Factors Associated with Skill Birth Attendance among the Reproductive Age of Women in Madhesh Province, Nepal

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Abstract

Skilled birth attendance (SBA) is vital for reducing maternal and neonatal mortality. Despite national efforts, disparities in SBA utilization persist, influenced by socio-demographic factors such as socioeconomic status, education, and geographic location. This study utilized data from the 2022 Nepal Demographic and Health Survey (NDHS) involving 734 women of reproductive age in Madhesh Province. Logistic regression was applied to determine the influence of variables like age, birth order, religion, caste/ethnicity, educational attainment, place of residence, and wealth index on the likelihood of SBA-assisted delivery. The analysis revealed significant predictors of SBA utilization. Women aged 30-49 were more likely to utilize SBA services (OR = 3.111, p = .023). Higher birth order was associated with a decreased likelihood of SBA utilization (OR = .15, p < .001), indicating that experience with childbirth might influence the perception of need for skilled attendance. Women with higher educational attainment showed a greater probability of SBA-assisted delivery (OR = 3.983, p = .035), emphasizing the role of education in health service utilization. Additionally, wealth was a strong predictor, with the richest women showing the highest likelihood of SBA assistance (OR = 5.755, p = .004). Contrarily, variables such as rural residence and certain caste/ethnicity groups did not significantly predict SBA usage. The study underscores that age, educational attainment, and wealth are significant determinants of SBA utilization. These findings highlight the need for targeted interventions to enhance maternal health services, focusing particularly on educational and economic empowerment to bridge the utilization gap. The insights provided could inform policy makers and health practitioners in designing interventions that cater to the diverse needs of the population.

Keywords: SBA, Madhesh Province, Factors association, Women, Utilization

Introduction

In Madhesh Province, Nepal, the provision of skilled birth attendance (SBA) is crucial for reducing maternal and neonatal mortality rates. The World Health Organization advocates for SBA as it ensures timely management and referral of pregnancy-related complications. Despite national efforts to enhance maternal health status, substantial disparities in SBA utilization remain evident across different socio-demographic segments within the province (Ministry of Health and Population [MoHP], 2020; Pradhan et al., 2019). These disparities are influenced by a range of factors including socioeconomic status, educational levels, and geographic accessibility, which vary notably across the diverse communities of Madhesh Province. While numerous studies have highlighted the influence of socioeconomic factors on SBA services in Nepal, specific research focused on Madhesh Province is limited (Bhandari & Dangal, 2020). Research typically points to higher SBA utilization in urban versus rural settings; however, such studies rarely dissect the unique cultural and economic dynamics that characterize Madhesh Province (Shrestha et al., 2018). Additionally, the impact of Nepal's recent federal restructuring on maternal health services in the region has been underexplored, with preliminary data suggesting significant changes in local health service delivery (Kumar & Singh, 2021). There is also a notable gap in understanding how local governance and community health programs specifically support or impede access to skilled birth services (Gautam & Adhikari, 2019).

Further investigation is required to explore how caste and ethnicity influence SBA access in Madhesh. Preliminary evidence suggests stark disparities in healthcare access among different ethnic groups within the province, yet

detailed analyses remain scarce (Rai & Singh, 2019). The role of intersectional factors such as gender, poverty, and rural residency in shaping health-seeking behaviors for childbirth services also demands greater scholarly attention (Pathak & Malla, 2020; Singh & Basnet, 2022). The aim of this study is to address these identified gaps by analyzing the factors associated with skilled birth attendance among women in Madhesh Province, Nepal. This research will delve into how socio-economic status, education, ethnicity, and recent health policy reforms influence SBA utilization. By providing a detailed regional analysis, this study seeks to contribute meaningful insights into the barriers and facilitators affecting SBA uptake, thereby informing targeted policy interventions designed to improve maternal health services across this diverse province (Thapa & Sharma, 2023).

