The Role of Social Norms in Institutional Delivery: Findings from A Survey in Makwanpur, Nepal

Alicia M. Paul (✉ apaul5@gwmail.gwu.edu)

Johns Hopkins University Bloomberg School of Public Health <https://orcid.org/0000-0003-2845-7654>

Rajiv N. Rimal

Johns Hopkins University Bloomberg School of Public Health

Shraddha Nepal

Nepal Evaluation and Assessment Team

Jeevan Lohani

Nepal Evaluation and Assessment Team

Research article

Keywords: social norms, institutional delivery, survey, maternal mortality

Posted Date: November 12th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-103379/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background: Nepal has a maternal mortality ratio of 186 per 100,000 live births, the second highest in South Asia. Institutional delivery, or giving birth in a medical facility with a skilled birth attendant, can prevent up to 16-33% of maternal deaths. Despite recent progress, Nepal's institutional delivery rate is only 54%. As maternal mortality remains high and institutional delivery low, a transition from a biomedical to a psychosocial approach is needed, through which normative beliefs may be an entry point. The purpose of this study is to examine the relationship between descriptive norms and institutional delivery among mothers in Makwanpur, Nepal.

Methods: This study uses baseline data from the Rejoice Architecture Project, a quasi-experimental study conducted in the Makwanpur District in Nepal in 2020. Female Community Health Volunteers (FCHVs) recruited 356 women from catchment areas of six health facilities across three Palikas (equivalent to municipalities) and administered oral surveys. Participants were eligible if they were 18 years or older, had a child younger than 2 years, and lived within the catchment area of a study site. Logistic regression was used to determine associations between descriptive norms and institutional delivery, controlling for antenatal care (ANC) visits, demographics, and interpersonal communication (IPC) with husband.

Results: Approximately 30% of participants perceived most women in their community gave birth at home compared to medical institutions and nearly 65% gave birth in an institution during their last delivery. Logistic regressions showed an association between descriptive norms and institutional delivery after controlling for external factors such that on average, women who perceived institutional delivery to be most common had 3.18 greater odds of giving birth in an institution.

Conclusions: Findings from this study support the notion that social norms relate to actual birthing behavior, specifically in the context of institutional delivery. These findings contribute to the growing body of literature relating to institutional delivery and offer insights for a potential norms-based approach for increasing rates of institutional delivery and reducing maternal mortality in developing countries.

Background

In 2017, the global maternal mortality ratio was 211 per 100,000 live births.¹ Less developed countries bear a disproportionate burden of maternal mortality, with an estimated maternal mortality ratio of 415 maternal deaths per 100,000 live births, up to 60 times greater than some of their more developed counterparts.² Since 2000, South Asia has achieved the greatest percentage reduction in maternal mortality from 395 to 163 maternal deaths per 100,000 live births, an improvement of 59%.³ However, maternal deaths in this region still account for 20% of maternal deaths globally.²

In 2015, the United Nations set a target to reduce the global maternal mortality ratio to 70 per 100,000 live births by 2030 to achieve the third Sustainable Development Goal: Ensure healthy lives and promote well-being for all at all ages.⁴ At the current pace, this target is expected to be missed by over one million lives.² This unfortunate trajectory calls for the identification and implementation of best practices for improving maternal health.

Institutional Delivery

Institutional delivery, or giving birth in a medical facility with a skilled birth attendant, is an essential practice for reducing maternal mortality.^{5,6} Childbirth requires continuous skilled care and attention, but 15% of pregnancies and deliveries result in complications or unanticipated events requiring emergency care from health professionals.^{7,8} Seventy-five percent of all maternal deaths can be attributed to five complications: hemorrhage, infection, pre-eclampsia or eclampsia, obstructed labor, and unsafe abortion, each of which is largely preventable or treatable.⁹ Giving birth in a medical facility offers women the opportunity, resources, and support to manage complications that could save her or her child's life. In medical facilities, maternal mortality can be avoided more easily than in home settings through simple procedures such as injecting oxytocics to reduce the risk of bleeding, practicing safe hygiene to reduce the risk of infection, and detecting high blood pressure before the onset of serious eclampsia symptoms, among many others.⁹ Skilled attendance during pregnancy and delivery can reduce maternal mortality by 16-33%, made possible by training of doctors, nurses and midwives and making available essential drugs; and equipment to ensure the safety of medical procedures.¹⁰

Institutional Delivery in Nepal

Nepal has made remarkable improvements in its maternal mortality ratio over the past two decades, declining from 539 maternal deaths per 100,000 live births in 1996 to 259 maternal deaths per 100,000 live births in 2016.² Today, Nepal has a maternal mortality rate of 186 maternal deaths per 100,000 live births; however, it still has the second-highest maternal mortality ratio in South Asia after Afghanistan.¹ One explanation for its high rate of maternal deaths is its low rate of institutional delivery. In Nepal, institutional delivery is practiced by only 54% of women who give birth.¹¹ By comparison, the global and regional rates are 81% and 76%, respectively.¹² Still, the country has increased its institutional delivery rate by 22% since 2011.¹¹ The government intends to continue this progress and has set a target to achieve a 90% institutional delivery rate by 2030.¹¹

Nepal still must make significant progress to meet its institutional delivery goals. To do so, the Ministry of Health and Population offers new and expecting mothers the Safe Motherhood Programme.¹³ The Safe Motherhood Programme offers three key services, including birth preparedness packages for early detection and prompt treatment of complications; the Rural Ultrasound Programme, which brings portable ultrasound devices to remote areas for screenings; and the Aama Programme, which eliminates all childbirth-related fees and offers cash incentives for delivering in a medical facility and completing four antenatal care (ANC) visits. The use of these services, however, is still quite limited. Although close to 100% of

pregnant women attend their first ANC visit, only 50% attend the recommended four ANC checkups.¹¹ To increase availability and accessibility of institutional delivery at the local level, the government expanded the number of local health centers with birthing centers and skilled birth attendants, essential logistics to carry out normal deliveries, and referral systems for cases with complications. By 2018, over 2,000 health posts and 188 Primary Health Care Centers were providing institutional delivery services.¹¹ Nonetheless, with rates of institutional delivery still low, other factors must be addressed to make a significant change.

