

Geographical Attributes, Distribution, and Determinants of Pelvic Organ Prolapse in Midwestern Nepal

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Received: February 11, 2024

Accepted: April 4, 2024

Online Published: April 8, 2024

doi:10.5539/jsd.v17n3p16

URL: <https://doi.org/10.5539/jsd.v17n3p16>

Abstract

The study investigated the geographical attributes, distribution, and determinants of pelvic organ prolapse (POP) in Nepal to comprehend the underlying factors contributing to its high prevalence in the region. Conducted in the Panchapuri municipality of midwestern Nepal, this cross-sectional study surveyed 103 married women aged 20–49 years using a semi-structured questionnaire. Participants were randomly selected from four health facility catchment areas in equal proportions. Descriptive statistics presented the data while binary logistic regression models assessed factors associated with POP. Participant allocations were mapped using ArcGIS, with shapefiles obtained from official sources. The study revealed a POP prevalence of 37.9%, with housewives exhibiting a significant association compared to businesswomen (AOR: 5.291; 95% CI: 1.046, 26.775). Constipation during pregnancy was significantly associated with POP (AOR: 9.104; 95% CI: 2.210, 37.501), while multipara women with a parity of four or more were 7.8 times more likely to have POP. Interestingly, geographical attributes like altitude, slope, and climate showed no association with POP. The findings underscore the significant association of POP with factors such as housewives, pregnancy-related constipation, and multiparity. Addressing these determinants through targeted research is vital in alleviating the burden of POP. This study emphasizes the urgent need for interventions, policies, and healthcare support, particularly focusing on maternal health and occupational well-being among rural housewives in Nepal.

Keywords: pelvic organ prolapse, reproductive age, women; parity, Nepal

1. Introduction

Pelvic organ prolapse (POP), characterized by the protrusion or displacement of pelvic organs, significantly impacts the health and quality of life of reproductive and menopausal women worldwide (Berek & Novak, 2007; Elsayed et al., 2016). According to the World Health Organization (WHO), reproductive disorders contribute to 33% of the overall disease burden affecting women globally. Despite its prevalence, there's limited understanding of POP in low- and middle-income countries (Gunasekera et al., 2007). In Sub-Saharan Africa and South Asia, including Nepal, POP prevalence ranges from 10.3% to 37.6% (Jokhio et al., 2020; Walker & Gunasekera, 2011; Mucho et al., 2021).

Uterine prolapse, as noted by the United Nations Fund for Population Activities (UNFPA), typically occurs more frequently among postmenopausal women globally, contrasting with its higher prevalence among younger women in Nepal. Research suggests that the risk of prolapse escalates with each inadequately spaced vaginal birth (Singh et al., 2021). Addressing proper birth spacing involves considering various factors such as early marriage, illiteracy, limited family planning, and social inequality (Adhikari, 2010).

While age, parity, and obstetric history play roles in women's reproductive health, they alone do not fully determine the occurrence of uterine prolapse. Complex sociocultural norms, often derogatory towards women, significantly contribute to the prevalence of prolapse in Nepal (Radl et al., 2012). Moreover, Nepalese women commonly delay seeking treatment until their condition worsens.

Treatment for uterine prolapse poses significant challenges influenced by factors including embarrassment, household responsibilities, healthcare accessibility, financial constraints, patriarchal family dynamics, and

women's limited agency in healthcare decision-making (Khadgi & Poudel, 2018). This complex interplay of social, cultural, and economic factors underscores the multifaceted nature of addressing uterine prolapse in Nepal.

Despite the multifactorial nature of POP, there's a dearth of information on its prevalence and contributing factors among reproductive-age Nepalese women, particularly in spatial terms (Singh et al., 2021; Thapa et al., 2014). Understanding the geographic distribution and determinants of POP in Nepal is crucial for addressing health disparities and targeting preventive interventions effectively. This study aims to bridge this gap by exploring the factors driving the high prevalence of POP in Nepal while examining its geographical attributes and distribution through spatial analysis.

2. Methods

2.1 Study Design

A cross-sectional study was conducted in the Panchapuri municipality of Surkhet district, situated in midwestern Nepal.