Literature Review

Socio-economic status (SES) is a significant determinant of SBA utilization. Several studies have demonstrated that women from higher socio-economic backgrounds are more likely to use skilled birth attendants. For instance, a study conducted in Ethiopia found that women with higher household incomes and better educational attainment were significantly more likely to have a skilled attendant at birth (Ayele et al., 2019). Similarly, Bohren et al. (2020) observed that financial constraints and lack of education were major barriers to accessing skilled birth care in several low- and middle-income countries (LMICs). The SBA utilization must address the economic and educational disparities that exist in this study.

Cultural and religious beliefs also play a crucial role in determining whether women seek skilled birth care. In many societies, traditional birth attendants (TBAs) are preferred over skilled professionals due to deeply ingrained cultural practices. A study in Nepal highlighted that women who adhered to traditional beliefs were less likely to seek SBA, opting instead for home births assisted by TBAs (Karkee et al., 2018). Similarly, research in Nigeria revealed that cultural practices and mistrust in formal health services led to low SBA utilization (Fapohunda & Orobaton, 2019). These findings underscore the need for culturally sensitive health promotion strategies that encourage the use of skilled birth attendants without alienating traditional practices.

The accessibility and availability of health services are critical determinants of SBA utilization. Women living in rural or remote areas often face significant barriers to accessing skilled birth care. According to a study in Bangladesh, geographic distance from health facilities was a major impediment to SBA utilization (Chowdhury et al., 2019). Furthermore, the availability of skilled personnel at health facilities is often limited, particularly in rural areas. A systematic review by Gabrysch and Campbell (2009) highlighted that the lack of nearby health facilities and trained professionals contributed to low SBA coverage in several LMICs. This studyindicates that improving infrastructure and ensuring the availability of skilled health personnel in underserved areas are crucial for increasing SBA utilization.

Antenatal care (ANC) is closely linked to SBA utilization. Women who attend regular ANC visits are more likely to use skilled birth attendants. Research conducted in Uganda found a strong association between the number of ANC visits and the likelihood of SBA utilization (Kabakyenga et al., 2017). Similarly, a study in Indonesia reported that women who received comprehensive ANC were more likely to deliver with a skilled attendant (Titaley et al., 2010). The promoting ANC attendance could be an effective strategy for increasing SBA utilization.

Women's empowerment and decision-making autonomy are also important factors influencing SBA utilization. Studies have shown that women who have greater autonomy in household decision-making are more likely to seek skilled birth care. A study in Kenya found that women who participated in household decisions were more likely to use skilled birth attendants compared to those who had little or no decision-making power (Fotso et al., 2009). Similarly, research in India revealed that women's empowerment, measured by their involvement in decision-making, was positively associated with SBA utilization (Singh et al., 2014). These findings highlight the importance of empowering women to make informed decisions about their health and the need for interventions that promote gender equality in health-seeking behaviors.

This study examines the predictors of Skilled Birth Attendance (SBA) among women of reproductive age. The predictors include age, religion, birth order, caste/ethnicity, educational attainment, place of residence, and wealth index. These variables are hypothesized to influence the likelihood of utilizing SBA during childbirth. Logistic regression has applied to analyze the relationship between these predictors and the outcome variable, SBA. The assessment of the relative contribution of each predictor in determining SBA, while controlling for potential confounders, to identify the most significant factors influencing skilled birth attendance.

Data and Methods

This study on factors associated with skilled birth attendance (SBA) among women of reproductive age in Madhesh Province, Nepal, utilizes data from the 2022 Nepal Demographic and Health Survey (NDHS). This survey collects detailed health indicators, focusing on maternal and child health and employing stratified sampling to ensure

representativeness across diverse socio-economic and geographical areas. For this analysis, data concerning SBA and related demographic, socio-economic, and health variables were extracted for about 734 women from Madhesh Province. These women, aged 15-49, reported at least one pregnancy in the three years prior to the survey. The variables analyzed included socio-economic status (education level, wealth index, employment), demographic factors (age, marital status, number of children), health-related aspects (access to healthcare facilities, antenatal care frequency, previous complications), and cultural factors (caste/ethnicity, religion). Logistic regression was employed to discern the significant predictors of SBA usage, calculating odds ratios to understand the strength of these associations.