Substantial inequities exist in the profile of Nepali women who give birth institutionally, as compared to those who do not. Data indicate that women's demographic backgrounds play a large role in their birthing care.^{2,15,16} For example, 85% of women who have received higher education participate in institutional delivery compared to 61% with basic education and 37% with no education.^{2,16} Additionally, nearly all women in the wealthiest quartile (92%) give birth in health facilities compared to 36% in the poorest quintile.^{2,16,17} Discrepancies also exist geographically between provinces. While some provinces have institutional delivery rates of up to 75%, others are as low as 35%.¹¹ A woman's ethnicity and age may also influence her likelihood of participating in institutional delivery. For instance, 69% of Brahmin/Chhetri caste members, which make up the more privileged castes, deliver in health facilities compared to 44% of other caste members.^{2,16} Likely because of educational differences, younger women are also more likely to have an institutional delivery, with rates of 66% among women 20 or younger compared to 48% among women ages 30-49.^{2,15,16}

Prior research also depicts a strong correlation between ANC visits and institutional delivery in Nepal.^{2,15,16,17} For instance, approximately 75% of women who complete four ANC visits will have an institutional delivery, a 5.5 times greater likelihood than women who do not complete any ANC visits.^{2,15} ANC visits offer opportunities for pregnant women to communicate with health workers about the benefits of delivering in a medical facility and having a skilled birth attendant present during delivery, as well as discuss the risks of potential pregnancy- and birth-related complications in home settings.^{2,16}

Others' attitudes and behaviors – particularly those of husbands' – could also influence the likelihood that a woman has an institutional delivery. Marital relationships and family dynamics are known to be contributing factors to institutional versus home delivery. Various studies point to the importance of female autonomy and husband support.^{18,19,20,21} For instance, Morrison et al.²⁰ found that some women in Makwanpur, Nepal have less decision-making power in their marital relationships and feel pressure to prioritize the needs and beliefs of their family members over their own, creating a fear of speaking up for institutional delivery. This finding was echoed by Onta et al.,²¹ who noted how the woman's role in her family could prevent her from delivering in a health facility. Their study also demonstrated the weight of husband support in institutional delivery. In some cases, women relied on their husband's time and resources to provide them with medical care and transportation to health facilities. When that support was lacking, women were more likely to deliver at home.²¹

Influence of Descriptive Norms on Institutional Delivery

The behaviors of other women in the community (or at least the perceptions of others' behaviors) can also influence a woman's decision to deliver in an institution. Descriptive norms are an individual's perceptions of the prevalence of certain behaviors in their social midst.²² Social scientists have long applied the concept of social norms to explain human behavior,^{23,24,25} with the understanding that descriptive norms can motivate particular behaviors when activated.²² Numerous researchers have established connections between descriptive norms and health behaviors in past studies,^{26,27} including but not limited to alcohol use,^{28,29} water conservation,³⁰ exercise and nutrition,^{31,32} and speeding while driving.³³

Prior research has explored social norms regarding institutional less thoroughly, but some evidence points to a potential impact. Two qualitative studies in Nepal have revealed a pattern of decision-making based on descriptive norms. For example, Shah et al.¹⁹ reported that some women choose to have home births because other women in their family and social networks had safe home deliveries in the past. Findings from Morrison et al.'s²⁰ study conveyed a similar notion, revealing that some women perceived institutional delivery as "unusual" in their communities and were, therefore, more likely to have a home birth. Norms-related literature in African contexts may also indicate relevance in Nepal. A study based in Ghana demonstrated that a woman's belief that community norms do not support institutional delivery was highly predictive of her actual behavior.³⁴ Evidence from another study in Uganda further supported this finding, exhibiting that when women believe that most other women give birth at home, they perceive it as "normal" and "safe" and practice it themselves.³⁵

Hypotheses

This study has two main hypotheses: 1) The number of ANC visits a woman completed during her last pregnancy will be positively associated with institutional delivery for that pregnancy. 2) Descriptive norms related to institutional delivery will be positively associated with participation in institutional delivery, controlling for other known drivers.

Methods

Study Background and Setting

This study used baseline data from the Rejoice Architecture Project, a quasi-experimental study to improve vaccination among newborns in the Makwanpur District in Nepal in 2020.³⁷ The Rejoice Architecture intervention was informed by Choice Architecture theory³⁶ which posits that if an

environment is configured in a certain way to promote a particular decision, individuals will be more likely to opt for that decision.³⁶ For this intervention, Choice Architecture was operationalized by altering the physical infrastructure and social environments of health facilities to encourage greater uptake of child immunizations. Because data were collected before the intervention, we do not describe the various components of the intervention in this paper.

This study was conducted in three Palikas (equivalent to municipalities) in Makwanpur District – Thaha Municipality, Kailash Rural Municipality, and Bakaiya Rural Municipality (see Figure 1). Makwanpur was selected for its geographic location, as it is accessible from Nepal's capital, Kathmandu, is large, and is geographically diverse. Two health facilities in each of the three Palikas were selected as study sites for this project, for a total of six sites. Each health facility was selected in collaboration with the Palikas based on accessibility, need, and representation of the district's ethnic and geographic diversity. In each Palika, one health facility was assigned as a treatment site and the other as a control site, matching these two sites on population characteristics. Additionally, while the Rejoice Architecture Project uses data from mothers, pregnant women, and prospective mothers, this study will only utilize mothers' data to restrict the sample to women who have given birth.

Participants

Participants ($N = 356$ mothers) were eligible if they were the mother of a child younger than two years, lived within the catchment area of one of the six study sites, and were 18 years or older. Participants were excluded if they or one of their family members participated in any of the formative research components for the same study (see Paul et al.³⁷ for a full description of the study), or if they did not meet the inclusion criteria.

Procedure

Female Community Health Volunteers (FCHVs) keep records of births in their communities. For this study, they assisted in identifying the larger pool of all women in their communities who had given birth in the last two years. Nepali data collectors from the Nepal Evaluation and Assessment Team recruited and interviewed participants in their homes. After reviewing recruitment materials and obtaining informed consent, data collectors read surveys aloud to participants and recorded responses on handheld tablets. Surveys lasted approximately one hour.

Measures

Institutional Delivery. The primary outcome variable for this study, participation in institutional delivery, was measured by where participants gave birth during their last pregnancy. Responses were coded as 0 for home births and 1 for births in hospitals, birthing centers, or other medical facilities.

ANC Visits. The number of ANC visits participants completed during their last pregnancy was measured using one item, "During your last pregnancy, how many times did you visit a health facility for medical services related to your pregnancy?" Responses were coded on a six-point scale from 0 (*never*) to 5 (*more than four times*).