2.2 Setting and Data Collection

The study area, Panchapuri, is an urban municipality in Surkhet district, Karnali province, covering 329.9 square kilometers with a population of 32,231 as per the 2011 Nepal census. The municipality comprises one primary health care center (PHCC) and four health posts, divided into 11 wards, with the headquarters in Babiyaachaur. This research focused on five villages with PHCCs and health posts, as part of a sub-study within a larger research project. The study was conducted from February to April 2019, targeting married women aged 20 to 49 years who had experienced at least two pregnancies. Sampling was conducted randomly across four health facility catchment areas until the desired sample size of approximately 131 was achieved, based on the estimated prevalence in the region.

2.3 Participants

Participants included women aged 20 to 49 years who had given birth at least twice, along with those with a history of vaginal hysterectomy and prolapse. Women delivering their firstborn via cesarean section were excluded. The study enrolled 103 participants residing in different wards of Panchapuri.

2.4 Explanatory Variables

The study's dependent variable was the presence of pelvic organ prolapse (POP), while independent variables included age, ethnicity, maternal education level, occupation, parity, and geographical attributes such as altitude, slope, climate, and proximity to healthcare centers.

2.5 Data Collection

Trained field assistants administered a semi-structured questionnaire to collect data on socio-demographic characteristics, socioeconomic status, POP symptoms, risk factors, treatments, and health service utilization. The questionnaire was divided into three sections, covering socio-demographic details, POP-related inquiries, and health service utilization. The questionnaire was pretested and translated into Nepali for clarity and cultural relevance. Participant selection employed the Expanded Program on Immunization (EPI) sampling method, with one participant randomly chosen from households with more than two eligible individuals.

2.6 Statistical Analysis

Descriptive analysis was performed to explore the data, considering baseline characteristics and potential determinants of POP. Multivariate analysis, utilizing binary logistic regression, investigated associations between dependent and independent variables. Data analysis was conducted using IBM SPSS statistical software version 28, with significance set at $p < 0.05$.

2.7 Map Generation

ArcGIS version 10.8 was utilized to generate maps displaying participant allocations. Shapefiles, obtained from the Geodata Berkely Library and Central Bureau of Statistics of Nepal, delineated the administrative divisions and geographical features of Panchapuri. Random allocations of points were generated to represent participant locations within wards. Maps were created to visualize the geographical distribution of wards based on quartiles of POP prevalence and constipation during pregnancy.

2.8 Ethical Considerations

The study received approval from the Ethics Review Committee of the Faculty of Medicine, University of Tsukuba, and the Nepal Health Research Council (NHRC). Informed consent was obtained from all participants, ensuring

confidentiality and ethical conduct throughout the study.

3. Results

The study found that the overall prevalence of pelvic organ prolapse (POP) among participants was 37.9% (39 out of 103). The average age of participants was 32.3 years (standard deviation: 6.7), with a range of socio-demographic and reproductive health characteristics as summarized in Table 1. Notably, a significant proportion of women (64.1%) had never attended school, while 24% identified as housewives. A considerable portion (38.8%) reported a monthly income of less than 10,000 Nepalese rupees (NPR), approximately 75 US dollars. Moreover, 35% of women had their first child before the age of 18, and over half (56.3%) had at least two children. Family planning was underutilized, with 58.3% of participants reporting no previous use. However, more than half (51%) delivered their first child in a health facility.

Table 1. Characteristics of study participants (N = 103)

Variables	N	%
<u>Sociodemographic characteristics (section I)</u>		
Age in years, mean \pm SD	32.31 \pm 6.65	
20–29	37	35.9
30–39	46	44.7
40–49	20	19.4
Education		
None	66	64.1
Primary	13	12.6
Secondary and above	24	23.3
Occupation		
Business	39	37.9
Commercial farm worker	39	37.9
Housewife	25	24.3
Ethnicity		
Brahmin	28	27.2
Chhetri	19	18.4
Dalit	49	47.6
Others	7	6.8
Monthly income, Nepalese rupee (1 USD = 132.38 NPR)		
< 10,000	40	38.8
10,000–20,000	31	30.1
\geq 20,000	32	31.1
<u>Reproductive health-related characteristics (section II)</u>		
Age at marriage, years		
12–16	46	44.7
17–24	57	55.3
Age at first childbirth, years		
16–18	36	35.0
19–21	57	55.3
22–25	10	9.7

Parity		
2	58	56.3
3	28	27.2
4+	17	16.5
Use of family planning		
Yes	43	41.7
No	60	58.3
Family planning method (n = 60)		
Condom	16	26.7
Depo	21	35.0
Norplant/implant	5	8.3
Vasectomy	9	15.0
Pills	8	13.3
IUCD/IUD	1	1.7
Place of delivery		
Home	45	43.7
Health facility	58	56.3
Physical workload during pregnancy		
More than before	34	33.0
As usual	52	50.5
Less than before	17	16.5
Smoking behavior		
Past	4	3.9
Present	14	13.7
Constipation status		
During pregnancy	23	22.3
Postpartum constipation	30	29.1
Present	28	27.2
Health check-up location		
Public health institutions	93	90.3
Traditional healers	6	5.8
Private medical centers	4	3.9

*SD: standard deviation; IUCD/IUD: intra-uterine contraceptive device/ intrauterine device.

