

# Factors affecting home delivery in the Kathmandu Valley, Nepal

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This nested case-control study compares the characteristics of mothers having home or institutional deliveries in Kathmandu, Nepal, and explores the reasons given by mothers for a home delivery.

The delivery patterns of mothers were identified in a cross-sectional survey of two communities: an urban area of central Kathmandu (Kalimati) and a peri-urban area (Kirtipur and Panga) five kilometres from the city centre. 357 pregnant women were identified from a survey of 6130 households: 183 from 3663 households in Kirtipur and Panga, 174 from 2467 households in Kalimati. Methods involved a structured baseline household questionnaire and detailed follow-up of identified pregnant women with structured and semi-structured interviews in hospital and the community.

The main outcome measures were social and economic household details of pregnant women; pregnancy and obstetric details; place of delivery; delivery attendant; and reasons given for home delivery. The delivery place of 334/357 (94%) of the pregnant women identified at the survey was determined. 272 (81%) had an institutional delivery and 62 (19%) delivered at home. In univariate analysis comparing home and institutional deliveries, maternal education, parity, and poverty indicators (income, size of house, ownership of house) were associated with place of delivery. After multivariate analysis, low maternal educational level (no education, OR 5.04 {95% CI 1.61-15.8}, class 1-10, OR 3.36 {1.04-10.8} compared to those with higher education) and multiparity (OR 3.1 {1.63-5.74} compared to primiparity) were significant risk factors for a home delivery. Of home deliverers, only 24% used a traditional birth attendant, and over half were unplanned due to precipitate labour or lack of transport.

We conclude that poor education and multiparity rather than poverty per se increase the risk of a home delivery in Kathmandu. Training TBAs in this setting would probably not be cost-effective. Community-based midwife-run delivery units could reduce the incidence of unplanned home deliveries.

## Introduction

Of the half a million maternal deaths occurring annually worldwide, 99% occur in developing countries.<sup>1</sup> The maternal mortality rate in Nepal is one of the highest in the world. Figures quoted range from 515 to 1500/100 000 live births.<sup>2,3,4</sup> The rate in the UK is 9/100 000.<sup>4</sup> This high level of maternal mortality in developing countries has been attributed partly to the non-availability of services and partly to poor utilization of services even when they are available.<sup>5</sup>

All women have a right to a delivery with a trained attendant whether at home or in hospital. Outside

Kathmandu over 90% of women continue to deliver at home, many unattended.<sup>2,6</sup> In Kathmandu, the capital of Nepal, as in many urban centres of less developed countries, there is an increasing trend towards institutional delivery. We have recently shown in a community-based study of two areas, one urban, one peri-urban, in Kathmandu that 81% of women choose institutional delivery.<sup>7</sup> Institutional delivery is estimated to be sought by 65% of mothers in the Kathmandu Valley as a whole. However, a significant proportion of women in urban Kathmandu continue to deliver at home despite few community-based attendants and easy access to institutional maternity services. In order to rationally design

appropriate maternity services, planners need more information about why mothers choose a home delivery in this urban setting. Are these low risk mothers who are rationally deciding to stay at home, perhaps with TBA support? Or are they mothers for whom hospital delivery is appropriate? This paper describes the factors influencing home delivery amongst women who have the choice of institutional or home delivery in the Kathmandu Valley.

## Subjects and methods

### Setting

#### *Nepal*

Nepal is a low income country in South Asia with a population of 21 million. The average GNP per capita is US\$200, life expectancy is 54 years and female illiteracy is 87%. Nationally 10% of births are attended by health staff and infant mortality is estimated at 95 per 1000 live births.<sup>8</sup>

#### *Kathmandu*

Kathmandu, the capital city, is situated in a valley at an altitude of 4500 feet. The total population of the valley is estimated at 1.1 million. The annual urban growth rate is 7.4%.<sup>8</sup>

#### *Study areas*

1. Kirtipur (including Panga) is a peri-urban area five kilometres south-west of the city, with a total population according to the 1991 census of 21 000 people. The majority are local farmers and wage labourers, whilst others commute the short distance to work in the city. It is a settled, largely Newar community (the traditional inhabitants) situated outside the Kathmandu municipality. There is little migration into the town, although it is close enough for women to deliver in Kathmandu.

2. Kalimati is an urban area of central Kathmandu, situated two kilometres from the main government maternity hospital, with a total population of about 14 000. This is a mixed community, with a core of long-term Newar residents and immigrants from other areas of Nepal, and from India. This site was chosen as it is typical of central, urban Kathmandu.