Interpersonal Communication. Interpersonal communication (IPC) with husband can influence a woman's decision to participate in institutional delivery.^{18,19,20,21} IPC with husband was measured using the average score of three items relating to spousal communication on topics of family matters, their child's health, and their personal needs and feelings. Questions were structured as, "In a typical month, how often do you talk to your husband about..." and were measured on a four-point scale from 0 (*never*) to 3 (*more than four times*). The average of the three scores was calculated for each participant and used as the IPC variable ($\alpha = 0.83$).

Descriptive Norms. Descriptive norms relating to institutional delivery pertain to beliefs about where most mothers give birth. Participants were asked, "Where do most women in your village give birth?" and responses were coded as 0 for home delivery and 1 for delivery in hospitals, birthing centers, or other medical facilities.

Barriers to Institutional Delivery. Barriers to institutional delivery were measured differently for participants who reported giving birth in a health facility versus at home. Women who gave birth in institutions were asked three questions to identify barriers they may have overcome. These items measured the time taken to travel to the health facility for delivery, whether she was offered a cash incentive for transportation home after delivery, and whether she was charged a fee for delivery. For travel time to the health facility for delivery, durations longer than one hour were considered barriers. The total number of reasons reported (up to three) was taken as the overall number of barriers to institutional delivery. Women who gave birth at home were asked one question, "Why didn't you deliver in a health facility?" and could list as many reasons as applicable.

Demographics. Analyses controlled for numerous individual-level factors including age, education, ethnicity, religion, and number of children. Age, education, and number of children were measured as continuous variables. Education was measured as the total number of years a participant had received formal schooling. Ethnicity and religion were measured categorically and presented as categorical variables in the descriptive statistics and as dichotomous variables in bivariate and multivariate analyses. In the analyses, Janjati was coded as 1, while other ethnicities were coded as 0. For religion, Buddhism was coded as 1, while other religions were coded as 0. Data on household assets were originally collected but found to be collinear with education, and so they were not included in the analyses.

Data Analysis

All study variables were analyzed descriptively to provide a summary of the sample. Continuous variables are reported as means (M) and standard deviations (SD), while categorical variables are reported as counts and percentages. Although this study only uses baseline data, we compare descriptive statistics across treatment and control groups using Chi-square tests for categorical variables and Student's t-test for continuous variables. For bivariate and multivariate analyses, categorical variables with more than two categories (ethnicity and religion) were dichotomized. These variables were coded as 1 for the largest categories (Janjati and Buddhism) and 0 for the other categories. Bivariate analyses were conducted between institutional delivery and all other variables. Chi-square tests were run for dichotomous variables and Student's t-tests were run for continuous variables. Logistic regressions were used for multivariate analyses and used institutional delivery as the outcome. In these equations, Model 1 depicts a bivariate logistic regression between ANC visits and institutional delivery, and Models 2-4 add demographic variables, IPC with husband, and descriptive norms, respectively. All statistical analyses were conducted using Stata/IC 16.1³⁸.

Results

Summary of Sample

Participants in this sample were between the ages of 18–41, with an average age of 24.63 years ($SD = 4.76$). On average, participants had completed approximately five years of education ($SD = 3.82$), ranging from zero to more than 10 years. Most of the sample reported practicing Buddhism (59.55%) as their religion, followed by Hinduism (35.67%). Most participants identified their ethnicity as Janjati (76.97%), with the next most common being Brahmin/Chhetri (11.52%), and Newar (7.02%). On average, participants had approximately two children ($SD = 1.12$), with a range from one to seven children.

Across the sample, 64.61% of women had delivered their youngest child in a medical institution compared to 35.39% giving birth at home. Among women who gave birth institutionally, at least 55% experienced some barrier to institutional delivery. For instance, travel to the health facility took up to 24 hours (53%) or 1–7 days (3%) during the time of delivery for most participants. Additionally, approximately 10% of women who gave birth in a health facility were not offered a cash incentive for transportation services home after delivery. Furthermore, over 20% were charged a fee for delivery, despite the majority having given birth in a government facility where fees should be covered through the Aama Programme.¹³ Among women who did not give birth institutionally, all reported between one to three reasons for not giving birth in an institution. The most common reasons were related to the inaccessibility of the health facility, including long distances to travel or no transportation (31%) and delivering before reaching the health facility (33%). Other reasons for delivering at home included perceiving institutional delivery as unnecessary (14%) and shyness to deliver in a facility (7%).

No significant differences were observed between treatment and control group demographics; however, significant differences were found for several other variables, including IPC with husband, descriptive norms, and institutional delivery. These variables were used as control and independent variables in the multivariate models. Refer to Table 1 for complete details. [include Table 1 [here](#)]

Bivariate Associations

Results of Student's t-tests showed that, on average, those who gave birth institutionally attended more ANC visits ($M = 3.95$, $SD = .99$) compared to those who gave birth at home ($M = 3.52$, $SD = 1.35$; $t[354] = -3.48$, $p < .001$). Similarly, education level was higher among those who gave birth institutionally ($M = 5.84$, $SD = 3.96$), compared to those who did not ($M = 3.68$, $SD = 3.12$; $t[354] = -5.29$, $p < .001$). In addition, IPC with husband was higher among those who gave birth institutionally ($M = 1.94$, $SD = .81$), compared to those who did not ($M = 1.57$, $SD = .81$; $t[354] = -4.05$, $p < .001$). In contrast, women who gave birth institutionally had fewer children ($M = 1.63$, $SD = .93$), on average, than those who gave birth at home ($M = 2.34$, $SD = 1.28$; $t[353] = 6.02$, $p < .001$). Results of Chi-square tests revealed that institutional delivery was associated with ethnicity [$\chi^2(1, 356) = 27.78$, $p < .001$], religion [$\chi^2(1, 356) = 22.42$, $p < .001$], and descriptive norms [$\chi^2(1, 356) = 39.90$, $p < .001$]. Refer to Table 2 for complete details. [include Table 2 [here](#)]

Multivariate Analyses

Model 1 of Table 3 presents the logistic regression results with the number of ANC visits during the last pregnancy as the independent variable and institutional delivery as the dependent variable. Results support the first hypothesis, showing a relationship between ANC visits and institutional delivery, such that for every additional ANC visit a woman completed, she had 38% greater odds of giving birth in a medical institution [$OR = 1.378$, 95% CI: 1.129, 1.683].