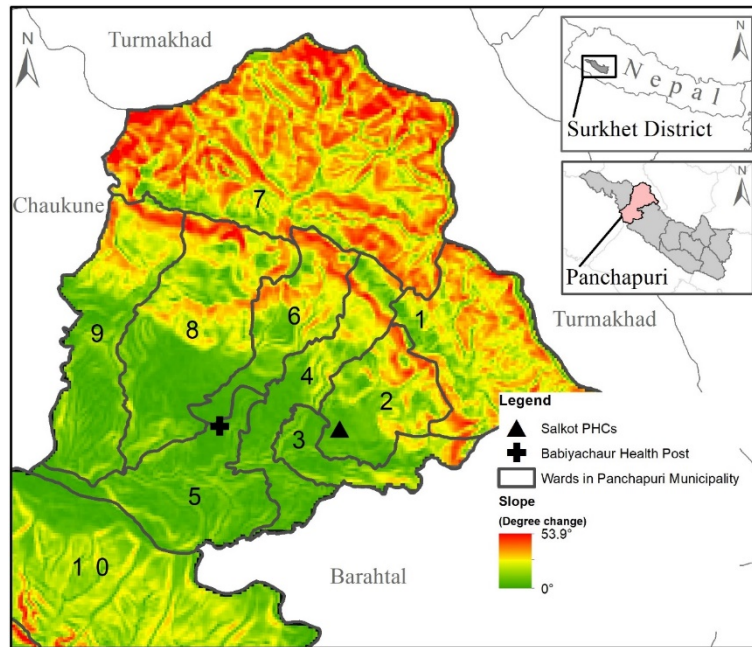


Figure 1. Map of the study area with slope (degree change)

During pregnancy, about half of the participants (50.5%) continued working as usual, with 33.8% reporting increased workloads. Smoking history was minimal, reported by only 3% of participants. Constipation was prevalent postpartum (30%) and during pregnancy (22.3%). Most participants (90.3%) sought health check-ups at public facilities, while 5.8% consulted traditional healers. Among those with POP, the majority were aged 30 to 39 years and predominantly sought treatment at hospitals (87.2%), resulting in improved health status for most. Treatment recommendations varied, with 10% advised surgery and 28.2% instructed to perform pelvic floor exercises. Overall, satisfaction with received treatment was high (76.9%).

Figure 1 depicts the placement of wards, Salkot Primary Health Centers (PHCs), and the Babiyaachaur Health Post. The distribution of slopes corresponds to the variations in altitude across the study area, with red representing the steepest terrain and green indicating flat areas. Figure 2 shows the prevalence of POP (%) in 10 wards of Panchapuri. On the map, darker areas indicate a higher proportion of prolapse cases, while lighter areas correspond to a lower percentage whereas Figure 3 shows the prevalence of constipation during pregnancy. Ward no. 2 had the highest prevalence of constipation during pregnancy.