### Maternity services

Within the urbanized area of the valley there are three main hospitals providing maternity services:

i. The government-funded maternity hospital (Prasuti Griha) currently has 15 000 deliveries per annum.

ii. Patan hospital, situated relatively near Kirtipur, has 5000 deliveries per annum.

iii. Teaching hospital, in the north of Kathmandu, has 3000 deliveries per annum. Throughout the city there are small private nursing homes also offering a delivery service. All these institutions charge for their services. Prasuti Griha provides the cheapest options, and nursing homes the most expensive.

### Methods

The study received ethical approval from the Nepal Health Research Council.

#### *i. Baseline household survey*

The cross-sectional socioeconomic and demographic survey of all households in the study areas was performed by a locally based NGO (Institute of Community Health, New Baneshwor, Kathmandu) from November 1994 to January 1995. Close supervision was provided by the study investigators.

Both areas were initially mapped and all households were then visited by a trained interviewer. The initial respondent was asked about general household data, and then asked if any women living in the household were pregnant. All pregnant women were interviewed personally (the interviewer returned if a woman was initially unavailable). At the time of the survey pregnant women were given a registration card and instructed to bring this to the hospital if they attended. No guidance about place of delivery was offered although women were asked about their intended place of delivery.

#### *ii. Follow-up interviews with pregnant women*

Actual place of delivery was subsequently recorded by two methods:

i. Deliverers in Prasuti Griha handed in their registration cards or were identified by their address given at admission and were interviewed.

ii. Our community staff visited patients around their expected time of delivery and recorded the delivery place of those who delivered at home or in other institutions. The delivery place of 334 of the 357 pregnant women identified at the survey was determined.

Four (1%) had an abortion and 19 (5%) were lost to follow-up. 334 (94%) of mothers identified in the household survey were successfully followed up.

**Table 1.** Unadjusted case-control comparison between home (n = 62) and institutional (n = 272) deliveries for maternal and socio-economic variables.

Variable		Cases (Home)	Controls (Institutional)	Odds ratio (95% C.I.) or t test	p value
Maternal age in years		Mean (s.d.) 23.9 (5.0)	Mean (s.d.) 23.1 (4.0)	t = -1.43	0.15
Number of occupants		5.1 (3.5)	6.2 (3.9)	t = 2.12	0.035
Number of rooms		2.4 (1.8)	3.5 (2.4)	t = 3.39	<0.001
Land owned (ropanies <sup>1</sup> )		0.56 (1.4)	1.1 (2.2)	t = 1.7	0.09
Location		no. (%)	no. (%)		
	Peri-urban	30 (48)	139 (51)	1.12	0.7
	Urban	32 (52)	133 (49)	(0.64-1.94)	
Household income NR <sup>2</sup> /month					
	< 1000	7 (11)	17 (6)	0.7	0.015
	1000-2500	32 (51)	107 (39)	(0.52-0.93)	
	2500-5000	17 (28)	98 (36)		
	5000-10 000	4 (7)	35 (13)		
	> 10 000	2 (3)	15 (6)		
House ownership					
	rented	28 (45)	82 (30)	0.53	0.025
	own	34 (55)	189 (70)	(0.3-0.93)	
Ethnic group					
	Brahmin	7 (11)	35 (13)	1.13	0.48
	Chetri	9 (15)	34 (13)	(0.81-1.56)	
	Newar	34 (55)	170 (62)		
	Other	12 (19)	33 (12)		
Maternal education					
	Illiterate or no education	35 (57)	83 (30)	0.44	<0.001
	Class 1-10	23 (37)	108 (40)	(0.31-0.68)	
	SLC <sup>3</sup> /Graduate	4 (6)	81 (30)		
Parity					
	Primigravida	18 (29)	159 (58)	3.44	<0001
	Multigravida	44 (71)	113 (42)	(1.86-6.37)	

<sup>1</sup> Ropani = land area measurement. 1 ropani = 21.96 × 21.96m

<sup>2</sup> NR = Nepali rupee, 50 NR = \$1

<sup>3</sup> SLC = school leaving certificate

For home deliverers, a semi-structured qualitative interview explored reasons for the home delivery, and whether it was planned or unplanned.

#### Data analysis

Quantitative data from household survey forms were entered into Filemaker Pro. The data was checked, transferred to Statview for Macintosh, cleaned, and

consistency checks for ranges were performed. Associations between cases (home deliverers) and controls (hospital deliverers) with important potential risk factors were tested univariately by calculating odds ratios with 95% confidence intervals. Significant risk factors by univariate analysis were entered into a logistic regression model to calculate the effect of individual risk factors adjusted for confounding

**Table 2.** Multivariate analysis with home delivery as dependent variable (significance level for entering = 0.2; log likelihood = -135.8)

Independent variable	Odds ratio (95% C.I.)	R <sup>2</sup> value %	P value
Parity		5.6	
multip	3.06 (1.63-5.74)		0.001
primip	1.0		
Maternal education		6.8	
Illiterate or no education	5.04 (1.61-15.8)		0.006
Class 1-10	3.36 (1.04-10.84)		0.04
SLC <sup>1</sup> /Graduate	1.0		
Household income	0.82 (0.55-1.22)	2	0.33
Number of rooms	0.85 (0.72-1.0)	4	0.06
Land ownership	0.85 (0.69-1.07)	1.2	0.16

The R<sup>2</sup> value shows the amount of variance explained by each factor.

