The role of obstetric knowledge in utilization of delivery service in Nepal

Rajendra Karkee1*, Om Bahadur Baral2, Vishnu Khanal3 and Andy H. Lee4
1School of Public Health and Community Medicine, BP Koirala Institute of Health Sciences, Dharan, 2Stichting Sarangkot, Kaski, 3Sanjeevani College of Medical Sciences, Butwal, Rupandehi, Nepal and 4School of Public Health, Curtin University, Perth, WA, Australia

*Correspondence to: R. Karkee. E-mail: rkarkee@gmail.com
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Abstract

Birth Preparedness and Complication Readiness (BP/CR) program has been promoted in Nepal to equip pregnant women with obstetric knowledge so as to motivate them to seek professional care. Using a prospective design of 701 pregnant women of more than 5 months gestation in a central hills district of Nepal, we evaluated if having obstetric knowledge could make a difference in maternal delivery behaviour. The results suggested that BP/CR program was effective in raising women’s obstetric knowledge, which was significantly associated with facility delivery according to logistic regression analysis. In particular, women who acknowledged that unexpected problems could occur during pregnancy and childbirth were more likely (odds ratio [OR] 5.83, 95% confidence interval [CI] 2.95–11.52) to deliver at a health facility than others unaware of the possible consequences. Similarly, women who knew any antepartum danger sign (OR 2.16, 95% CI: 1.17–3.98), any intrapartum danger sign (OR 3.80, 95% CI: 2.07–6.96) and any postpartum danger sign (OR 3.47 95% CI: 1.93–6.25), tended to deliver at a health facility. Convincing and counselling the pregnant women of the health consequences of pregnancy and childbirth would increase their utilization of delivery service.

Introduction

Many adverse health outcomes are associated with behavioural risk factors. Behaviours, such as hand washing, tobacco smoking and alcohol drinking, are known to be key determinants of population health [1]. Maternal survival is also related to maternal behaviour of delivery and childbirth [2]. Despite the availability of delivery services, many women in developing countries still give birth at home following traditional belief and custom [3, 4]. A large prospective study in Mumbai slums found ‘custom’ as the most common reason for home birth [5]. In western Uganda, women continue to deliver at home even when experiencing pregnancy complications. They adhere to traditional birthing practices and believe that pregnancy is a test of endurance [6]. In Timor-Leste, previous experience of uncomplicated home birth has led many women to view birth as a normal non-medical event and choose home for subsequent deliveries [7].

According to the stage theory of behaviour change, individuals pass through a series of stages before changing their behaviours. ‘Precontemplation’ and ‘contemplation’ are the initial stages in which individuals recognize the problem and assess ‘pros’ and ‘cons’ of the intended change before making preparation for actual action [8]. In other words, behavioural change starts with recognition of the underpinning health problem. In the context of delivery service use, women and her family should be aware of the negative consequences and danger signs during pregnancy and childbirth. Recognition of potential problems is relevant because pregnancy and childbirth are often regarded as normal life events that do not require professional help [7, 9, 10].

As a result, many behavioural change interventions rely on health knowledge as a major awareness

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Birth Preparedness and Complication Readiness (BP/CR) is one such behavioural change intervention in safe motherhood program developed to motivate women to deliver at health facilities. In terms of stage theory, pregnant women first acquire obstetric knowledge and awareness of danger signs before making intention (preparation activities) to deliver at a health facility [11]. Accordingly, they should be counselled and advised to make a birth plan. Health information can also be disseminated by community mobilization through local leaders and media. Immediate preparation activities are found to influence eventual delivery in a health facility setting [12].

The impact of maternal health knowledge on utilization of health services has been reported in the literature. A previous study of 482 women in Nepal concluded that besides maternal health knowledge, socioeconomic variables such as caste, husband’s education, household wealth and rural residence explained a large proportion of the health behaviour variances [13]. Maternal health knowledge termed as ‘human capital’ has been found positively associated with childhood immunization in India [14]. Facility delivery, a special case of health service utilization, is determined by various factors, with specific considerations and conditions during the final moment of antepartum stage [4, 15, 16]. Although evidence has emerged that maternal education can influence facility delivery [4, 17], it remains unknown whether obstetric knowledge is independently associated with delivery service use in Nepal. Moreover, previous studies on the effect of health knowledge were mainly cross-sectional, making it difficult to establish time sequence [4]. This article aims to assess the obstetric knowledge of pregnant women and its association with facility delivery by conducting a prospective cohort study in a central hills district of Nepal.

