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Expansion in the private sector provision of institutional delivery services and horizontal equity: evidence from Nepal and Bangladesh

David R Hotchkiss,[1]* Deepali Godha[2] and Mai Do[1]

[1]Department of Global Health Systems and Development, Tulane University School of Public Health and Tropical Medicine, New Orleans, LA, USA and [2]16/1 South Tukoganj, Indore (M.P.), India.

*Corresponding author. Department of Global Health Systems and Development, Tulane University School of Public Health and Tropical Medicine, 1440 Canal Street, Suite 2200, New Orleans, LA, USA. E-mail: hotchkis@tulane.edu

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Wealth-related inequity in the use of maternal healthcare services continues to be a substantial problem in most low- and middle-income countries. One strategic approach to increase the use of appropriate maternal healthcare services is to encourage the expansion of the role of the private sector. However, critics of such an approach argue that increasing the role of the private sector will lead to increased inequity in the use of maternal healthcare services. This article explores this issue in two South Asian countries that have traditionally had high rates of maternal mortality—Nepal and Bangladesh. The study is based on multiple rounds of nationally representative household survey data collected in Nepal and Bangladesh from 1996 to 2011. The methodology involves estimating a concentration index for each survey to assess changes in wealth-related inequity in the use of institutional delivery assistance over time. The results of the study suggest that the expansion of private sector supply of institutional-based delivery services in Nepal and Bangladesh has not led to increased horizontal inequity. In fact, in both countries, inequity was shown to have decreased over the study period. The study findings also suggest that the provision of government delivery services to the poor protects against increased wealth-related inequity in service use.

Keywords Maternal services, equity, private sector

KEY MESSAGES

- Limited empirical evidence is available on whether an expansion in the private sector provision of institutional-based delivery services has led to increased wealth-related inequity in the use of services.
- In Nepal and Bangladesh, the expansion of private sector supply of institutional-based delivery services has not led to increased wealth-related inequity in service utilization. In fact, wealth-related inequity decreased over the 1996–2011 study period in both countries.
- The study findings also suggest that the provision of government delivery services to the poor protects against increased wealth-related inequity in service use.

Introduction

Although remarkable progress has been made in recent years in combating maternal mortality in low- and middle-income countries, wealth-related inequity in the use of maternal healthcare services continues to be a substantial problem. As has been reported in previous studies, women from richer households continue to be much more likely to deliver in healthcare facilities than poorer women (Houweling *et al.* 2007). In most countries, there are greater rich–poor disparities in the use of maternal healthcare services than in the use of many other types of priority healthcare interventions, including newborn and child healthcare services (Bhutta *et al.* 2010).

One strategic approach available to policy makers to increase the use of maternal healthcare services is to encourage the expansion of the role of the private sector—where the private sector is defined as all providers outside the public sector, whether their aim is philanthropic or commercial. Since the 1980s, there has been extensive debate on the proper role of the private healthcare sector. Advocates argue that private sector expansion could allow governments to better target the poor and other vulnerable populations. Many also point out that the private sector already constitutes a significant proportion of the healthcare delivery market in most low- and middle-income countries. However, critics argue that increased reliance on the private sector may lead to more limited financial access to healthcare services among the poor, and as a result, increase wealth-related inequity (Brugha and Zwi 1998; Mills *et al.* 2002; Marriott 2009; Yoong *et al.* 2010).

Relatively little empirical evidence from low- and middle-income countries is available on this issue. A recent study based on nationally representative data from 34 sub-Saharan African countries found that increased private sector provision of deliveries is associated with favourable outcomes in terms of service access and equity (Yoong *et al.* 2010). Another multi-country study, based on data from 45 developing countries, found that, in all but two countries, richer women are more likely to use both private and public services than poorer women (Houweling *et al.* 2007). No studies are available that investigate changes in the size of the private sector over time in relation to changes in equity in maternal healthcare use.

This article explores whether an expansion in the role of the private sector leads to increased wealth-related inequity in the use of institutional delivery assistance. The study is based on data from two South Asian countries that traditionally have had high rates of maternal mortality—Bangladesh and Nepal. Although both countries have made progress in reducing maternal mortality over the past 20 years, the percentage of women who deliver with the assistance of a skilled birth attendant remains low—27% in Bangladesh in 2010 and 36% in Nepal in 2011 (World Health Organization and UNICEF 2012). The study, based on multiple rounds of Demographic and Health Survey (DHS) data from both countries, involves estimating a concentration index for each survey round to assess changes in the degree of wealth-related inequity in the use of institutional delivery care over time.