Models 2 and 3 present the logistic regressions with demographic controls and IPC with husband. Results from Model 2 indicate that demographic variables explain the relationship between ANC visits and institutional delivery, as the odds ratio for ANC visits were no longer statistically significant. In this model, odds of institutional delivery were associated with participant age [$OR = 1.105$, 95% CI: 1.028, 1.187], years of education [$OR = 1.126$, 95% CI: 1.051, 1.206], and number of children [$OR = .492$, 95% CI: .355, .680]. Results from Model 3 indicate 46% greater odds of institutional delivery for every 1-unit increase in IPC with husband, controlling for demographic variables [$OR = 1.464$, 95% CI: 1.061, 2.019]. Furthermore, being Janjati maintained significance across Models 2 and 3 (this group was less likely than other groups to have institutional delivery).

Model 4 of Table 3 adds descriptive norms as another independent variable. Results of the logistic regression support the second hypothesis, showing a relationship between descriptive norms and institutional delivery. More specifically, controlling for other variables, women who perceived institutional delivery as more common in their communities than home delivery had 3.18 greater odds of participating in institutional delivery [$OR = 3.180$, 95% CI: 1.866, 5.420]. Years in school and being Janjati were no longer significant in Model 4, indicating that descriptive norms may partially explain the relationships between institutional delivery and education and ethnicity. Refer to Table 3 for complete details. [*include Table 3 here*]

Discussion

This study sought to determine the relationship between descriptive norms relating to institutional delivery and participation in institutional delivery among mothers of young children in Makwanpur, Nepal. Results partially support the first hypothesis, that the number of ANC visits completed during a woman's last pregnancy is positively associated with institutional delivery for that pregnancy. Although this relationship was found to be significant in a bivariate model, it was no longer significant when the influence of demographic variables was taken into account. These results partially corroborate findings from prior literature, suggesting completion of four ANC visits is related to giving birth in a medical facility.^{2,15,16,43,40,41} For every additional ANC visit a woman completed, she had 38% greater odds of having an institutional delivery when other factors were not taken into account. Several theories could explain this tenuous relationship. For instance, women who attend ANC visits during pregnancy may become more motivated to have an institutional delivery by learning from health staff the benefits of institutional delivery and having the opportunity to ask questions to make informed decisions for their birthing plans.^{16,40,41} ANC visits may also help to build trust between expecting mothers and health staff, further encouraging future uptake of services.⁴¹ Both factors support a positive relationship between ANC visits and institutional delivery. The opposite could also be the case, however: When women have a negative experience with the health provider during their ANC visits (which may happen if the clinic is crowded or if providers are disrespectful), they may be more reluctant to opt for institutional delivery. The relationship between ANC visits and institutional delivery may also be explained by intrinsic factors. For example, women who typically engage in healthy behaviors in general, because of their higher education, for example, may also be more likely to participate in healthy pregnancy- and childbirth-related practices such as ANC and institutional delivery.¹⁶

Other factors found to be related to institutional delivery were age, years of education, ethnicity, religion, number of children, IPC with husband, and descriptive norms. Age was not initially associated with institutional delivery in the bivariate analyses, but it was after we controlled for demographic variables. Findings suggest that when external variables are held constant, older women have greater odds of delivering in a health facility. This finding contradicts conclusions from recent studies, which have either found no relationship between age and institutional delivery⁴³ or that older women are more likely to give birth at home than younger women.^{16,35,40} However, Gabrysch and Campbell⁴² propose a few reasons for why older mothers may be more likely to deliver in institutions. For one, older women may experience greater autonomy and decision-making power in marital relationships than younger women.⁴² Additionally, older women may be encouraged to utilize formal health services for pregnancy- and childbirth-related care due to the added medical risks of childbirth later in life.⁴²

Mothers' education was initially associated with institutional delivery, but this association got attenuated when other variables, namely descriptive norms, were included in the model. This finding also contradicts prior research, which has consistently found strong positive associations between education and institutional delivery.^{16,39,43} Researchers have proposed that education helps women to understand the benefits of institutional delivery and risks of home birth, creating a perceived need for expert care.^{16,39} However, this finding suggests that education alone may not directly influence birthing practices. Instead, education, particularly health education, could be establishing social norms for healthy birthing practices among young women. Indeed, our ancillary analyses found that the association between education and descriptive norms was significant, $r = .219$ ($p < .001$).

Similarly, the strength of the relationship between being ethnically Janjati diminished from the bivariate analysis when controlling for descriptive norms. Janjati is a broad ethnicity encompassing multiple castes, including marginalized and non-marginalized groups. Data from the 2006 Nepal Demographic and Health Survey⁴⁴ suggest that 66% of Janjati women do not receive any education. In Makwanpur, marginalized castes primarily make up the Janjati community, which is reflected in the relatively low levels of education in this sample. If our conjecture that social norms are established through the education system is true, this might explain why the association between being Janjati and practicing institutional delivery diminished after controlling for descriptive norms. Also mirroring this pattern was the relationship between subscribing to Buddhism and institutional delivery, which showed an association in the bivariate analyses that disappeared when demographic variables were controlled for. One explanation for this could be the tendency for Janjatis to practice Buddhism.⁴⁵ It could be that the initial association between religion and institutional delivery may be explained by ethnicity.

Results showed a negative relationship between parity and institutional delivery. This result corroborates findings from Newell et al.,³⁵ who found that having more children was associated with a lower likelihood of institutional delivery in Uganda. It is possible that as women bear more children, the likelihood of going into labor unexpectedly or encountering obstacles to reaching a health facility increases. It may be that women with multiple children are not always able to reach a health facility in time to deliver each child. It may also be that, for most women who do not encounter complications at birth, the trip to the hospital or other birthing facilities may be perceived as being unnecessary. This speaks to risk perception: having had non-complicated deliveries in the past may reduce perceptions of risk associated with giving birth at home. However, additional research should explore alternative explanations for this finding.

This study also provides evidence on the importance of marital relationships in birthing practices, supporting findings from prior literature. The average frequency of conversations a woman had with her husband regarding family matters, child health, and her personal needs and feelings played a role in

her birthing outcome. Findings from this study suggest the more often couples communicate, the greater their odds of delivering their child in a health facility. Past literature proposes that women who feel supported by their husbands are more likely to express their opinions about pregnancy and childbirth and participate in institutional delivery.^{18,19,20,21} Here, IPC with husband demonstrates that when wives feel comfortable openly communicating with their partners about personal and family matters, they are more likely to participate in institutional delivery. These findings may also show that families who give birth in institutions are more likely to discuss their options and make decisions jointly in general.

