

Cesarean Section and Its Correlates Among Early Child Bearing Women in Nepal

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Research note

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Abstract

Objective: To examine the factors associated with cesarean section among early child bearing women in Nepal.

Results: Out of 4006 women of reproductive age group from 1996 to 2016, more than 50% had early pregnancy. The population-based cesarean section (CS) rate was about 10% [95% confidence interval: (8.9-11.6)]. Our logistic regression model showed that women with early child bearing had 32% (p-value <0.05, 95% confidence interval: 0.50- 0.94) less chance of having CS than women of age group 19-29 years. It was also evident that poorest women of same age group had 66% less likelihood of having CS than the richest (p-value: <0.05, 95% confidence interval: 0.29-0.99). Similarly, women from province-1, province-3 and province-4, having complete four antenatal check-ups and delivering in a private institution were associated with CS among early child bearers.

Introduction

In today's world of independency with rapid improvement in health-quality, health-consciousness and awareness, it is dejected to note that very 5th child is born by adolescent mothers (< 19 years) and around eighty percentages of such early pregnancies occur in third-world countries as per the data provided by the United Nations International Children's Emergency Fund (UNICEF) (1). Meanwhile, cesarean section (CS) is a surgical procedure conducted to deliver the babies by performing an incision on the mother's abdomen in order to reduce complications that may arise in the course of vaginal delivery and improve the health outcomes in both the mother and neonate. However, rate of CS has continued to rise dramatically in past 30 years (2).

There has been an upsurge in the rate of CS all over the world, data from 2016 showed that currently 18.6% births occur by CS, which is far greater than the optimum rate mentioned by WHO. The rate of CS is rising by 4.4% every year with highest being in Asia and lowest in North-America (3). Similarly, early pregnancies are also considered as a universal burden covering all countries irrespective of their economic status (4). It has been estimated that around sixteen million girls between the age of 15–19 years give birth each year globally and babies delivered from these teen-age mothers occupies 11% of total birth worldwide. It is staggering to note that highest numbers (around 95,153) of such early pregnancies occurs in Eastern-Asia (5). Furthermore, ninety-five percentages of such birth happen to be from developing countries like Nepal (6).

WHO statistics of 2014 shows that among the cause of mortality of young mothers, complications during pregnancy and delivery is the second leading factor which is highly associated with unfavorable perinatal and obstetric outcomes (7, 8). Moreover, finding has represented that early pregnancies are at risk of CS nearly by 80% in comparison to older women due to reasons like biological immaturity, fetal distress, poor nutritional status, disproportion between fetus and maternal pelvis size, failure of induction and oxytocin augmentation (9, 10, 11). Sadly, early pregnancies among such young population are not a product of

voluntarily choice and decision but lack of access to proper education and existing stereotype and prejudice in the communities (12).

Speaking about Nepal, it is already fighting burden of Maternal Mortality Rate (MMR) of 281 deaths per 100,000 live births which is highest in comparison to other South-Asian countries and home delivery in unhygienic environment is another load in its back. Multi-parity, teen-age pregnancy, less or no antenatal visits being some of the basic key indicators of the vaginal delivery at home (13, 14). In the study conducted in Nepal, finding has shown that nearly 2/3rd of females were married before the age of 19 years in the year 2017/18 (15, 16). Furthermore, this trend was mostly prevalent in families from lower economical groups. On the other hand, it has also been found that women having higher level of educational status have higher preference for CS (17, 18, 19). Thus, attitude and practice of Nepalese society towards child marriage, restriction of individualism and burden of imposed conclusion among girls are the root cause of the soaring rate of early pregnancies in Nepal. Government of Nepal is working vigorously in solving these issues and reducing the burden of early motherhood among adolescents. Family Health Division (FHD) has developed National Adolescent Health Development Strategy (NAHDS) in order to increase the availability with easy access of information along with counseling services for adolescents about their health. Government is playing crucial role in collaboration with various Non-Government Organization (NGO) and different medias to sensitize its population in the topics of child marriage and its complications, women empowerment and decision-making, maternal health and many more.

However, which mode of delivery is more sound and safer for adolescent pregnancy, planned vaginal or planned CS? Well, this is the new milestone and field of many clinical researches as well as the controversies too (20). In light of these growing concerns, our objective was to find the association between adolescent pregnancy and CS and identifying factors contributing to prevalence of CS among adolescent mothers in Nepal.

Materials And Methods

National Demographic and Health Survey (NDHS) data collected in the year 2016 in Nepal was used for this study. Total of 4006 women of reproductive age group who responded to the survey question indicating the method of their last birth were included and we excluded those with a missing record for our outcome variable (CS) which is defined as delivery by cesarean section and is obtained as a binary response of “Yes” or “No” in the DHS.