Methods

Country selection

Bangladesh and Nepal are selected for this study based on the following criteria: (1) each country has at least three rounds of DHS data available, (2) the public and private sectors in each country are clearly distinguishable in the survey questions related to the last childbirth, (3) each country has a reasonable proportion of women who utilize institutional delivery care for the last childbirth (10% or more) and (4) each country has experienced an expansion of the role of the private sector in the provision of institutional-based delivery assistance.

Data sources and indicators

For each country, data from multiple rounds of the DHS were used. In Nepal, the surveys were conducted in 1996, 2001, 2006 and 2011, and in Bangladesh, the surveys were conducted in 1996–97, 1999–2000, 2004, 2007 and 2011. Each of the surveys included questions on assets and living conditions and, for women who delivered in the 5-year period before each survey, self-reported information on the place of delivery. The data were obtained with permission from MEASURE DHS, funded by the US Government's Agency for International Development.

The main variable of interest in this study is the place of delivery for the most recent birth that occurred during the 3-year period prior to the survey. Deliveries were classified as having taken place in a private facility, a public facility or at home. Private institutional delivery is defined to include any delivery that took place in an institution identified as either a private commercial facility or a non-governmental organization (NGO) facility. Those cases in which the place of delivery was coded as 'other' or 'don't know' (which account for <2% and 1% of eligible cases in each survey in Nepal and Bangladesh, respectively) were dropped from the analysis. The main independent variable of interest is an index of household wealth provided by DHS. The index is constructed from information on household assets and living conditions using principal component analysis and categorized into five wealth quintiles (from poorest to richest).

The final sample includes women of reproductive age (15–49 years) who reported having given birth in the 3 years preceding the survey irrespective of marital status. In Nepal, the final sample sizes are 3811 for 1996, 3489 for 2001, 2969 for 2006 and 2740 for 2011. In Bangladesh, the final sample sizes are 3263 for 1997, 3735 for 1999–2000, 3726 for 2004, 3373 for 2007 and 4649 for 2011.

Procedures and equity measures

The methodology used in the analysis follows that used by Agha and Do (2008) and Hotchkiss *et al.* (2011), which explored whether an expansion in private sector contraceptive supply leads to inequality in modern contraceptive prevalence use. We first carried out descriptive analysis of the changes over time in the share of all deliveries that took place in a private institutional setting, a public institutional setting and at home. We also looked at changes over time in the use of private healthcare facilities among women in each wealth quintile.

To assess horizontal equity in the use of institutional delivery care by wealth groups, which we define as unequal use for

equal need (Whitehead 1992), we calculated a concentration index for each survey round to determine equality in the use of institutional delivery care. The concentration index can vary from −1.0 to +1.0, where negative values indicate relatively higher utilization among the poor, positive values indicate comparatively higher utilization among the better off and 0 indicates no inequality.

For most types of healthcare services, including the treatment of acute and chronic health conditions and preventive care, the concentration index is a measure of inequality rather than inequity, where the former measures differences in utilization across wealth groups and the latter measures differences in utilization across wealth groups after controlling for need. To assess whether health care is equitably distributed, research methods are available to standardize for need in relation to household wealth (O'Donnell *et al.* 2007). For maternal health care, complications during the woman's pregnancy and the woman's previous birth history may constitute different degrees of need. However, there is consensus among maternal healthcare experts that all women are in need of institutional delivery assistance to appropriately address potential complications and to ensure proper care for the newborn child (World Health Organization 2005). As such, in this analysis, we interpret the concentration index as a measure of not only inequality but also horizontal inequity.

To assess differences in horizontal equity over time, concentration curves from each survey year and for each country are generated using the Lorenz option in Stata 10.1. These curves display the cumulative distribution of institutional delivery by cumulative population proportions of wealth groups ranked from poorest to richest. The line-of-equality or the 45-degree line means an equitable distribution of institutional delivery services among the study population irrespective of household economic status. If a curve lies above this line, it indicates a pro-poor utilization of institutional deliveries within the population, and if a curve lies below the line, it indicates a pro-rich utilization of the service. The distance between any curve and the line of equality indicates the degree of inequality, with the uppermost (lowermost) curve showing the most pro-poor (pro-rich) distribution.