Total R<sup>2</sup> % value = 14.25.

effects of other exposures. Regression coefficients are given with 95% confidence intervals and exact p values. Stata statistical analysis version 4.0 was used.

## Results

### Home and institutional delivery rates

Home and institutional delivery rates from the two areas were very similar. 82% of women from Kirtipur/Panga (peri-urban area) and 81% of women from Kalimati (urban area) chose to deliver in an institution providing maternity services. 18% of women from Kirtipur/Panga and 19% of women from Kalimati delivered at home.

### Comparison of home and institutional deliverers

The unadjusted odds ratios for important variables comparing home and institutional deliverers are shown in Table 1. This shows that the home deliverers live in smaller houses, have lower incomes and are less well educated than institutional deliverers. They are more likely to have had previous pregnancies. Table 2 shows stepwise logistic regression analysis of the variables used in Table 1 to adjust for confounding variables, and the stratified effect of different levels of parity and maternal education

on choice of place of delivery. The results show that less educated multiparous women are most likely to deliver at home, but poverty indicators per se do not remain as significant independent risk factors.

### Home deliverers

The use of home delivery attendants is described in Table 3. Information was available for 51/62 (82%) of home deliverers; 11 (18%) had moved away and could not be contacted. Only 12 (24%) of all the home deliverers were attended by a traditional birth attendant during the delivery. Of these only one woman lived in the urban area, Kalimati. Overall 59% were attended by a female relative and 18% delivered alone. The reasons for having a home delivery are shown in Table 4. Home deliveries are divided into those that are planned and those that are unplanned. Women not choosing to have a home delivery did so because they had a precipitate labour or because they were unable to get to hospital. Reasons given for planned home delivery include lack of money and a previous easy delivery.

## Discussion

We have documented the delivery patterns, and the characteristics of mothers having home or

**Table 3.** Use of home delivery attendants in periurban and urban communities

Variable		Periurban no. (%)	Urban no. (%)	Total no. (%)
Attendant	TBA <sup>1</sup>	11 (44)	1 (4)	12 (23)
	Mother in law	13 (52)	6 (23)	19 (37)
	Other relative	0 (0)	11 (42)	11 (22)
	No attendant	1 (4)	8 (31)	9 (18)
	TOTAL	25 (100)	26 (100)	51 (100)

<sup>1</sup> Traditional Birth Attendant

**Table 4.** Reasons given for planned and unplanned home delivery

Reason given*	Planned	Unplanned	Total no. (%)
Worries about cost	8	-	8 (15)
Easy previous delivery	10	-	10 (19)
Fear of hospital	4	-	4 (7)
No carer for other children	3	-	3 (6)
Precipitate labour	-	16	16 (30)
No transport when in labour	-	12	12 (23)
			53 (100)

\* some respondents gave multiple reasons.

institutional deliveries in Kathmandu, Nepal, in a large community-based cross-sectional study. In further interviews conducted in the home we also explored the reasons given by mothers for a home delivery.

### Choice of home delivery

We have shown that poor maternal education and multiparity are important independent factors in determining choice of a home delivery in Kathmandu. Poverty per se did not remain as an independent risk factor after adjusting for confounders. Nwakoby in Nigeria<sup>5</sup> also found that maternal education is associated with use of maternity services for delivery, but found no influence of parity. This study also showed that occupation and religion had an effect on

choice of delivery place. Grosse and Auffrey<sup>9</sup> concluded that there was a 'strong and consistent association of literacy with maternal mortality'. They found that practices likely to promote health, including use of modern health services, were associated with literacy. Another Nigerian study<sup>10</sup> showed that despite adequate local provision of maternity services, 65% of women still delivered at home. The authors attributed this to fees for delivery services, level of income, cultural beliefs, and education. They concluded that provision of relatively accessible services does not guarantee their use and that other social and cultural considerations must be taken into account. In Kathmandu it seems that economic factors are less important because the fees for services in the main government maternity hospital are still low, and there is an exemption policy for very poor mothers.