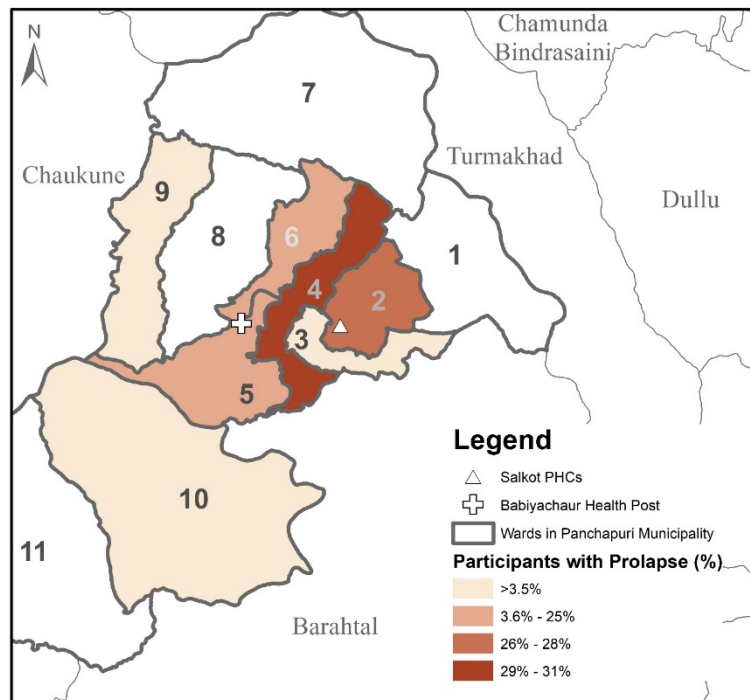


Figure 2. The prevalence of pelvic organ prolapse (POP) by ward

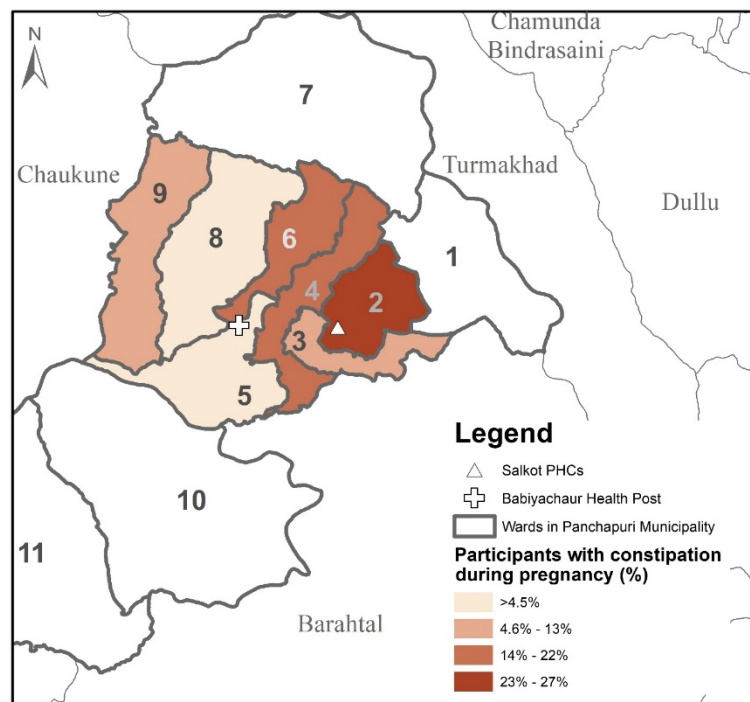


Figure 3. The prevalence of constipation during pregnancy by ward

Table 2. Health-related information among POP participants. (N = 39)

Variables	N	%
Age Category		
20-29	3	7.7
30-39	19	48.7
40-49	17	43.6
Place of Treatment		
Hospitals	34	87.2
Clinics	5	12.8
Health status after treatment		
Improved	31	79.5
Not improved	6	15.4
worse	2	5.1
Treatment types		
Ring Pessary	8	20.5
Medication as per advice	16	41.0
Surgery/advice	4	10.3
Pelvic floor exercises	11	28.2
Treatment satisfaction		
Yes	30	76.9
No	9	23.1

Table 3 shows the Percentages of women who agree with the statements regarding how to reduce POP risk. Of the participants, 85.4% had heard that lifting heavy weights during pregnancy could cause POP, and 52.9% were aware that having too many babies too soon was a risk factor for POP. However, most of the participants were unaware that constipation, an abortion performed by a trained professional, long-term coughing, and delivery in a health institution could also increase the risk of POP.

Table 3. Percentages of women who agree with the statements regarding how to reduce POP risk (N = 103)

Statement	%
Do not lift heavy weight during pregnancy	85.4
Do not apply pressure before true labor pain	24.5
Eat nutritious diet at the time of pregnancy & delivery	48.5
Avoid constipation	11.7
Avoid long-term coughing	16.5
Deliver in health-institutions	13.6
Abortion through trained health personnel	8.7
Treat diabetes & other chronic diseases in time.	8.7
Do not give birth to too many babies	52.9