Due to sampling variability in the survey data, a visual inspection of these curves cannot be used to conclude statistical dominance and, as a result, dominance tests were conducted. Two different approaches are used—the multiple comparison approach (m.c.a.) and the intersection union principal (i.u.p.) (for details on the approaches, see O'Donnell *et al.* 2007). The first approach rules statistical dominance if there is even one significant difference between curves in one direction and none in the other direction and also corrects for multiple comparisons. For example, dominance between curves A and B is concluded if curve A lies significantly above curve B even at one point and curve B does not lie above curve A at any point. If there is no significant difference between curves in either direction then this approach concludes non-dominance. In contrast, the 'i.u.p.' approach concludes dominance only if there are significant differences at all points. While the latter reduces erroneous acceptance of dominance, this stricter rule also reduces the power of detection. Curves are said to be crossed if curve A lies significantly above curve B at one point and curve B lies significantly above curve A at another point.

Note that the study 'descriptively' explores the association between private sector expansion and inequity in service use. We do not attempt to empirically attribute changes in the equity of institutional deliveries to changes in private supply, as we do not have information on the supply of maternal healthcare services. This and other limitations of the study are described in the 'Discussion' section.

Results

This section presents the empirical results for the two study countries. We first describe changes in the share of women who report using assistance in private institutional healthcare settings over time. We then present changes in the values of concentration indices for the use of institutional deliveries and tests for statistical dominance of the concentration curves. Next, to help describe changes in equity in the use of institutional-based delivery, we explore changes over time in the extent to which poor women relied on the private institutional sector for delivery care. Finally, we explore whether the results hold when we repeat the analysis at the regional level.

Per cent of all women who delivered in a private institutional setting

Figures 1 and 2 show the per cent of sample women in each country who report having delivered in the past 3 years in a private institutional setting. The numbers on top of the bars indicate the total percentage of deliveries that took place in institutional settings; the numbers inside or to the right of the bars indicate the percentage of deliveries at home, at public sector facilities and at private sector facilities.

The results show that there was an expansion in the role of the private institutional sector in both countries. In Nepal, the per cent of women using private institutional delivery assistance increased from 1.3% in 1996 to 10.4% in 2011, and in Bangladesh, the per cent increased from 2.1% in 1996 to 17.1% in 2011. The per cent of women using government healthcare facilities also increased over the same period, from 6.3% to 31.9% in Nepal, and from 2.9% to 12.0% in Bangladesh.

Figures 1 and 2 also present the percentage of women who delivered in institutional settings over time. As the private sector share increased in Nepal and Bangladesh, the percentage

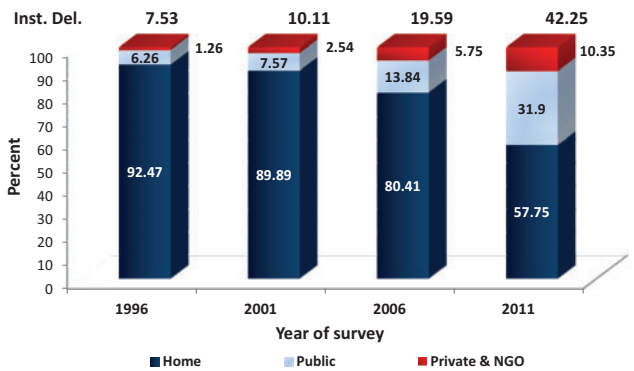

Figure 1 Place of delivery by year, Nepal.

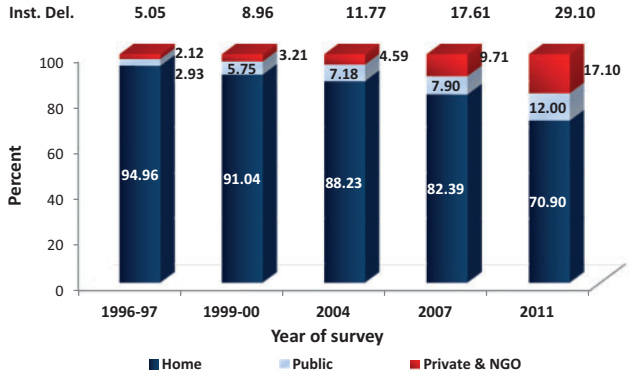

Figure 2 Place of delivery—Bangladesh.