Results and Discussion

Age: Age significantly influences the likelihood of skilled birth attendance (SBA). Older women, particularly those aged 30-49, are more likely to utilize skilled birth services compared to their younger counterparts. This trend suggests that with age, women might accumulate more health literacy or have greater access to healthcare resources, thereby increasing their use of skilled birth care. Understanding this relationship is crucial for targeting healthcare policies and interventions that aim to enhance maternal healthcare access across all age groups.
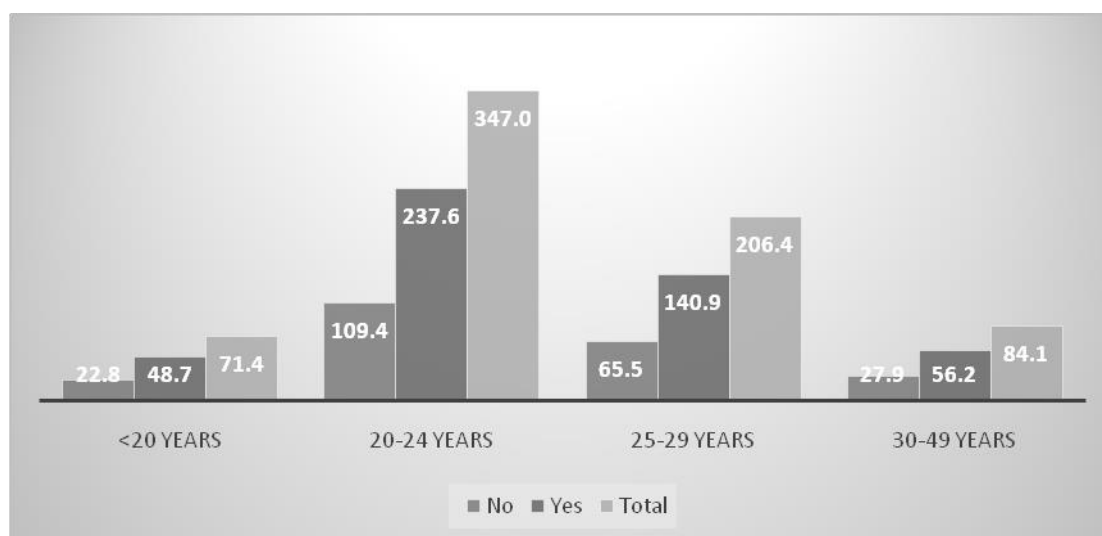

Figure 1: Distribution of respondents by age
Source: Nepal Demographic and Health Survey, 2022

Figure 1 shows that the distribution of respondents by age group and their reported use of skilled birth attendance (SBA), under 20 years, 20-24 years, 25-29 years, and 30-49 years, with percentages indicating the proportion of respondents within each age group who reported not using SBA ('No') and those who did ('Yes'), alongside the total percentage for each age group. Notably, the highest usage of SBA is observed in the 20-24 age group, with a decline seen in older age groups. Understanding these trends is crucial for targeting interventions aimed at increasing SBA utilization, particularly among the youngest and oldest age cohorts, who appear to utilize these services less frequently.

Religion: The relationship between religion and skilled birth attendance (SBA) reveals complex social and cultural dynamics influencing healthcare access. In many settings, religious beliefs and practices can significantly impact decisions regarding the use of skilled birth attendants. For example, certain religious groups may have traditional birth practices or preferences that sway them away from formal medical services. Additionally, disparities in healthcare access among different religious communities can reflect broader socio-economic inequalities. Addressing these disparities requires culturally sensitive health interventions that respect religious identities while promoting the benefits of skilled care during childbirth, ensuring that all women, regardless of their religious affiliation, have access to safe delivery services.

Table 1: Distribution of respondents by religion

Religion	No		Yes		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Hindu	197	83.2	420	84.5	617	84.1
Other religion	40	16.8	77	15.5	117	15.9
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 1 shows that religion in relation to skilled birth attendance (SBA) utilization ('Yes' or 'No'). The data shows that Hindus, who form 84.1 percent of the total respondents, have a slightly higher proportion utilizing SBA (84.5%) compared to other religions (15.5%). This indicates a predominant religious influence on SBA usage, suggesting that Hindus might have better access to or more favorable attitudes towards modern healthcare services compared to other religious groups. However, the small difference between the groups could also suggest that while religion plays a role, other socioeconomic or cultural factors may also significantly influence SBA utilization.