Findings from this study also provide evidence to support the second hypothesis that descriptive norms are positively associated with participation in institutional delivery, controlling for other factors. Mothers who perceived that most women in their community gave birth in medical facilities had 3.18 greater odds of giving birth in institutions. The association between descriptive norms and institutional delivery was statistically significant after controlling for demographic variables, ANC visits, and IPC with husband. These findings support the notion that social norms relate to actual birthing behavior, specifically in the context of institutional delivery. While prior research has observed instances of normative influence in birthing decisions through qualitative methodologies, these findings offer the first statistically validated connection in the context of South Asia.

Despite this finding, we are tentative about what this means, particularly given that ours was a cross-sectional study. Although a host of domains have documented the relationships between descriptive norms and health behaviors,^{28,29,30,31,32} and there are solid theoretical arguments for these expectations,^{22,46} we must also entertain the idea of reverse causality. In our sample, women who gave birth institutionally may have seen many other pregnant women come to the same facility to give birth and thereby concluded that this must be a widespread behavior. We urge future scholars to pursue this line of inquiry through longitudinal analyses.

It is also important to note that social norms are one important factor that should be addressed in combination with several other strategies. For instance, results indicate a distinct need to increase accessibility of health facilities for women going into labor, as participants reported distance and lack of transportation as one of the most common reasons for home birth. Efforts are needed to reduce travel time to health facilities to encourage greater service uptake and prevent deliveries that occur during transportation to the health center. We also found that some women were provided financial resources after delivery for transportation costs, whereas others were not. In one respect, this is not technically a barrier to institutional delivery, as it takes place after delivery has occurred. It is possible, however, that word does get around to expecting mothers that a particular institution either does or does not provide these financial incentives, which may affect women's decisions in the future. Moreover, results show that some women feel shy and uncomfortable delivering at health facilities. Strengthening the trust between health workers and service-seekers could facilitate greater service use, more communication and information sharing, and healthy birthing behaviors.

Future Directions

The relationship between descriptive norms and institutional delivery identified by this study offers insights for a potential norms-based approach to increase rates of institutional delivery and reduce maternal mortality in developing countries. Many interventions that promote institutional delivery tend to focus on educating women, offering incentives, or improving health systems to increase awareness and accessibility of formal care.^{47,48,49} While these approaches have seen some success,^{47,48} findings from the current study suggest that addressing social norms could be a key intervention angle that has not received adequate attention in the past.

Future interventions should seek to increase institutional delivery by promoting positive social norms, making those norms more salient across the community. Several studies in Ghana and Ethiopia point to a potential pathway through which norms and behavior change could occur. Findings suggest that social networks can augment the effects of norms related to institutional delivery and other birthing behaviors. For example, Cofie et al.⁵⁰ discovered that women who have participated in institutional delivery tend to provide instrumental and informational support to encourage other women in their social networks to give birth in health facilities. Furthermore, in a study by Asrese and Adamek,⁵¹ social networks were found to be reference tools for expecting mothers to ascertain how common institutional deliveries were in their communities and were statistically associated with greater use of health facilities for delivery. Dougherty et al.⁵² took the idea a step further by implementing a community-based intervention to improve maternal health outcomes in Ghana by addressing social norms. Their findings demonstrate the positive impact of a behavior change program on three maternal health outcomes, including early initiation of ANC, four or more ANC visits, and skilled birth attendance. This outcome indicates the potential to address behavior change for institutional delivery through social networks and social norms.

Limitations

Findings from this study must be interpreted within the context of several limitations. To begin, this is a cross-sectional study, which lacks temporality. Findings do not suggest a causal pathway, but an association between descriptive norms and institutional delivery. Findings from this study may also be limited by recall bias, as mothers were asked to report behaviors during their pregnancy care that took place up to two years before the time of this study. Additionally, this study was conducted within one region of Nepal with limited ethnic and religious diversity. Future research should continue to explore the nature of this relationship in other cultural contexts.

Conclusions

This study identified an association between descriptive norms and institutional delivery while controlling for antenatal care visits, demographics, and interpersonal communication with husband among mothers of young children in Makwanpur, Nepal. This finding corroborates preliminary evidence from previous literature of the role of social norms in institutional delivery practices. Moreover, it provides evidence to suggest that psychosocial factors, in addition to structural ones, may underlie a woman's decision for institutional delivery. Future research should explore a potential norms-based approach to increasing institutional delivery and decreasing maternal mortality in developing countries, particularly in South Asia contexts.

Abbreviations

ANC Antenatal care

FCHV Female Community Health Volunteer

IPC Interpersonal communication

M Mean

SD Standard deviation

Declarations

Ethics Approval and Consent to Participate

The Institutional Review Boards with Johns Hopkins University (ID no.: 9951) and the Nepal Health Research Council (Ref no.: 1311) approved this study. Findings from this study will be disseminated in participating Palikas in Makwanpur and through peer-reviewed journals.

All participants were provided and read aloud an information form detailing the study's purpose and procedures. All participants provided written consent before data were collected.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets generated and analyzed during the current study are not currently available but will be made available in a repository one year after study completion.

Competing Interests

The authors declare that they have no competing interests.

Funding

This work was supported by The Bill and Melinda Gates Foundation [ID no.: OPP 1212270]. The funders took no part in preparing the study design, decision to publish, or writing of the manuscript.

Authors' Contributions

All authors (AP, RR, SN, JL) contributed to the design of the study. AP analyzed and interpreted the data, as well as made substantial contributions to the writing of the manuscript. RR acted as principal investigator, as well as oversaw and provided feedback on data analysis and interpretation, contributed to writing the manuscript, and approved the final manuscript. SN contributed to editing and writing the manuscript and provided feedback to other authors. JL contributed to editing the manuscript and providing significant feedback to other authors. AP is the corresponding author.

Acknowledgements

We thank the Thaha, Bakaiya Rural, and Kailash Rural Municipalities for their collaboration. We also express gratitude to the staff and leadership at each participating health facility for their partnership and making this research possible.

References

1. The World Bank Group. Maternal mortality ratio (modeled estimate, per 100,000 live births) - Nepal, South Asia, World. Geneva, Switzerland: WHO, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division. 2019. https://data.worldbank.org/indicator/SH.STA.MMRT?locations=NP-8S-1W&name_desc=false. Accessed 6 Aug 2020.