Table 4 presents the univariable and multivariable analyses of the associations of selected variables with POP. In the univariable analysis, a minimum birth interval of fewer than 2 years was associated with a higher prevalence of POP (OR: 4.547; 95% CI: 1.566, 13.203). Moreover, the immediately preceding birth interval also showed a significant relationship with POP. Similarly, women with constipation during pregnancy were six times more likely to experience POP than women without constipation (OR: 6.741; 95% CI: 2.460, 18.474). Age, parity, and

occupation were significantly associated with POP, while ethnicity, education level, and income were not. Likewise, the multivariable logistic regression analysis after adjusting the selected variables showed that housewives had a higher likelihood of POP (AOR: 5.291; 95% CI: 1.046, 26.775) than women who were business owners. POP was more likely among women having constipation during pregnancy (AOR: 9.104; 95% CI: 2.210, 37.501). Additionally, multipara women with a parity of 4+ were 7.8 times more likely to have POP compared with women with a parity of 2.

Table 4. Univariable and multivariable associations of POP. (N = 103)

Variable	OR (95% CI) ^a	P-value	AOR (95% CI) ^b	P-value
Age				
20–29	Ref.		Ref.	
30–39	9.333 (1.983, 43.919)	0.005	4.096 (0.722, 23.234)	0.111
40–49	21.389 (4.005, 114.222)	< 0.001	4.077 (0.522, 31.809)	0.180
Ethnicity				
Brahmin	Ref.			
Chhetri	1.875 (0.340, 10.334)	0.470		
Dalit	0.724 (0.251, 2.088)	0.550		
Others	1.875 (0.340, 10.334)	0.470		
Minimum birth interval				
≥ 2 years	Ref.		Ref.	
< 2 years	4.547 (1.566, 13.203)	0.005	0.996 (0.109, 9.099)	0.997
Preceding birth interval				
≥ 2 years	Ref.		Ref.	
< 2 years	4.198 (1.593, 10.413)	0.003	0.347 (0.051, 2.356)	0.279
Occupation				
Business	Ref.		Ref.	
Agriculture	1.000 (0.333, 3.002)	1.000	0.997 (0.223, 4.450)	0.997
Housewife	4.198 (1.391, 12.667)	0.011	5.291 (1.046, 26.775)	0.044
Constipation status				
During pregnancy	6.741 (2.460, 18.474)	< 0.001	9.104 (2.210, 37.501)	0.022
Postpartum constipation	0.706 (0.264, 1.885)	0.487		
Present	0.333 (0.104, 1.066)	0.064		
Parity				
2	Ref.		Ref.	
3	2.961 (0.996, 8.797)	0.051	1.423 (0.317, 6.392)	0.646
4+	15.000 (4.159, 54.098)	< 0.001	7.837 (1.321, 46.499)	0.023

* Dependent Variable: POP; ^a OR = Odd Ratio; ^b AOR = adjusted odd ratio; CI=Confidence Interval; Ref. Reference category.

4. Discussion

This study was designed to assess the geographical attributes, distribution, and determinants of highly prevalent POP among women of reproductive age in Nepal. Ours is the first study to examine the geographical attributes and distribution of women with POP and adds important findings to the existing literature on the risk of POP among different ethnic groups living in diverse geographical spots. The present study revealed that the prevalence of POP was 37.9%, which is relatively high compared to a previous study in Nepal, which found a prevalence of 22.6% (Puri, 2011). An even much higher prevalence of 44.8% was found in a study in Northwest Ethiopia (Bezie,

& Addisu, 2019). These findings add valuable insights to the existing literature on the risk of POP and highlight the need for further research on this important issue.

The study suggested that geographical attributes such as altitude, slope, and climate differences were not relevant to the prevalence of prolapse or constipation during pregnancy in the wards. A previous study suggested a slight relation between altitude and slope in gastrointestinal problems, (Meena, Pandey, Arya, & Ahmed, 2010 & Ren et al., 2010) but this was mostly to short-term visitors and not inhabitants. This may explain why these potential geographical differences do not have a relationship with the results of the current study. However, the difference in health care centers and health posts may have a relationship due to the types of health care provided and the distances to access them (Sibeko & Moodley, 2006; Yonel et al., 2018 & Al-Taiar, Clark, Longenecker, & Whitty, 2010). Ward no. 4 stands out when considering the longitudinal straight distance (10.5 km) in comparison with the general distance (1.2–1.5 km on average). Babiyachaur health post is in ward no. 5, with the closest point to no. 4 being 600 meters away, while the longest distance increases to more than 8 km (direct distance); thus, considering the available routes and types of transportation, the estimated distance increases exponentially. Considering the possibility of significant differences in the number of people who visit the health post compared to the PHCC, which is located more centrally for wards no. 4 and 2, this evidence could also reflect a difference in the attendance and amount and type of healthcare provided at these two locations, with an increase in the prevalence of POP and constipation during pregnancy in these wards. The study found that constipation during pregnancy was a significant risk factor for POP, (Obsa et al., 2022 & Sievert et al., 2012) consistent with previous research. Sievert et al. reviewed the literature regarding the prevention of pelvic floor disorders (PFD) and determined that constipation during pregnancy could also be a risk factor for POP (Sievert et al., 2012). The present study supports this conclusion, suggesting that chronic straining during defecation may damage the pudendal nerve and cause a loss of tone in the pelvic floor muscles, resulting in prolapse.