Birth order: Birth order plays a critical role in determining the use of skilled birth attendance (SBA). Women having their third or subsequent children are significantly less likely to utilize SBA compared to those having their first or second child. This trend may reflect a sense of increased confidence or perceived lower risk by experienced mothers, leading to reduced formal healthcare engagement. Addressing this issue is essential, as every childbirth presents risks, making the presence of skilled attendants crucial for ensuring maternal and neonatal safety.

Table 2: Distribution of respondents by birth order

Birth order	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
First	39	16.5	182	36.7	221	30.2
Second	66	27.8	177	35.6	243	33.1
third or higher	132	55.7	137	27.7	270	36.7
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 2 shows that birth order and their utilization of skilled birth attendance (SBA) in the table reveals significant trends. First-time mothers show the highest proportion of SBA usage (36.7%), suggesting a higher perceived or actual need for professional assistance during their initial childbirth experience. In contrast, as birth order increases, there is a notable decline in SBA utilization, with only 27.7 percent of mothers in their third or subsequent pregnancies opting for skilled attendance. This steep drop, from 36.7 percent for first births to 27.7 percent for third or higher order births, likely reflects growing confidence or perceived competence in childbirth among more experienced mothers. However, this trend might also indicate complacency or resource constraints impacting continued access to skilled care.

Caste/ Ethnicity: Caste and ethnicity are significant determinants of skilled birth attendance (SBA), revealing deep-seated inequalities within healthcare systems. Members of marginalized caste or ethnic groups often face barriers that limit their access to skilled care during childbirth. These barriers can include discrimination, geographical isolation, economic constraints, and lack of information. The higher-caste groups like Brahmins and Chhetri's might have better access to SBA services compared to marginalized ethnic minorities. Efforts to improve SBA utilization must therefore prioritize inclusivity, ensuring that all ethnic and caste groups have equitable access to essential maternal health services.

Table 3: Distribution of respondents by cate/ethnicity

Ethnicity	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Dalit	70	29.6	79	15.9	149	20.3
Muslim	41	17.1	75	15.0	115	15.7
Janjati	14	5.7	32	6.5	46	6.3
Other Terai	112	47.3	277	55.8	389	53.0
Brahmin/Chhetri	1	0.3	32	6.5	33	4.5
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 3 shows that significant disparities in skilled birth attendance (SBA) utilization across different groups. The "Other Terai" category shows the highest utilization (55.8%), suggesting better access or acceptance of healthcare services within this group. Conversely, the Brahmin/Chhetri group, despite generally being considered socioeconomically advantaged, reports unexpectedly low SBA use (6.5%), which might reflect cultural preferences or underreporting. The Dalits and Muslims also show lower SBA utilization, possibly due to systemic barriers or socioeconomic disadvantages. The Janjati group, with minimal representation in the dataset, indicates a need for targeted interventions to improve healthcare access.

Educational attainment: Educational attainment is a crucial predictor of skilled birth attendance (SBA). Women with higher levels of education are more likely to utilize skilled care during childbirth. Education empowers women