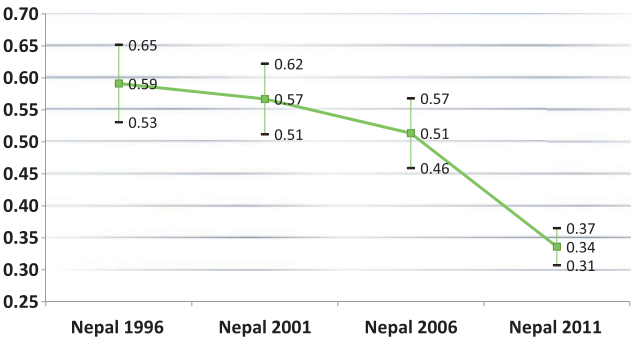

Figure 3 Concentration index results for institutional delivery, 1996–2011, Nepal.

of women who report having had institutional deliveries also increased. In Nepal, institutional delivery assistance increased from 7.5% in 1996 to 42.3% in 2011, and in Bangladesh, institutional delivery increased from 5.1% in 1996 to 29.1% in 2011.

Inequality and horizontal inequity in institutional deliveries

Figures 3 and 4 present for Nepal and Bangladesh, respectively, the estimated concentration indices for the use of institutional delivery care, along with 95% confidence intervals. As described in the 'Methods' section, the concentration index for actual use of institutional delivery care is interpreted as an indicator of both inequality and inequity. The study results suggest that, in both countries, wealth-related inequality in the use of institutional delivery services decreased. In Nepal, the concentration index decreased from 0.59 in 1996 to 0.34 in 2011, and in Bangladesh, the concentration index dropped from 0.64 in 1996 to 0.35 in 2011. In both countries, the concentration index dropped steadily from each survey year to the subsequent survey year.

Figures 5 and 6 show concentration curves for each survey for both Nepal and Bangladesh. These curves show the cumulative percentage of institutional deliveries on the *y*-axis against the cumulative percentage of the study population on the *x*-axis, ranked from poorest to richest. As all the curves lie below the line of equality, they indicate that the distribution of institutional delivery services is lower among the poorer segments of the study populations. In both countries, with each survey year,

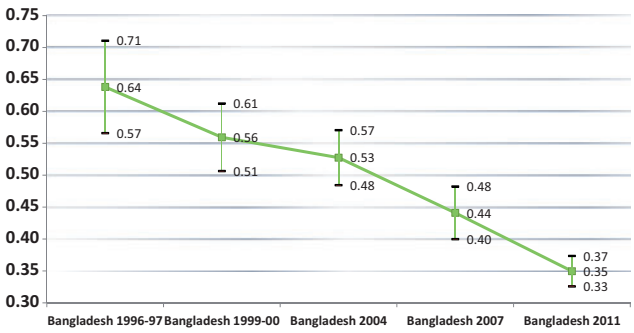

Figure 4 Concentration index results for institutional delivery, 1996–2011, Bangladesh.

the concentration curves appear to be nearer to the line of equality suggesting that over time the distribution of institutional delivery services among study population has become more equitable.

To provide further statistical evidence on this issue, dominance tests were conducted between concentration curves for consecutive survey years as well as between the concentration curves from the earliest and most recent survey years. In Nepal, dominance testing between concentration curves from years 1996 and 2001 shows statistical non-dominance using both approaches. On the other hand, in Nepal, the 2006 concentration curve dominates that of 2001 as per the 'm.c.a.' approach but shows non-dominance according to the more conservative 'i.u.p.' approach; similar results were found when comparing 2006 and 2001 concentration curves. This may be due to an overlap between the curves. The 2011 concentration curve is found to be dominant over the 1996 concentration curve using both 'm.c.a.' and 'i.u.p.' approaches indicating that the distribution of institutional delivery is significantly less pro-rich in 2011 than in 1996.

In Bangladesh, no dominance is found between the concentration curves for any two consecutive survey years—1996–97 and 1999–2000; 1999–2000 and 2004 and 2004 and 2007—using either the 'm.c.a.' approach or the 'i.u.p.' approach. This indicates that the curves for consecutive survey years are not statistically different from each other in either direction. However, the concentration curve for 2011 shows dominance over the curves for both 2007 and 1996–97 using the 'm.c.a.' approach, whereas the results show non-dominance with the 'i.u.p.' approach.

