income	2.78***	1.51*	8.1
Middle-income	2.90***	2.00***	12.8
Low-income	1.00	1.00	
R-squared		14.04%	

FIGURE 2

Figure 2. Use of ANC, facility delivery, and PNC, by voucher purchase



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