2. Aryal KK, Sharma SK, Khanal MN, Bista B, Sharma SL, Kafle S, Steffen MM. Maternal health care in Nepal: trends and determinants. DHS Further Analysis Reports No. 118. Rockville, Maryland, USA: ICF. 2019. <https://dhsprogram.com/pubs/pdf/FA118/FA118.pdf>. Accessed 6 Aug 2020.
3. United Nations Children's Fund (UNICEF). Maternal mortality. New York, NY, USA. 2019. <https://data.unicef.org/topic/maternal-health/maternal-mortality/>. Accessed 6 Aug 2020.
4. United Nations. Sustainable development goals, Goal 3: Ensure healthy lives and promote well-being for all at all ages. New York, NY, USA. 2015. <https://www.un.org/sustainabledevelopment/health/>
5. Campbell OMR, Graham WJ, Lancet Maternal Survival Series steering group. Strategies for reducing maternal mortality: getting on with what works. *Lancet*. 2006 Oct 7;368(9543):1284–99. doi:10.1016/S0140-6736(06)69381-1.
6. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, et al. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *Lancet*. 2014 Jul 26;384(9940):347–70. doi:10.1016/S0140-6736(14)60792-3.
7. Kerber KJ, Graft-Johnson JE de, Bhutta ZA, Okong P, Starrs A, Lawn JE. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet*. 2007 Oct 13;370(9595):1358–69. doi:10.1016/S0140-6736(07)61578-5.
8. United Nations Population Fund (UNFPA). Saving mothers' lives the challenge continues. New York, NY, USA. 2004. <https://www.unfpa.org/sites/default/files/pub-pdf/savingmotherslives.pdf>. Accessed 6 Aug 2020.
9. Maternal mortality. Geneva, Switzerland. <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>. Accessed 6 Aug 2020.
10. Graham WJ, Bell JS, Bullough CH. Can skilled attendance at delivery reduce maternal mortality in developing countries? 2001;33. https://www.researchgate.net/publication/239924607_Can_Skilled_Attendance_at_Delivery_Reduce_Maternal_Mortality_in_Developing_Countries. Accessed 6 Aug 2020.
11. Department of Health Services. Annual report 2074/75 (2017/18). Government of Nepal Ministry of Health and Population. Kathmandu, Nepal. 2019 Jul 2. <https://dohs.gov.np/annual-report-2074-75/>. Accessed 17 Sep 2020.
12. Delivery care. New York, NY, USA. 2020. <https://data.unicef.org/topic/maternal-health/delivery-care/>. Accessed 6 Aug 2020.
13. Family Health Division. Safe motherhood programme. Government of Nepal Ministry of Health and Population. Kathmandu, Nepal. 2020. <https://www.mohp.gov.np/eng/program/reproductive-maternal-health/safe-motherhood-programme>. Accessed 17 Sep 2020.
14. Nepal Health Sector Support Programme (NHSSP). AAMA PROGRAMME: A PROGRAMME FOR NEPALI WOMEN. Kathmandu, Nepal. 2014. http://www.nhssp.org.np/NHSSP_Archives/health_financing/Aama_brief_2014.pdf. Accessed 6 Aug 2020.
15. Shrestha SK, Banu B, Khanom K, Ali L, Thapa N, Stray-Pedersen B, et al. Changing trends on the place of delivery: why do Nepali women give birth at home? *Reproductive Health*. 2012 Oct 10;9(1):25. doi:10.1186/1742-4755-9-25.
16. Acharya P, Adhikari TB, Neupane D, Thapa K, Bhandari PM. Correlates of institutional deliveries among teenage and non-teenage mothers in Nepal. *PLOS ONE*. 2017 Oct 11;12(10):e0185667. doi:10.1371/journal.pone.0185667.
17. Dahiru T, Oche OM. Determinants of antenatal care, institutional delivery and postnatal care services utilization in Nigeria. *The Pan African Medical Journal*. 2015 Aug 31;21(321). doi:10.11604/pamj.2015.21.321.6527.
18. Danforth EJ, Kruk ME, Rockers PC, Mbaruku G, Galea S. Household Decision-making about Delivery in Health Facilities: Evidence from Tanzania. *J Health Popul Nutr*. 2009 Oct;27(5):696–703. doi:10.3329/jhpn.v27i5.3781.
19. Shah R, Rehfuess EA, Paudel D, Maskey MK, Delius M. Barriers and facilitators to institutional delivery in rural areas of Chitwan district, Nepal: A qualitative study. *Reprod Health*. 2018 Jun 20;15. doi:10.1186/s12978-018-0553-0.
20. Morrison J, Thapa R, Basnet M, Budhathoki B, Tumbahangphe K, Manandhar D, et al. Exploring the first delay: A qualitative study of home deliveries in Makwanpur district Nepal. *BMC Pregnancy and Childbirth*. 2014 Feb 27;14(1):89. doi:10.1186/1471-2393-14-89.
21. Onta S, Choulagai B, Shrestha B, Subedi N, Bhandari GP, Krettek A. Perceptions of users and providers on barriers to utilizing skilled birth care in mid- and far-western Nepal: A qualitative study. *Glob Health Action*. 2014 Aug 11;7. doi:10.3402/gha.v7.24580.
22. Cialdini RB, Reno RR, Kallgren CA. A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*. 1990;58(6):1015–26. doi:10.1037/0022-3514.58.6.1015.
23. Berkowitz L. Frustrations, Comparisons, and Other Sources of Emotion Arousal as Contributors to Social Unrest. *Journal of Social Issues*. 1972;28(1):77–91. doi:10.1111/j.1540-4560.1972.tb00005.x.
24. Pepitone, A. (1976). Toward a normative and comparative biocultural social psychology. *Journal of Personality and Social Psychology*, 34(4), 641–653. doi:10.1037/0022-3514.34.4.641.
25. Staub E. Instigation to Goodness: The Role of Social Norms and Interpersonal Influence. *Journal of Social Issues*. 1972;28(3):131–50. doi:10.1111/j.1540-4560.1972.tb00036.x.
26. Rimal RN, Lapinski MK, Cook RJ, Real K. Moving Toward a Theory of Normative Influences: How Perceived Benefits and Similarity Moderate the Impact of Descriptive Norms on Behaviors. *Journal of Health Communication*. 2005 Jul 1;10(5):433–50. doi:10.1080/10810730591009880.
27. Rimal RN. Modeling the Relationship Between Descriptive Norms and Behaviors: A Test and Extension of the Theory of Normative Social Behavior (TNSB). *Health Communication*. 2008 Apr 3;23(2):103–16. doi:10.1080/10410230801967791.
28. Perkins, H. W., & Berkowitz, A. D. (1986). Perceiving the community norms of alcohol use among students: Some research implications for campus alcohol education programming. *International Journal of the Addictions*, 21(9-10), 961–976. doi:10.3109/10826088609077249.

29. Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: a meta-analytic integration. *J Stud Alcohol*. 2003 May 1;64(3):331–41. doi:10.15288/jsa.2003.64.331.
30. Lapinski MK, Rimal RN, DeVries R, Lee EL. The Role of Group Orientation and Descriptive Norms on Water Conservation Attitudes and Behaviors. *Health Communication*. 2007 Aug 8;22(2):133–42. doi:10.1080/10410230701454049.
31. Priebe CS, Spink KS. When in Rome: Descriptive norms and physical activity. *Psychology of Sport and Exercise*. 2011 Mar 1;12(2):93–8. doi:10.1016/j.psychsport.2010.09.001.
32. Staunton M, Louis WR, Smith JR, Terry DJ, McDonald RI. How negative descriptive norms for healthy eating undermine the effects of positive injunctive norms. *Journal of Applied Social Psychology*. 2014;44(4):319–30. doi:10.1111/jasp.12223.
33. Cestac J, Paron F, Delhomme P. Drive as I say, not as I drive: Influence of injunctive and descriptive norms on speeding intentions among young drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*. 2014 Mar 1;23:44–56. doi:10.1016/j.trf.2013.12.006.
34. Ganle JK, Kombet ML, Baatiema L. Factors influencing the use of supervised delivery services in Garu-Tempane District, Ghana. *BMC Pregnancy Childbirth*. 2019 Apr 27;19. doi:10.1186/s12884-019-2295-6.
35. Newell R, Spillman I, Newell M-L. The Use of Facilities for Labor and Delivery: The Views of Women in Rural Uganda. *J Public Health Afr*. 2017 Sep 4; 8(1). doi:10.4081/jphia.2017.592.
36. Thaler RH, Sunstein CR, Balz JP. Choice architecture. In: Shafir E, editor. *The behavior foundations of public policy*. Princeton, NJ, USA: Princeton University Press; 2014. p. 428-439.
37. Paul A, Upreti K, Nepal S, Lohani J, Adhikari K, Rimal R. Rejoice architecture meets social norms to accelerate vaccination in Nepal: Protocol for a mixed-method quasi-experimental study. [version 1; peer review: awaiting peer review]. *Gates Open Res*. 2020 Aug 26;4:121. doi:10.12688/gatesopenres.13168.1
38. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC. 2019.
39. Karkee R, Binns CW, Lee AH. Determinants of facility delivery after implementation of safer mother programme in Nepal: a prospective cohort study. *BMC Pregnancy and Childbirth*. 2013 Oct 20;13(1):193. doi: 10.1186/1471-2393-13-193.
40. Shahabuddin ASM, Brouwere VD, Adhikari R, Delamou A, Bardaj A, Delvaux T. Determinants of institutional delivery among young married women in Nepal: Evidence from the Nepal Demographic and Health Survey, 2011. *BMJ Open*. 2017 Apr 1;7(4):e012446. doi:10.1136/bmjopen-2016-012446.
41. Sharma SR, Poudyal AK, Devkota BM, Singh S. Factors associated with place of delivery in rural Nepal. *BMC Public Health*. 2014 Apr 3;14(1):306. doi:10.1186/1471-2458-14-306.
42. Gabrysch S, Campbell OM. Still too far to walk: Literature review of the determinants of delivery service use. *BMC Pregnancy and Childbirth*. 2009 Aug 11;9(1):34. doi: 1186/1471-2393-9-34.
43. Karkee R, Lee AH, Binns CW. Birth preparedness and skilled attendance at birth in Nepal: Implications for achieving millennium development goal 5. *Midwifery*. 2013 Oct 1;29(10):1206–10. doi:10.1016/j.midw.2013.05.002.
44. Bennett L, Dahal DR, Govindasamy P. Caste, ethnic and regional identity in Nepal: Further analysis of the 2006 Nepal Demographic and Health Survey. Calverton, Maryland, USA: Macro International Inc. 2008. <https://dhsprogram.com/pubs/pdf/FA58/FA58.pdf>. Accessed 16 Aug 2020.
45. Gurung HB. Trident and thunderbolt cultural dynamics in Nepalese politics. In: Battachan BK, editor. *Ethnicity, Caste and a Pluralist Society*. Kathmandu, Nepal: Social Science Baha Himal Association; 2008. <https://dhsprogram.com/pubs/pdf/FA58/FA58.pdf>. Accessed 16 Aug 2020.
46. Rimal RN, Real K. How Behaviors are Influenced by Perceived Norms: A Test of the Theory of Normative Social Behavior. *Communication Research*. 2005 Jun 1;32(3):389-414. doi:10.1177/0093650205275385
47. Bucagu M, Kagubare JM, Basinga P, Ngabo F, Timmons BK, Lee AC. Impact of health systems strengthening on coverage of maternal health services in Rwanda, 2000–2010: a systematic review. *Reproductive Health Matters*. 2012 Jan 1;20(39):50–61. doi:10.1016/S0968-8080(12)39611-0.
48. Målqvist M, Yuan B, Trygg N, Selling K, Thomsen S. Targeted Interventions for Improved Equity in Maternal and Child Health in Low- and Middle-Income Settings: A Systematic Review and Meta-Analysis. *PLOS ONE*. 2013 Jun 20;8(6):e66453. doi: 1371/journal.pone.0066453
49. Sarkar A, Chandra-Mouli V, Jain K, Behera J, Mishra SK, Mehra S. Community based reproductive health interventions for young married couples in resource-constrained settings: a systematic review. *BMC Public Health*. 2015 Oct 9;15(1):1037. doi:10.1186/s12889-015-2352-7
50. Cofie LE, Barrington C, Sodji-Tettey S, Ennett S, Maman S, Singh K. A qualitative study of women's network social support and facility delivery in rural Ghana. *PLoS One [Internet]*. 2018 Nov 6;13(11). doi: 10.1371/journal.pone.0206429.
51. Asrese K, Adamek ME. Women's social networks and use of facility delivery services for uncomplicated births in North West Ethiopia: a community-based case-control study. *BMC Pregnancy Childbirth [Internet]*. 2017 Dec 28;17. doi: 10.1186/s12884-017-1626-8.
52. Dougherty L, Stammer E, Derbile E, Dery M, Yahaya W, Gle DB, et al. A Mixed-Methods Evaluation of a Community-Based Behavior Change Program to Improve Maternal Health Outcomes in the Upper West Region of Ghana. *J Health Commun*. 2017 Dec 21;23(1):80–90. doi: 10.1080/10810730.2017.1414901.
53. Makwanpur District in Nepal 2015. 2019 Nov 20. https://commons.wikimedia.org/wiki/File:Makwanpur_District_in_Nepal_2015.svg.
54. Ministry of Federal Affairs and Local Development (MoFALD). District Makwanpur. 2017. <https://sthaniya.gov.np/gis/>.