Per cent of poor women who delivered in a private institutional setting

Figures 7 and 8 present the share of women that used private facilities over time by wealth quintile in both countries. Tables A1 and A2 present the same results in tables. These figures show that, among women in each of the five wealth groups in each country, the per cent of women who delivered in institutional settings increased during the study periods, as did the percentage of women who delivered at a private sector facility. Even women in the poorest two wealth groups increased their use of private facilities over the study period.

In Nepal, for example, the percentage of women in the poorest wealth group who delivered in a private facility

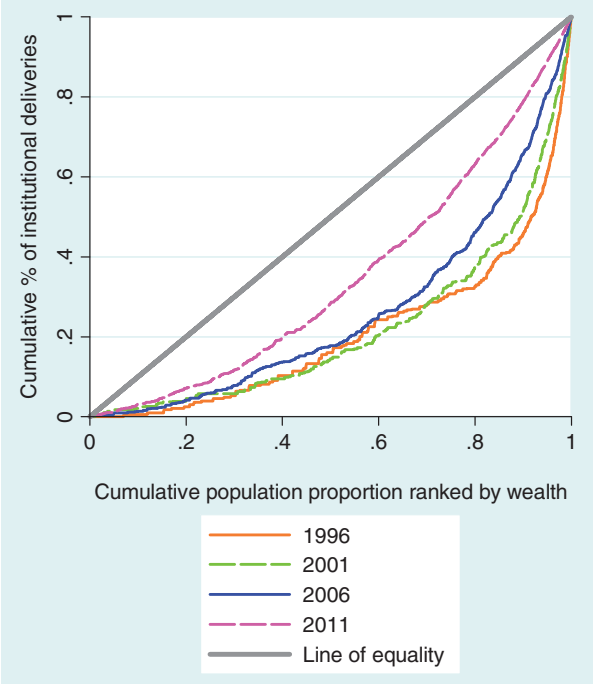

Figure 5 Concentration curves 1996, 2001, 2006 and 2011, Nepal.

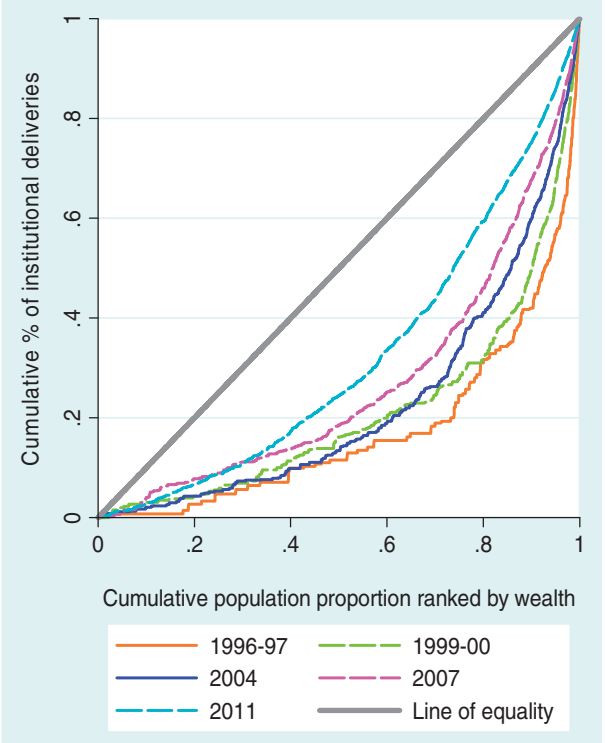

Figure 6 Concentration curves 1996–97, 1999–2000, 2004, 2007 and 2011, Bangladesh.

increased from 0.5% in 1996 to 1.9% in 2011. Among those in the second to poorest wealth quintile, there was an increase in the per cent delivering in private facilities from 0.0% to 4.7% over the same period. However, the increase in the per cent of women delivering in public facilities was substantially higher than the increase in the private sector. In Nepal, the public sector continued to be the main source of institutional deliveries among all women.

The situation in Bangladesh is different. Over the period from 1996 to 2011, the per cent of women in the poorest quintile who used private facilities increased from 0.0% to 3.2%, and among women in the second to poorest wealth quintile, the increase was from 0.2% to 8.9%. Moreover, by the time of the 2011 survey, private commercial and NGO facilities combined became a more important source of delivery assistance among women in the top four wealth quintiles than the public sector.