We conducted bivariable analysis using the chi-square test and two multivariable logistic regression analysis (one to identify factors associated with CS and other factors associated with CS among early child bearing women) adjusted for all possible covariates under analysis and $p < 0.05$ was used to indicate statistical significance in our models. Since this is a survey data we used “svy” command with sample weight as indicated by DHS to account for the clustering effect of the data.

Ethical consideration

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We obtained permission to conduct our study using NDHS data from DHS after they reviewed our proposal on May 2019. Nepal Research Council and ICF Macro Institutional Review Board in Calverton, Maryland, USA provided ethical clearance to DHS to conduct this survey and provide access to researchers or institutions willing to use DHS survey datasets for their study. Hence, informed consent directly from participants was not a part of the present study.

Results

The sociodemographic distribution of the participants is shown in Table 1. Nearly 37% of participants were ≤ 18 years (early child bearing) when they first gave birth. More than 50% of the participants had secondary or higher level of education and considerable proportion of women delivered average sized baby ($\sim 67\%$). Overall, nearly 6% [95% CI: 4.4–7.6, $p < 0.001$] of women with early child bearing had CS however, this rate was around twice among women of age group (19–29) years. Rate of CS was twice in women residing at urban areas than rural areas [12.9% (95% CI: 10.9–15.1, $p < 0.001$)]. Similarly, non-government sectors are having significantly higher CS [26.3 (95% CI: 21.8–31.4)] than the government sectors [12.9 (95% CI: 11.0–15.0)] (Table 1).

Table 1
Sociodemographic distribution of women of all reproductive age group

	Overall proportion	Proportion of CS (CI)	
		Population-based CS (N = 4006)	Institutional-based CS (N = 2445)
Age at first birth			
≤ 18	36.94	5.8 (4.4–7.6)	10.8 (8.3–14.0)
19–29	61.71	12.1 (10.4–14.0)	18.3 (15.9–20.9)
≥ 30	1.35	37.9 (24.4–53.6)	45.2 (29.4–62.1)
<i>p-value</i>		< 0.001	< 0.001
Education			
No education	30.73	4.8 (3.5–6.7)	12.1 (9.0–16.1)
Primary or less	19.05	6.1 (4.3–8.5)	11.3 (8.2–15.4)
Secondary or more	50.22	15.2 (13.2–17.4)	19.2 (16.7–21.8)
<i>p-value</i>		< 0.001	< 0.001
Residence			
Urban	58.36	12.9 (10.9–15.1)	17.9 (15.4–20.6)
Rural	41.64	6.7 (5.3–8.6)	13.7 (11.1–16.9)
<i>p-value</i>		< 0.001	< 0.05
Religion			
Hindu	87.04	10.1 (8.7–11.6)	16.2 (14.2–18.4)
Non-Hindus	12.96	10.6 (7.4–15.0)	17.6 (12.6–24.1)
<i>p-value</i>		> 0.05	> 0.05
Birth order			
First	37.54	15.1 (12.7–17.9)	18.7 (15.8–22.1)
Second or more	62.46	7.2 (6.0–8.6)	14.2 (11.9–16.8)

p-value obtained from chi-square test

CS = cesarean section

CI = 95% confidence interval

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	Overall proportion	Proportion of CS (CI)	
		Population-based CS (N = 4006)	Institutional-based CS (N = 2445)
<i>p-value</i>		< 0.001	< 0.05
Wealth index			
Poorest	25.54	2.9 (1.9–4.4)	7.4 (4.8–11.2)
Poorer	21.37	4.7 (3.3–6.7)	9.2 (6.6–12.9)
Middle	20.52	7.8 (5.7–10.8)	12.6 (9.2–17.0)
Richer	19.25	10.1 (7.9–12.8)	14.0 (10.9–17.9)
Richest	13.33	29.7 (25.1–34.8)	32.4 (6.6–12.9)
<i>p-value</i>		< 0.001	< 0.001
Size of child			
Large (> 3500 gm)	15.76	14.3 (11.1–18.4)	21.4 (17.1–26.4)
Average (2500–3500 gm)	66.93	9.1 (7.9–10.5)	15.0 (13.1–17.1)
Small (< 2500 gm)	17.31	10.4 (7.9–13.5)	16.8 (12.9–21.6)
<i>p-value</i>		< 0.01	< 0.05
Place of delivery			
Government sector	37.97	12.9 (11.0–15.0)	12.9 (11.0–15.0)
Non-government sector	62.03	26.3 (21.8–31.4)	26.3 (21.8–31.4)
<i>p-value</i>		< 0.001	< 0.001
ANC visits			
< 4 visits	30.23	4.3 (3.0–6.1)	12.0 (8.6–16.5)
≥ 4 visits	69.77	12.8 (11.2–14.5)	17.4 (15.3–19.8)
<i>p-value</i>		< 0.001	< 0.05