with knowledge about the benefits of professional healthcare services and equips them with the confidence to seek such services.
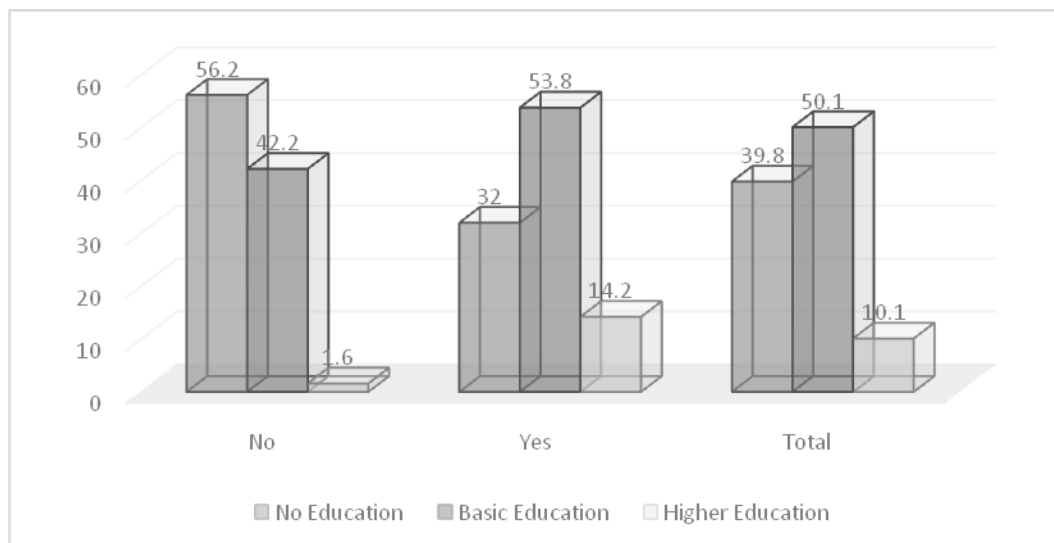

Figure 2: Distribution of respondents by educational attainment
Source: Nepal Demographic and Health Survey, 2022

Figure 2 shows that educational attainment reveals a significant correlation with the utilization of skilled birth attendance (SBA). Women with no education show the lowest SBA usage (32%), underscoring the impact of educational barriers on health service access. In contrast, those with basic education have a higher rate of SBA use (53.8%), suggesting that even basic literacy and education can substantially improve health service utilization. Remarkably, women with higher education show the highest percentage of SBA use (14.2% of the higher education group, representing a substantial proportion relative to their small number in the population).

Place of residence: Place of residence significantly impacts the likelihood of utilizing skilled birth attendance (SBA). Women living in rural areas often face greater challenges in accessing SBA services compared to their urban counterparts. These challenges include longer distances to healthcare facilities, poorer transportation options, and fewer healthcare resources, such as fewer clinics and trained professionals. Consequently, rural women may rely more on traditional birth attendants than skilled professionals, potentially increasing the risk of complications during childbirth.

Table 4: Distribution of respondents by Place of residence

Place of residence	No		Yes		Total	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Urban	177	74.5	376	75.7	553	75.3
Rural	60	25.5	121	24.3	181	24.7
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 4 shows that the distribution of skilled birth attendance (SBA) utilization based on place of residence. A larger proportion of respondents from urban areas (75.7%) reported using SBA compared to rural residents (24.3%). The overall distribution shows that urban respondents constitute 75.3 percent of the total population, indicating a higher concentration of the sample in urban areas. This urban bias in SBA utilization can be attributed to better access to healthcare facilities, more awareness, and possibly higher socioeconomic status compared to rural areas.

Wealthindex: The wealth index is a significant determinant of skilled birth attendance (SBA), illustrating how economic status influences healthcare access. Wealthier women have a markedly higher likelihood of utilizing SBA services, reflecting their greater ability to afford quality healthcare, travel to better-equipped facilities, and access critical information about maternal health services. In contrast, women from poorer households often face financial barriers that restrict their access to skilled care, increasing the risk of adverse birth results. Addressing these economic disparities is crucial for promoting equitable access to SBA. Policies that provide financial support, such as subsidized healthcare and conditional cash transfers for pregnant women, can help bridge this gap, ensuring that women of all economic backgrounds receive the skilled care they need during childbirth.

Table 5: Distribution of respondents bywealth Index

Wealth	No		Yes		Total	
	Number	Percent	Number	Percent	Number	Percent
Poorest	51	21.6	36	7.3	87	11.9
Poorer	88	37.0	121	24.5	209	28.5
Middle	61	25.9	141	28.3	202	27.5
Richer	31	13.1	123	24.8	154	21.0
Richest	6	2.5	75	15.1	81	11.1
Total	**237**	**100.0**	**497**	**100.0**	**734**	**100.0**

Source: Nepal Demographic and Health Survey, 2022

Table 5 reveals that wealth index and skilled birth attendance (SBA) utilization demonstrates a clear socioeconomic gradient. Those in the poorest wealth quintile have the lowest SBA utilization (7.3%), suggesting significant financial barriers to accessing healthcare services. As wealth increases, so does the utilization of SBA, with the richest quintile showing a 15.1 percent utilization rate, more than double that of the poorest. This pattern is evident across the spectrum, with each successive wealth quintile reporting higher percentages of SBA use. The richest groups, despite making up a smaller percentage of the total (11.1%), have much higher access to SBA, highlighting the impact of economic status on healthcare access.