Disaggregation by region

We repeated our analysis at the regional level in both Nepal and Bangladesh. In Nepal, the results suggest that the reliance on the private sector increased in each of the five regions, but more so in the Eastern and Central regions than in the Western, Mid-Western and Far-Western regions. The use of public sector services also increased substantially in all five regions, and inequity, as measured by the concentration index, decreased in all but the Western region (results not shown). In Bangladesh, the role of the private sector also increased in each of the regions (Barisal, Chittagong, Dhaka, Khulna, Rajshahi and Sylhet), and by the time of the last survey in 2011, the private sector was a more important source of institutional delivery assistance than the public sector in every region except for Sylhet. At the same time, there was a decrease in inequity of the use of institutional delivery assistance in all six regions (results not shown).

Discussion

The purpose of this study is to investigate whether an expansion of the role of the private sector in the provision of institutional deliveries has led to increased inequity in service use in Nepal and Bangladesh. The private sector is defined to include services provided by both NGOs and the private commercial sector. Some heath sector reform advocates argue that, by facilitating the expansion of the private sector, governments can potentially better target those women who are most in need of services, but lack the ability and willingness to pay. However, others argue that the increased reliance on the private sector without appropriate adjustment of the targeting of subsidies to the poor and other vulnerable groups could potentially lead to greater inequity in service utilization. Because the relationship between increased private market share and wealth-related inequity is not obvious, maternal health policy makers in low- and middle-income countries need empirical evidence on this issue.

Concentration indices and curves are used to assess changes in inequity in the use of institutional-based services over time in Nepal and Bangladesh using multiple rounds of DHS data. In this analysis, we assume that all the women who gave birth within the 3-year period before the survey were in need for delivery services. In other words, institutional services are assumed to be the standard of care for all women who deliver to avoid and address complications and ensure the proper care

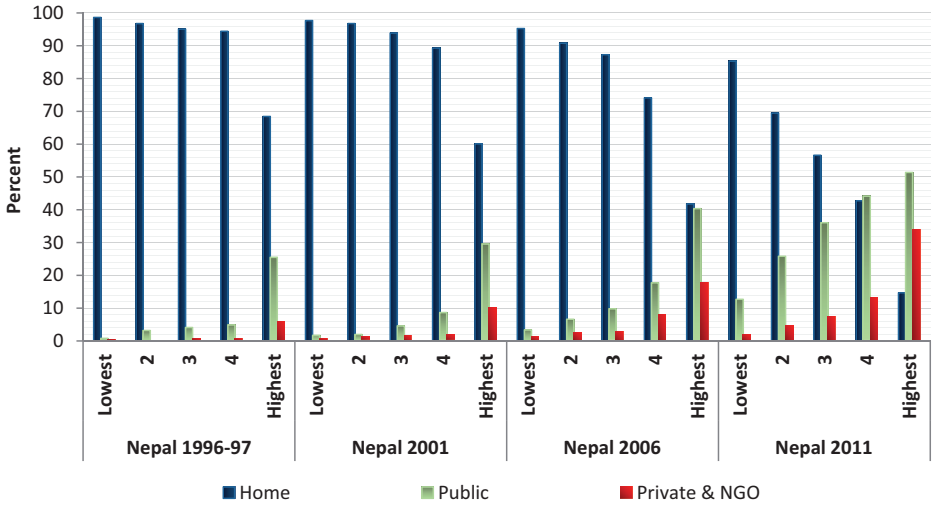

Figure 7 Per cent distribution of women by place of delivery and by wealth quintile, 1996–2011, Nepal.