Tables

Table 1. *Summary statistics and comparability of treatment and control groups*

Variable	Treatment (N = 191) n (%)	Control (N = 165) n (%)	Total (N = 356) n (%)
Age (<i>SD</i>)	24.55 (4.36)	24.72 (5.09)	24.63 (4.76)
Years in School (<i>SD</i>)	4.82 (3.70)	5.38 (3.95)	5.08 (3.82)
Ethnicity			
Dalit	4 (2.09)	6 (3.64)	10 (2.81)
Chepang	0 (0)	2 (1.21)	2 (0.56)
Newar	9 (4.71)	16 (9.7)	25 (7.02)
Janjati	156 (81.68)	118 (71.52)	274 (76.97)
Brahmin/Chhetri	21 (10.99)	20 (12.12)	41 (11.52)
Other	0 (0)	2 (1.21)	2 (0.56)
Missing	1 (0.52)	1 (0.61)	2 (0.56)
Religion			
Hinduism	61 (31.94)	66 (44)	127 (35.67)
Buddhism	123 (64.4)	89 (53.94)	212 (59.55)
Islam	0 (0)	1 (0.61)	1 (0.28)
Christianity	5 (2.62)	5 (3.03)	10 (2.81)
Other	2 (1.05)	1 (0.61)	3 (0.84)
Missing	0 (0)	3 (1.82)	3 (0.84)
Number of Children (<i>SD</i>)	1.84 (1.12)	1.93 (1.12)	1.88 (1.12)
Number of ANC Visits (<i>SD</i>)	3.79 (1.17)	3.81 (1.13)	3.80 (1.15)
IPC with Husband (<i>SD</i>)	1.71 (0.80)**	1.91 (0.86)**	1.80 (0.83)
Descriptive Norms			
Women Give Birth at Home	35 (21.21)***	72 (37.7)***	107 (30.06)
Women Give Birth at Institution	130 (78.79)***	119 (62.3)***	249 (69.94)
Barriers to Institutional Delivery			
Among Institutional Births (<i>SD</i>)	0.90 (0.79)	0.85 (0.86)	0.87 (0.83)
Among Home Births (<i>SD</i>)	1.31 (0.52)	1.21 (0.47)	1.28 (0.50)
Institutional Delivery	108 (56.54)***	122 (73.94)***	230 (64.61)

Note: *** p<0.01, ** p<0.05, * p<0.1

Note: IPC = Interpersonal communication; IPC with husband was measured as an average of 3 items ranging from 0 (*never*) to 3 (*more than 4 times*)

Note: Descriptive Norms are participants' perceptions of where other women in their community give birth

Note: Barriers to Institutional Delivery were measured differently for participants who reported giving birth in a health facility versus at home. Barriers range from 0 to 3 for institutional births and 1 to 3 for home births.

Table 2. *Bivariate associations between institutional delivery and all other study variables*

Variable	Home Delivery	Institutional Delivery	<i>t</i>
	<i>M (SD)</i>	<i>M (SD)</i>	
ANC Visits	3.52 (1.35)	3.95 (.99)	-3.48***
Age	24.75 (4.93)	24.56 (4.67)	.366
Years in School	3.68 (3.12)	5.84 (3.96)	-5.29***
Number of Children	2.34 (1.28)	1.63 (.93)	6.02***
IPC with Husband	1.57 (.81)	1.94 (.81)	-4.05***
Variable	Home Delivery	Institutional Delivery	χ^2
	%	%	
Janjati	92.86	68.26	27.78***
Buddhism	76.19	50.43	22.42***
Descriptive Norms	49.21	81.3	39.9***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Janjati and Buddhism are dichotomous variables for ethnicity and religion, respectively.

Note: IPC = Interpersonal communication; IPC with husband was measured as an average of 3 items ranging from 0 (*never*) to 3 (*more than 4 times*)

Note: Descriptive Norms is the participant's perception that other women in their community give birth institutionally

Table 3. Logistic regression analysis for variables associated with institutional delivery (N = 356)

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>OR</i>	95% CI	<i>OR</i>	95% CI	<i>OR</i>	95% CI	<i>OR</i>	95% CI
ANC Visits	1.378***	(1.129, 1.683)	1.172	(.916, 1.500)	1.171	(.912, 1.505)	1.154	(.893, 1.492)
Age			1.105***	(1.028, 1.187)	1.109***	(1.032, 1.191)	1.105***	(1.029, 1.186)
Years in School			1.126***	(1.051, 1.206)	1.101***	(1.024, 1.183)	1.076*	(.999, 1.159)
Janjati			0.287***	(.113, .727)	0.322**	(.127, .818)	0.389*	(.146, 1.032)
Buddhism			0.713	(.381, 1.333)	0.687	(.363, 1.300)	0.609	(.315, 1.175)
Number of Children			0.492***	(.355, .680)	0.481***	(.346, .668)	0.491***	(.357, .674)
IPC with Husband					1.464**	(1.061, 2.019)	1.441**	(1.038, 2.000)
Descriptive Norms							3.180***	(1.866, 5.420)
Constant	0.546	(.249, 1.199)	0.610	(.090, 4.153)	0.307	(.042, 2.233)	0.174*	(.022, 1.286)
R ²	0.025		0.183		0.196		0.235	
Number of obs.	356		355		346		346	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: Janjati and Buddhism are dichotomous variables for ethnicity and religion, respectively

Note: IPC = Interpersonal communication; IPC with husband was measured as an average of 3 items ranging from 0 (*never*) to 3 (*more than 4 times*)

Note: Descriptive Norms is the participant's perception that other women in their community give birth institutionally

Figures

Figure 1

Geographical location of Makwanpur District Note: This figure was adapted from the original image. 53 This image is free to use under the creator's licensing conditions. Licensing agreement available at <https://creativecommons.org/licenses/by-sa/3.0/de/legalcode>. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

Figure 2

Geographical location of participating municipalities Note: This figure was adapted from the original image.⁵⁴ This is a government published, public image. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.