Nepal has made great strides in improving the health and well-being of women. According to the Ministry of Health, the fertility rate of women aged 15–49 years decreased from 4.1 in 2000 to 2.3 in 2016 (MOH, 2017). However, the women in the study area had a higher number of childbirths compared to the national average. As several studies have shown, the prevalence of POP increases with parity, which is consistent with our findings (Lien, Chen, & Ng, 2012 & Patil, & Patil, 2013). In our study, multipara women (parity 4+) were 7.8 times more likely to have POP compared to women with fewer childbirths. This is likely because repeated pregnancies and childbirths can damage the sphincter muscles and ligaments, which may not fully regain their elasticity and strength (Devkota et al., 2020).

Heavy physical work is common among rural women in Nepal, regardless of their health status. Our study found that housewives who engaged in heavy physical work had an increased risk of POP, a finding consistent with previous research (MOH, 2017 & Chiaffarino et al., 1999). This is likely because women in these areas often spend a significant amount of time performing tasks such as carrying and lifting heavy objects, fetching water from a distance, and performing household chores (Forner, Beckman, & Smith, 2020). The physical strain of these activities may contribute to the development of POP.

4.1 Limitations of the Study

This study provided valuable insights into the distribution and determinants of POP in rural Nepal, although it should be noted that the sample size was limited. As such, it is recommended that future studies on this topic include a larger sample to provide more robust findings. Additionally, the study used a random allocation of points, limiting its generalizability. Further studies in different locations are necessary to fully understand the distribution and determinant factors of POP in rural Nepal.

5. Conclusions

This study underscores the significant burden of pelvic organ prolapse (POP) among reproductive-age women in Nepal, with a prevalence of 37.9%. The findings highlight critical areas for intervention and further research to mitigate the impact of POP on Nepalese women's health.

The observed association between POP and disparities in healthcare access emphasizes the importance of tailored healthcare services to address the needs of populations with limited access to healthcare centers and posts. Additionally, interventions targeting multipara women in maternal health programs are crucial to addressing the increased risk of POP associated with higher parity.

Furthermore, the study underscores the need for occupational health measures to alleviate the physical strain experienced by rural housewives, who are disproportionately affected by POP. Strategies aimed at reducing heavy physical work among this demographic could contribute significantly to POP prevention and management.

In conclusion, this study highlights the urgency of implementing targeted interventions and healthcare policies to address the multifaceted determinants of POP in Nepal, ultimately improving the quality of life for affected women and reducing the overall disease burden.

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Acknowledgments

We extend our sincere gratitude to the Surkhet Primary Health Centers (PHCs) for their invaluable collaboration in facilitating this study. Special thanks to Dr. Sandeep and Dr. Sonam for their unwavering technical support and cooperation during the fieldwork. We also express our gratitude to Prof. Bernardo Bravo Mendez for his insightful review of the manuscript. Our heartfelt appreciation goes out to the dedicated team members involved in this research endeavor, and most importantly, to the women who generously participated in this study.

Authors contributions

Conceptualization: R.S. Methodology: R.S., C.I.B-C. Writing - Original Draft Preparation: R.S. Writing - Review

& Editing: R.S., R.K-S., C.I.B-C. All authors have reviewed and approved the final version of the manuscript for publication.

Funding

This research did not receive funding from any public, private, or nonprofit organizations through a dedicated grant.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Canadian Center of Science and Education.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Further, the study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Review Committee of the Faculty of Medicine, University of Tsukuba (Notification no. 1373), and the Nepal Health Research Council (NHRC) (Reg. no. 693/2018).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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