Methods

Study setting and participants
A large prospective cohort study was conducted between December 2011 and November 2012 to investigate factors associated with delivery service utilization in Kaski, a central hills district of Nepal. Details on the study district, population and sampling have been described elsewhere [12]. Briefly, a total of 701 pregnant women of more than 5 months of gestation were recruited from 5 urban wards and 7 rural ‘illakas’ in the Kaski district. Pregnant women residing in these randomly selected areas were identified through local antenatal registry as well as with the help of female community health volunteers and invited to participate in the study. Given that the probability of finding such pregnant women during a single visit was about one-quarter of the annual number of expected pregnancies in the Kaski district, a sample size of 700 would represent ~20% of the eligible women in the district and was considered appropriate within our available budget. Of the total 748 eligible women approached, 47 refused to participate, giving a response rate of 93.7%.

During the recruitment stage, 15 local female data collectors conducted baseline interview to assess sociodemographic information as well as obstetric knowledge of pregnancy and childbirth, followed by another interview within 45 days postpartum to ascertain their utilization of delivery services. Both baseline and follow-up interviews took place at each participant’s home. The study was approved by the Human Research Ethics Committee of Curtin University (approval number HR 130/2011), the Ethical Review Board of the Nepal Health Research Council (approval number 88/2011) and the District Public Health Office of Kaski. An information sheet was distributed and read to each participant before obtaining her signed or thumb-print informed consent.

Birth preparedness program in Nepal
In Nepal, BP/CR messages were initiated in 2002, along with education and communication materials for safe motherhood [18], as part of the government initiative called ‘SUMATA’. This term was coined using three initial Nepali letters to indicate three messages: (i) to care for women during pregnancy, (ii) to share their work and (iii) to prepare for birth
These messages targeted family members because pregnant women often continue to work until delivery, lacking preparation, care and support from the family. Messages were propagated into the community via a variety of sources such as radio and television, print materials and street theatre performances. After initial success to raise awareness on obstetric knowledge and danger signs, BP/CR was launched in a number of districts in partnership with non-governmental organizations. Various cadres of health personnel, both facility-based health workers who are the government employees and receive regular salary (maternal and child health workers, auxiliary nurses and midwives), as well as community-based volunteers (female community health volunteers and traditional birth attendants), were trained in counselling techniques and use of BP/CR tools (flipcharts and key chains) to disseminate danger signs and preparation activities [10].

Female community health volunteers identify pregnant women in the villages and counsel BP/CR messages encouraging the women to avail nearby health services. The facility-based health workers counsel pregnant women during antenatal check-up about danger signs of pregnancy and delivery, and preparation activities [20, 21]. Since 2009, BP/CR has been incorporated within the national safe motherhood program and scaled up through the government district health system (district hospitals and local health centres) to provide delivery services in partnership with JHPIEGO [10]. Both female community health volunteers and facility-based health workers use pictorial chart to educate women on obstetric danger signs.

**Instrument**

The questionnaire to assess obstetric knowledge was derived from BP/CR monitoring tools, and maternal and neonatal baseline health survey previously applied in three districts of Nepal [22, 23]. It was pretested on 50 pregnant women for understanding, cultural appropriateness and content validity prior to administration. The structured questionnaire sought information on sociodemographic characteristics, BP/CR from pregnant women. Participants were first asked general health knowledge of pregnancy and childbirth, then about the danger signs at each antepartum, intrapartum and postpartum phase. Their unprompted spontaneous responses were recorded and matched to the list of key danger signs in the questionnaire. Antepartum danger signs include vaginal bleeding, swollen hands and body, severe abdominal pain, loss of consciousness and convulsions, blurred vision, severe headache and fever. Intrapartum danger signs include vaginal bleeding, prolonged labour, retained placenta, swollen hands and body, loss of consciousness and convulsions. Postpartum danger signs include vaginal bleeding, severe fever, smelly water discharge, swollen hands and body, loss of consciousness and convulsions. These danger signs were adopted from the BP/CR package as implemented in the health system of Nepal [21].

**Statistical analysis**

The binary outcome variable was place of delivery coded as 1 for health facility and 0 for home. Obstetric knowledge was assessed by five variables: (i) whether unexpected problems can occur during pregnancy and childbirth (yes/no), (ii) received information regarding pregnancy and delivery (yes/no), (iii) antepartum awareness (yes/no), (iv) intrapartum awareness (yes/no) and (v) postpartum awareness (yes/no), depending on whether the respondent mentioned any of the listed danger signs at the three phases.