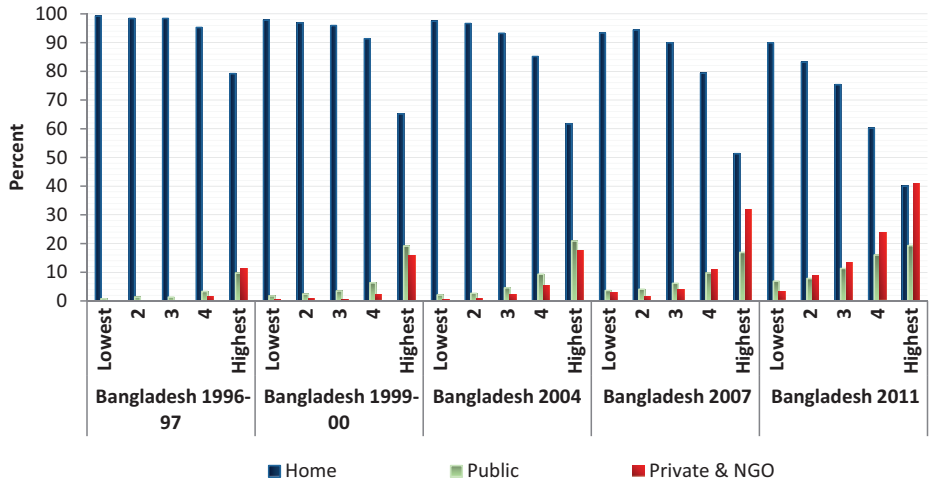

Figure 8 Per cent distribution of women by place of delivery and by wealth quintile, 1996–2011, Bangladesh.

of the newborn. As a result, we interpret the concentration index generated for each survey as a measure of horizontal inequity in service use.

Overall, the results of the study suggest that the expansion of the private sector supply of institutional-based delivery services in Nepal and Bangladesh has not led to increased inequity. In fact, inequity was shown to have decreased over the study period in both countries. In Nepal, the concentration curve in the last survey year (2011) was statistically dominant over the concentration curve in the earliest survey year (1996) using two statistical test procedures. In Bangladesh, only one of the two test procedures yields statistical dominance between the last survey year (2011) and the first (1996–97). Moreover, we find that sampled women in the poorest wealth quintiles in each country increased their reliance on the private institutional sector during the study period in both countries.

How did inequity in facility-based delivery decrease in the study countries? The increase in the use of institutional deliveries began through the increased use of the public sector for each wealth group—more so in Nepal than in Bangladesh. In Nepal, both public and private sector shares increased among women in each wealth group over time. However, the share of women delivering in public facilities rose faster than the share delivering in private facilities, with women in richer households experiencing higher utilization rates in each sector. These results suggest that the public sector played a bigger role than the private sector in contributing to more equitable distribution of service utilization in Nepal. The increase in the proportion of women delivering in healthcare facilities may be in part due to the Nepal's free delivery policy, which was introduced in January 2009. Aimed to reduce the cost of delivery care to households and to increase facility deliveries, the programme initially entitled women to free delivery care and was later modified so that it provides cash payments to women who deliver in facilities, and incentives for health workers to assist home deliveries (Witter *et al.* 2011).

In Bangladesh, where the use of facility-based delivery has not increased as fast as Nepal, the situation is different. Improving equity in the provision of maternal healthcare services has been an explicit policy objective of the

Government of Bangladesh over the past 15 years. Among the goals of the government's strategy has been to increase reliance on NGOs for service delivery (including the use of vouchers in selected districts) and to improve the availability of Emergency Obstetric Care (National Institute of Population Research and Training (NIPORT), MEASURE Evaluation and ICDDR,B 2012). The analysis shows some evidence of the success of the strategy. Improvements in equity over time coincided with the increased uptake of private sector services among women in better off households at the expense of services from the public sector. The use of the private institutional sector started among women in richer households, and then increased over time among women in the middle and poorer wealth groups. By the time of the 2011 survey, the private sector had become a more important source of institutional delivery assistance than the public sector for all but the poorest wealth quintile.

While comparisons between the two countries should be made with caution due to variation in the policy, economic, political and cultural contexts, it is interesting to note that the more privatized system of Bangladesh, where 59% of births in healthcare facilities were in the private sector in 2011 as compared to 25% in Nepal, performed similarly to that of the more publicized system in Nepal in terms of changes in equity. While there was much less of an increase in the overall utilization of institutional delivery services, there was a similar decline in the concentration index.

We emphasize that the decreases in wealth-based inequity over the study period are due to increases in the overall (public and private) utilization of institutional delivery services, and that in both countries, the public sector remains an important source of delivery assistance among the poor. In this analysis, we were unable to disaggregate the contributions of public and private sectors in improving wealth-related equity.