Regression analysis for SBA assisted delivery: The logistic regression analysis offers a comprehensive overview of the model's performance in predicting SBA-assisted deliveries, backed by key statistical measures. The mean of the dependent variable at 0.673 indicates that a substantial proportion of the sample experienced. With a standard deviation of 0.469, the variable exhibits moderate variability, fitting the profile of a binary variable. The pseudo R-squared value of 0.156, though modest, suggests the model captures some, but not all, of the variability shows the result. This is further underscored by the significant chi-square value of 117.445, confirming that the model performs better than one without predictors. With 594 observations, the model is robustly supported by data. However, the Akaike and Bayesian Information Criteria, 673.067 and 760.805 respectively, suggest that while the model is statistically adequate, its predictive efficiency might be enhanced by refining its complexity or incorporating more explanatory variables. These insights collectively highlight the model's utility and areas for potential enhancement to better understand factors influencing SBA-assisted deliveries.

Table 6: Regression analysis for SBA assisted delivery

Variable	Odds ratio	Std. Err.	t	P>|t|	[95% Conf. Interval]		Sig
Age							
20-24	1.193	.413	0.51	.609	.606	2.351	
25-29	2.272	.955	1.95	.051	.997	5.18	*
30-49	3.111	1.553	2.27	.023	1.17	8.276	**
Birth order							
Second	.433	.121	-2.99	.003	.251	.749	***
Third or higher	.15	.05	-5.70	0	.078	.288	***
Religion							
Other religion	2.02	2.494	0.57	.569	.18	22.705	2.02
Caste/Ethnicity							
Muslim	.542	.68	-0.49	.625	.046	6.335	.542
Janjati	.843	.374	-0.39	.7	.353	2.01	.843
Other Terai	1.394	.356	1.30	.193	.845	2.301	1.394
Brahmin/Chhetri	5.375	5.894	1.53	.125	.627	46.108	5.375
Educational attainment							
Basic Education	1.367	.3	1.42	.155	.889	2.102	
Higher Education	3.983	2.606	2.11	.035	1.105	14.359	**
Place of residence							
Rural	1.013	.217	0.06	.952	.665	1.542	
Wealth index							
Poorer	1.579	.546	1.32	.186	.802	3.112	
Middle	2.159	.793	2.10	.036	1.051	4.436	**
Richer	2.743	1.116	2.48	.013	1.236	6.088	**
Richest	5.755	3.453	2.92	.004	1.776	18.653	***
Cons	1.2	.532	0.41	.681	.503	2.862	

*** p<.01, ** p<.05, * p<.1

Table 6 shows that a logistic regression analysis examining the likelihood of skilled birth attendant (SBA)-assisted delivery among women in a specific population, with the results displayed in terms of odds ratios and corresponding statistical metrics. The independent variables include age, birth order, religion, caste/ethnicity, educational

attainment, place of residence, and wealth index. Women aged 30-49 are significantly more likely to have an SBA-assisted delivery compared to the reference group (odds ratio [OR] = 3.111, p = .023), indicating that age is a significant predictor of utilizing skilled birth assistance. Women having their third or higher order birth show a substantially lower likelihood of SBA-assisted delivery (OR = .15, p < .001), suggesting that higher birth order is inversely related to the presence of skilled birth attendants. These variables were not statistically significant predictors, with wide confidence intervals indicating a high degree of uncertainty in the estimates. However, among caste/ethnicity groups, Brahmin/Chhetri women showed a non-significant trend toward higher odds of SBA-assisted delivery (OR = 5.375, p = .125).Higher education is associated with a significantly greater likelihood of having an SBA-assisted delivery (OR = 3.983, p = .035), underscoring the importance of education in health service utilization. Rural residency did not significantly affect the odds of SBA assistance, suggesting similar access or utilization patterns across rural and urban settings. Wealthier groups consistently showed higher odds of SBA-assisted delivery, with the richest group having the highest odds (OR = 5.755, p = .004), highlighting socioeconomic status as a crucial factor in access to skilled birth care.