After applying chi-square tests of association, the effects of obstetric knowledge on facility delivery utilization were assessed using a multivariable logistic regression model accounting for plausible sociocultural, economical accessibility and physical accessibility confounders [4]. Sociocultural variables were maternal age, education, parity and ethnicity. Maternal age was recoded into three groups: <20, 20–24 and ≥24 years. Education was categorized as either no education, primary (1st to 5th grade), secondary (6th to 10th grade) or upper secondary (after 10th grade). Ethnicity was classified as lower caste, janajati, upper caste and religious minorities, following the government’s classification of...
caste on the health system [24]. ‘Upper caste’ and ‘lower caste’ correspond to Indo-Aryan people whereas ‘janajati’ refers to indigenous Tibeto-Burman people. Religious minorities include Christians and Muslims, but since only three respondents belonged to religious minorities they were subsequently merged with the janajati group [12].

Although delivery services are provided free under the Nepal government’s ‘safer mother programme’ [25], there are other indirect costs involved at a health facility setting. Economic accessibility was measured by household wealth generated from the first component of a principal component analysis using household assets [26]. The household assets included cooking fuel, flooring material, television, mobile phone, sofa, cupboard, type of toilet and type of water source. The asset score was divided into quintiles. Physical accessibility was measured by residential location (urban or rural) and distance to nearest health facility. The latter referred to the time (min) taken on foot and/or by vehicle to reach the facility and categorized as <30, 30–60 and >60 minutes. All participants had access to health care facilities. The majority of participants (58.5%) could reach their nearest health facility within half an hour; only 12% of women incurred more than 1 h of travel time. Because antenatal care visits were observed to be common among the participants, the variable was dichotomized to <4 and ≥4 visits. All statistical analyses were performed using the SPSS package version 21.

**Results**

### Participant characteristics

The mean age of participants was 23.5 (SD 4.17) years, mostly (62%) under the age of 25 years. The mean gestational age at recruitment was 27.9 (SD 5.49) weeks. About half the cohort (52%) was first time mothers and belonged to upper caste group (53%). They were mostly (92.3%) literate with some schooling. Almost all (98%) pregnant women had made at least one antenatal care visit while 74% made the recommended four or more visits.

### Obstetric knowledge

Table I summarizes obstetric knowledge of pregnancy and childbirth for the cohort. About three-quarters of them received information regarding pregnancy and delivery care. Main source of information came from health personnel/health facility followed by female community health volunteers, relatives and friends, radio and television. More than 85% of women agreed that unexpected problems can occur during pregnancy and childbirth, so
that it is necessary to deliver at a health facility and attend antenatal check-ups. Similarly, over 85% respondents could identify the nearest health facility for normal delivery services. Their knowledge of danger signs during antepartum, intrapartum and postpartum phases were high (Table I). The most common danger sign reported was vaginal bleeding: 74.2%, 64.3% and 72.2% during ante-, intra- and post-partum phases, respectively. The second common symptom was swollen hands and body during antepartum (38.7%), prolonged labour during intrapartum (44.5%) and smelly water discharge during postpartum (34.0%). More respondents were aware of danger signs during antepartum than danger signs during intrapartum or postpartum. About 15.8%, 21.1% and 23.9% respondents could not tell any danger signs during antepartum, intrapartum and postpartum, respectively (Table II).

**Association with facility delivery**

Of the 701 pregnant women in the cohort, the place of delivery was known for 644 participants: 547 (85%) delivered at a health facility and 97 (15%) gave birth at home. Excluded women were either lost to follow up (n = 43), had antepartum stillbirths (n = 9) or delivered on the way to hospital (n = 5). Table II shows the univariate association between obstetric knowledge variables and place of delivery. The rate of facility delivery among women with obstetric knowledge was higher than their counterparts without such knowledge. Table III confirms the positive association between obstetric knowledge and facility delivery, after accounting for plausible sociocultural, economical accessibility and physical accessibility confounding factors in the logistic regression model. Women who acknowledged that unexpected problems could occur during pregnancy and childbirth were more likely (odds ratio (OR) 5.83, 95% confidence interval (CI) 2.95–11.52) to deliver at a health facility than others unaware of the possible consequences. Similarly, women who knew any antepartum danger sign (OR 2.16, 95% CI: 1.17–3.98), any intrapartum danger sign (OR 3.8, 95% CI: 2.07–6.96) and any postpartum danger sign (OR 3.47 95% CI: 1.93–6.25), tended to deliver at a health facility.