p-value obtained from chi-square test

CS = cesarean section

CI = 95% confidence interval

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	Overall proportion	Proportion of CS (CI)	
		Population-based CS (N = 4006)	Institutional-based CS (N = 2445)
Province			
Province 1	14.35	13.7 (10.5–17.6)	20.5 (16.1–25.8)
Province 2	18.95	5.6 (3.8–8.1)	11.7 (8.2–16.5)
Province 3	10.83	18.4 (13.7–24.1)	24.9 (19.2–31.7)
Province 4	10.88	17.7 (13.7–22.5)	25.1 (20.1–31.0)
Province 5	16.25	7.2 (5.3–9.8)	11.2 (8.3–14.9)
Province 6	15.03	2.8 (1.5–4.6)	6.3 (3.5–11.2)
Province 7	13.70	3.9 (2.4–6.0)	5.5 (3.5–8.5)
<i>p-value</i>		< 0.001	< 0.001
<i>p-value</i> obtained from chi-square test			
CS = cesarean section			
CI = 95% confidence interval			
ANC = Antenatal care			

Multivariable logistic regression analysis showed that several sociodemographic factors like age at first birth, education, province, wealth index, child size at birth and number of ANC visits were significantly associated with cesarean section. The likelihood of CS decreased by 32% [aOR: 0.68, 95% CI (0.50–0.94), $p < 0.05$] among early child bearing women than women of age group 19–29 years. Moreover, women with poor economic status were 76% less likely to have CS than those with higher economic status [aOR: 0.24, 95% CI (0.17–0.33), $p < 0.001$] (Table 2).

Table 2

Bivariable and multivariable logistic regression analysis for the association between population-based cesarean section and sociodemographic factors

	Odds ratio (OR)	
	Crude OR (CI)	Adjusted OR (CI)
Age at first birth		
19–29	1	1
≤ 18	0.45 (0.32–0.62)***	0.68 (0.50–0.94)*
≥ 30	4.44 (2.35–8.38)***	3.89 (2.00–7.56)***
Education		
No education	1	1
Primary or less	1.28 (0.80–2.04)	1.07 (0.68–1.70)
Secondary and above	3.53 (2.38–5.25)***	1.63 (1.11–2.39)*
Province		
Province 7	1	1
Province 1	3.96 (2.26–6.92)***	3.01 (1.76–5.14)***
Province 2	1.47 (0.79–2.74)	1.50 (0.81–2.78)
Province 3	5.62 (3.13–10.08)***	3.24 (1.87–5.61)***
Province 4	5.35 (3.06–9.37)***	4.01 (2.37–6.80)***
Province 5	1.94 (1.09–3.47)*	1.36 (0.78–2.35)
Province 6	0.68 (0.33–1.42)	1.06 (0.52–2.16)
Wealth index		
Rich	1	1
Poor	0.17 (0.12–0.24)***	0.24 (0.17–0.33)***
Average	0.37 (0.25–0.55)***	0.55 (0.37–0.81)**
ANC visits		
< 4 visits	1	1
≥ 4 visits	3.24 (2.21–4.74)***	1.75 (1.21–2.53)**
Child size		
Average	1	1

	Odds ratio (OR)	
	Crude OR (CI)	Adjusted OR (CI)
Large	1.67 (1.22–2.28)**	1.63 (1.23–2.16)**
Small	1.16 (0.84–1.59)	1.44 (1.05–1.98)*
Number of participants included in the multivariable logistic regression model, N = 3997 (nine women had missing records for child size)		
OR = Odds ratio		
Crude odds ratio was obtained from bivariable logistic regression analysis		
Adjusted odds ratio was obtained from multivariable logistic regression analysis which was adjusted for all covariates under analysis		
ANC = Antenatal care		
CI = 95% confidence interval		
* = $P < 0.05$, ** = $P < 0.01$, *** = $P < 0.001$		

The separate multivariable logistic regression analysis performed to find the factors associated with CS among early child bearing women showed that province, wealth index, number of ANC visits and place of delivery were the major factors affecting the rate of CS among this age group. The likelihood of CS was four to six-fold higher in province 1, 3 and 4 than province 7. Similarly, poor women of this age group had 46% less likelihood of having CS than that of rich women of same age group [aOR: 0.54, 95% CI (0.29–0.99), $p < 0.05$]. We depicted the relationship between CS and various wealth quintiles among early child bearing women in “supplementary file 1”. Meanwhile, women having more than four ANC visits were also having higher CS rate than those who had less than four ANC visits. Women with early child bearing were twice as likely to have CS in non-governmental sectors than the government sectors [aOR: 2.38, 95% CI (1.35–4.21), $p < 0.01$] (Table 3).