Does a home delivery carry an increased risk in such a setting? A recent study in Tanzania<sup>11</sup> showed that perinatal mortality in home births delivered without a trained attendant was three times higher than that for births in a hospital or dispensary with trained attendants. In Papua New Guinea<sup>12</sup> a high rate of obstetric complications was found amongst apparently normal pregnancies delivering at home. Over half the home deliveries in our study were unplanned rather than chosen, precipitate labour and a lack of transport being the most important reasons. This suggests that these mothers would have sought an institutional delivery if an ambulance system, or a more local delivery unit, had been available.

### Policy implications

Our results have implications for planners of services in urban and peri-urban areas in Nepal and similar developing countries.

a) Community based *antenatal education* might be targeted at poorly educated mothers to enable them to make an informed decision about their choice of place of delivery, but there is no good evidence that such messages change behaviour. There may be other cultural constraints, e.g. a decision by the husband or mother-in-law which over-rides that of the mother.

b) The provision of *satellite maternity services* in the community may be the solution to unplanned home births due to lack of transport and precipitate delivery. Midwife-run obstetric units, with facilities for rapid transfer to specialist facilities, could be a cost-effective service and would reduce the workload on specialist tertiary facilities, which could then provide a better service for high risk cases. It may be that many mothers who currently seek a hospital delivery would prefer a more local and user-friendly alternative. Pilot studies are needed.

c) Traditional Birth Attendants (TBAs) were used relatively little in this setting. 76% of women delivering at home did so with no skilled person in attendance, and 18% delivered entirely alone. In urban Kalimati only one (4%) of our home deliverers used a TBA compared with 11 (46%) in peri-urban Kirtipur/Panga. This reflects the social stability of the two areas: the urban area comprises a large number of migrants for whom traditional support systems have broken down, whereas these systems still exist in the stable peri-urban community where families have lived for generations.

There is a national TBA training programme in Nepal, working predominantly in rural areas where the vast majority of women continue to deliver at home. Our study suggests that training TBAs in urban Kathmandu is probably not cost-effective. Mothers who do plan a home delivery need information about how to access a trained TBA or, preferably, a midwife available for domiciliary service.

### Further questions for policy research

Our study did not explore why women chose an institutional delivery nor how the decision process was made within the household. The question of who decides about place of delivery – mothers, husbands or grandmothers – is clearly important. In Nepal there are a multiplicity of different ethnic groups, and in urban areas a mixture of traditional (extended family structure) and recent immigrant (nuclear family structure) households. Minden conducted a series of in-depth interviews with women who delivered at the main maternity hospital in Kathmandu.<sup>13</sup> She found that many of the new economic migrants, often working in factories and living with their husbands in rented rooms, were largely dissatisfied with the quality of institutional care but felt the risks of a delivery at home outweighed this problem. Curiously she felt these socially disadvantaged mothers had more decision-making power than the mothers from more traditional homes. Detailed anthropological, longitudinal case study research is needed to explore household dynamics (e.g. between husbands, grandmothers and mothers) and potential areas for conflict.

From informal discussions we believe that most women in Kathmandu, especially primigravidae, are aware of the health risks of pregnancy and unsupervised delivery, and seek an institutional delivery which is within their economic means. At present hospital charges in the main maternity hospital are low enough not to deter most mothers, and there are exemption schemes for the poorest mothers.

We have shown that the independent factors affecting choice of delivery place amongst mothers in the Kathmandu valley are maternal education and parity. The majority of home births in our study occurred with no trained person in attendance adding to the risks of perinatal morbidity and mortality, already high in Nepal. Community based antenatal education for poorly educated mothers, and extended training for TBA's are policy options but may not be cost-effective. Low cost, midwife-run, community-based

birthing centres with speedy referral facilities appear to be the best option to improve access to safer motherhood services in this urban setting.

In rural areas childbirth practices will, of course, be quite different. Institutional services are largely inaccessible, and many women have a strong cultural preference for either an unattended delivery or one conducted by an untrained family member. Iterative and participatory methods will be needed to introduce safer childbirth practices in these locations in parallel with the development of better district-level emergency obstetric services.<sup>14,15</sup>

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Purna Shrestha trained as a nurse in Nepal, followed by further training in the American University in Beirut, Lebanon. She has an MSc in Maternal and Child Health from Chandigarh, India. Since 1994 she has worked in Nepal on the MIRA research project as a field manager.

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Anthony Costello trained in medicine at Cambridge University and the Middlesex Hospital. After postgraduate training in paediatrics, he became a medical officer and subsequently a field director with Save the Children Fund in Nepal. Since 1990 he has been based at the Centre for International Child Health at the Institute of Child Health, University of London, where he is a Reader in International Child Health and an Honorary Consultant Paediatrician at the Hospital for Tropical Diseases.

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