**Discussion**

This large prospective cohort study revealed that pregnant women in the Kaski district of Nepal had generally good knowledge of pregnancy and childbirth. More than 85% of women acknowledged that unexpected problems can occur during pregnancy and childbirth; that it was necessary to deliver at a health facility and to attend antenatal check-ups. Over three-quarters of the women could tell at least one danger sign during antepartum, intrapartum and postpartum phases. Such awareness level appeared to be higher than previous reports in other developing countries such as South Africa [27], Jordan [28], Tanzania [29, 30] and Uganda [29, 30]. Vaginal bleeding was the most well-known danger sign similar to other studies. Indeed, vaginal bleeding is the most common event in pregnancy and childbirth and also a main cause of maternal death [31].

The higher level of awareness among our study participants might be attributed to their high literacy rate (92%) and antenatal care visits (98%) [12].
The overall adult literacy rate in Kaski was 82% and the district was relatively developed, ranking third in terms of human development index among 75 districts of Nepal [32]. Moreover, BP/CR programme has been implemented in the district, suggesting the positive impact of BP/CR in raising maternal obstetric knowledge. Although the relationship between health knowledge and health behaviour remains inconclusive [1], it has been argued that education may change behaviour so that health knowledge is one pathway in the education–behaviour link. Other plausible pathways include socioeconomic status, modern attitudes and cognitive skills and autonomy [33, 34].

In maternity service utilization, evidence is now accumulating that maternal obstetric knowledge can make a significant difference in delivery behaviour. The specific knowledge on danger signs and possible life-threatening situation makes women concerned about their pregnancy and to seek professional help as much as possible. A number of interventions, including awareness raising campaign in Burkina Faso, counselling on pregnancy complications during prenatal care in rural Mali, BP/CR package in Nepal and birth plan in rural Tanzania, had increased the facility-based delivery rate [35–38]. Similarly, survey studies of postpartum women in Zambia, Tanzania, Laos and Ghana found that obstetric knowledge variables were significantly associated with facility delivery, while the link between antenatal care visits and facility delivery could be explained by increased maternal obstetric knowledge [39–42]. Our finding that obstetric knowledge being independently associated with facility delivery adds to this body of evidence and supports the BP/CR proposition that women’s behaviour to deliver at a health facility is driven by acquisition of health knowledge on pregnancy and childbirth. At the same time, it should be noted that just receiving information about pregnancy and delivery care may not be sufficient to make the decision, in view of the lack of statistical significance of the variable ‘information received’ in the regression analysis. In fact, the majority (68%) of women who delivered at home reported receiving such information because they might have been told either during antenatal care visits or by female community health volunteers.

A major strength of this study was the prospective follow-up of pregnant women to identify their place of delivery, while assessment of their obstetric knowledge was undertaken at antepartum phase. It should be remarked that assessment of knowledge at postpartum could be biased since the women might subsequently experience delivery problems that are likely to affect their response. Moreover, the danger signs mentioned were all unprompted and not suggested by the interviewers. However, despite the entire cohort was exposed to obstetric counselling and the resulting awareness level was high, it appears that some pregnant women still delivered at home, suggesting that they had either not taken the counselling seriously, not fully understood the consequences or not been given the proper advice. Quality of health facilities could also influence delivery service utilization, yet evaluation of service quality was not undertaken in this study. Another

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### Table III. Effect of obstetric knowledge on facility delivery from logistic regression analysis (n = 644)

<table>
<thead>
<tr>
<th>Obstetric knowledge</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexpected problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>2.81 (1.78, 4.42)</td>
<td>6.78 (3.32, 13.86)</td>
</tr>
<tr>
<td>Information received</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>1.63 (1.02, 2.62)</td>
<td>1.50 (0.82, 2.73)</td>
</tr>
<tr>
<td>Antepartum awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>2.59 (1.56, 4.29)</td>
<td>2.07 (1.11, 3.88)</td>
</tr>
<tr>
<td>Intrapartum awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>2.49 (1.56, 3.97)</td>
<td>3.79 (2.04, 7.03)</td>
</tr>
<tr>
<td>Postpartum awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>2.81 (1.78, 4.42)</td>
<td>3.62 (1.98, 6.58)</td>
</tr>
</tbody>
</table>

*aAdjusting for maternal age, education, parity, antenatal care visits, ethnicity, residential location, household wealth and distance to nearest health facility.*
Obstetric knowledge in Nepal

The level of obstetric knowledge was generally high in the study area. Obstetric knowledge is a significant factor to seek care. Convincing and proper counselling the pregnant women of the health consequences of pregnancy and childbirth would increase their utilization of delivery service.

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Conflict of interest statement

None declared.

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