The results of the study are consistent with those found in previous studies. For example, found that greater participation of the private sector is associated with improvements in access and equity in the use of maternal healthcare services in sub-Saharan Africa. In addition, Patouillard *et al.* (2007) found that some interventions designed to improve the use and equity of healthcare service delivery through private for-profit sector engagement have been successful, and Houweling *et al.* (2007, p. 8) found that 'in absolute terms, poor–rich inequalities in the use of public facilities usually are larger than private sector inequalities, suggesting that the public sector does not provide a safety net for the poor'.

There are a number of limitations of the study. First, the study descriptively explores the association between private sector expansion and inequity in service use. We are unable to attribute changes in the equity of institutional-based deliveries to changes in private supply. Second, our data do not contain information on the maternal healthcare supply environment, which includes the financial and physical access to services, service readiness and service quality in both the public and private sectors. The physical availability of private services is mostly likely higher in urban areas than in rural areas, and that, as reported in other studies of maternal health care in low- and middle-income countries, the quality of health care delivered by private providers varies substantially and may not be necessarily better than that offered in the public sector (Basu *et al.* 2012). With respect to financial access, we also do not have information on the out-of-pocket fees charged at facilities, which may be an important determinant of service utilization. Third, although we have information on whether deliveries in private institutional settings took place in facilities managed by NGOs or in other types of private facilities, we are unable to definitively distinguish between private for-profit and not-for-profit facilities in the analysis. Finally, the study results cannot be used to make recommendations on the proper role of the public and private sectors. As pointed out, the proper role of the private sector is likely to depend on the ability of governments to provide effective stewardship, the healthcare financing environment and the organization of the private sector.

Conclusion

The study findings suggest that the expansion of the private sector in Nepal and Bangladesh has not led to increased wealth-related inequity in the use of institutional-based delivery services. On the contrary, wealth-related inequity appears to have decreased during the study period in both countries. The study findings also suggest that the provision of government delivery services to poor women protects against increased wealth-related inequity in service use.

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Conflict of interest

None declared.

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Appendix

Table A1 Per cent distribution of women giving birth during the past 3 years, by place of delivery at most recent birth and by wealth quintile in Nepal

Survey year	Wealth quintile	Home	Public	Private/ NGO
Nepal 1996–97	Poorest	98.67	0.82	0.51
	Poor	96.78	3.22	0.00
	Middle class	95.09	4.12	0.78
	Rich	94.44	4.92	0.64
	Richest	68.48	25.52	6.01
Nepal 2001	Poorest	97.69	1.71	0.60
	Poor	96.80	2.00	1.20
	Middle class	93.89	4.60	1.50
	Rich	89.31	8.67	2.02
	Richest	60.12	29.60	10.28
Nepal 2006	Poorest	95.28	3.39	1.34
	Poor	90.81	6.65	2.54
	Middle class	87.30	9.81	2.89
	Rich	74.13	17.75	8.12
	Richest	41.80	40.37	17.83
Nepal 2011	Poorest	85.34	12.72	1.94
	Poor	69.49	25.84	4.67
	Middle class	56.62	36.07	7.31
	Rich	42.76	44.17	13.07
	Richest	14.70	51.40	33.90

Table A2 Per cent distribution of women giving birth during the past 3 years, by place of delivery at most recent birth and by wealth quintile in Bangladesh

Survey year	Wealth quintile	Home	Public	Private/ NGO
Bangladesh 1997	Poorest	99.23	0.77	0.00
	Poor	98.41	1.37	0.22
	Middle class	98.44	1.34	0.22
	Rich	95.29	3.34	1.37
	Richest	79.21	9.72	11.07
Bangladesh 2000	Poorest	97.85	1.77	0.38
	Poor	96.87	2.42	0.71
	Middle class	95.94	3.49	0.57
	Rich	91.38	6.34	2.28
	Richest	65.20	19.15	15.64
Bangladesh 2004	Poorest	97.48	2.10	0.42
	Poor	96.67	2.69	0.64
	Middle class	93.24	4.59	2.17
	Rich	85.18	9.34	5.48
	Richest	61.71	20.90	17.39
Bangladesh 2007	Poorest	93.39	3.66	2.95
	Poor	94.39	4.10	1.51
	Middle class	89.94	6.18	3.88
	Rich	79.35	9.76	10.89
	Richest	51.32	16.94	31.74
Bangladesh 2011	Poorest	89.93	6.91	3.16
	Poor	83.23	7.85	8.92
	Middle class	75.36	11.36	13.28
	Rich	60.23	16.03	23.74
	Richest	40.01	19.33	40.67