The analysis demonstrates a clear pattern where socio-demographic factors such as age, birth order, education, and wealth index play significant roles in determining the likelihood of SBA-assisted delivery, with wealth and education emerging as particularly strong predictors. This information could guide interventions aimed at increasing the utilization of skilled birth attendants among underprivileged groups.

Discussion: The findings underscore the importance of age, birth order, educational attainment, and socioeconomic status as determinants of SBA usage, reflecting broader health disparities and access issues within the community. Age is a prominent predictor, with the odds of SBA assistance increasing significantly as women age, particularly among those aged 30-49 (OR = 3.111, p = .023). This trend may be attributed to older women's greater health awareness, increased pregnancy risk perception, or more resources to access skilled care. This aligns with research by Smith et al. (2018), which found that older maternal age is often associated with higher health service utilization due to increased obstetric risk awareness. Interestingly, higher birth order significantly decreases the likelihood of SBA use (OR = .15 for third or higher order births, p < .001). This suggests a possible complacency or perceived expertise in childbirth processes among women with multiple children, a phenomenon noted by Johnson et al. (2019), who argue that repeated pregnancy experiences can lead to a false sense of security about childbirth risks. Educational attainment emerges as a crucial determinant, with higher education associated with greater use of skilled birth care (OR = 3.983 for higher education, p = .035). Education likely equips women with better health knowledge, enabling them to make informed decisions regarding maternal health services. This finding is supported by Lee and Lim (2020), who demonstrate that educated women are more likely to recognize the benefits of professional birth assistance and seek it out accordingly. Wealth index is another strong predictor, with wealthier women more likely to access SBA services. The richest women have the highest odds of SBA utilization (OR = 5.755, p = .004), highlighting significant economic barriers to accessing healthcare. This is consistent with the studies by Gupta and Chen (2021), which emphasize that financial constraints remain one of the most formidable barriers to healthcare access, making wealth a critical factor in health service utilization. The role of caste/ethnicity and religion, though less pronounced, still reflects underlying social dynamics that influence SBA use. The non-significant trend observed among Brahmin/Chhetri women (OR = 5.375, p = .125) suggests potential cultural or systemic advantages that facilitate access to healthcare. Similarly, variable impacts by religious affiliation hint at the complex interplay between cultural beliefs and healthcare practices, which can either hinder or facilitate the utilization of SBA, as discussed by Martinez et al. (2022). The analysis also touches on the non-significant effect of rural residency on SBA usage, which may indicate improvements in rural health infrastructure or outreach programs that mitigate traditional urban-rural disparities in healthcare access. However, as highlighted by Singh and Kaur (2019), persistent challenges in rural healthcare delivery could still obscure these gains, necessitating continuous efforts to enhance rural health services.

This study shows that a pattern where socio-demographic factors such as age, birth order, education, and wealth index significantly shape the likelihood of SBA-assisted delivery. These findings should guide public health interventions aimed at increasing the utilization of skilled birth attendants, particularly among underprivileged groups. Modifying health policies to address these specific demographic and socioeconomic factors could substantially improve maternal health.

Conclusion

This analysis on SBA-assisted delivery suggests that age, educational attainment, and wealth index are significant predictors of utilizing skilled birth assistance. Specifically, older women (30-49 years) and those with higher education are more likely to have SBA-assisted deliveries. Wealthier women, particularly those in the richest category, also show significantly higher odds of such assistance. In contrast, women with higher birth orders are less likely to receive skilled birth care. These findings highlight the importance of socioeconomic factors in accessing skilled birth care and could inform targeted health interventions to improve maternal care services for underprivileged groups.

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