Table 3

Bivariable and multivariable logistic regression analysis to identify factors associated with CS among early child bearing women (≤ 18 years)

	Proportion of CS (CI), N = 1480	cOR (CI)	aOR (CI)
Education			
No education	4.4 (2.7–7.0)	1	1
Primary or less	5.6 (3.4–8.9)	1.30 (0.66–2.55)	0.65 (0.32–1.33)
Secondary and above	7.3 (5.0–10.6)	1.74 (0.91–3.33)	0.62 (0.33–1.18)
Province			
Province 7	1.8 (0.6–4.8)	1	1
Province 1	8.1 (4.6–13.8)	4.88 (1.49–15.99)**	4.59 (1.34–15.78)*
Province 2	4.8 (2.7–8.3)	2.79 (0.85–9.09)	2.74 (0.81–9.26)
Province 3	9.7 (4.5–19.6)	5.93 (1.59–22.06)**	6.10 (1.60–23.22)*
Province 4	11.8 (7.0–19.3)	7.42 (2.29–24.06)**	6.75 (1.89–24.08)**
Province 5	3.9 (2.0–7.4)	2.24 (0.65–7.69)	2.13 (0.62–7.27)
Province 6	2.6 (0.9–7.4)	1.49 (0.33–6.66)	2.50 (0.52–12.02)
Wealth index			
Rich	10.4 (7.2–14.7)	1	1
Poor	3.2 (2.0–5.0)	0.28 (0.16–0.49)***	0.54 (0.29–0.99)*
Average	5.7 (3.0–10.7)	0.52 (0.23–1.19)	0.62 (0.28–1.37)
ANC visits			

Number of participants included in the multivariable logistic regression model, N = 809

CS = cesarean section

ANC = Antenatal care

cOR = Crude odds ratio obtained from bivariable logistic regression analysis

aOR = Adjusted odds ratio obtained from multivariable logistic regression analysis which was adjusted for all covariates under analysis, CI = 95% confidence interval

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	Proportion of CS (CI), N = 1480	cOR (CI)	aOR (CI)
< 4 visits	2.6 (1.5–4.5)	1	1
≥ 4 visits	7.8 (5.9–10.2)	3.18 (1.77–5.70)***	1.02 (1.48–3.53)*
Child size			
Average	5.6 (4.0–7.7)	1	1
Large	7.2 (4.3–11.8)	1.31 (0.71–2.44)	1.42 (0.73–2.79)
Small	5.5 (3.1–9.5)	0.99 (0.51–1.90)	1.10 (0.57–2.12)
Place of delivery			
Government	8.7 (6.2–12.2)	1	1
Private	16.6 (11.6–23.2)	2.08 (1.21–3.56)**	2.38 (1.35–4.21)**
Number of participants included in the multivariable logistic regression model, N = 809			
CS = cesarean section			
ANC = Antenatal care			
cOR = Crude odds ratio obtained from bivariable logistic regression analysis			
aOR = Adjusted odds ratio obtained from multivariable logistic regression analysis which was adjusted for all covariates under analysis, CI = 95% confidence interval			
* = $P < 0.05$, ** = $P < 0.01$, *** = $P < 0.001$			

Discussion

This study was conducted with the aim of finding out the factors associated with CS among early child bearers. CS is incorporated as a standard part of modern medical era and institutionalization of delivery is considered as a major pillar for the safe childbirth (21). In developing countries like Nepal, lack of awareness among general population and existing sociocultural norms are overt forces pushing the adolescents towards early marriage and centralized health care delivery system are enabling for unsafe home deliveries despite of fatal risk and complications.

This study identified advancing age as a risk factor of CS which was similar to the results from other study (22). However, lower level of CS among early pregnant mothers might be highly influenced by their health seeking patterns. Subjective components like lack of autonomy, low decision-making power, perception towards health and pregnancy, diffidence with male health care providers could be the barriers of health seeking behavior ultimately resulting in vaginal and home deliveries (12, 14). In line with many studies, our results found that pregnant woman with higher educational status are found to be more

Loading [MathJax]/jax/output/CommonHTML/jax.js } association has been found between female education and

uses of health care facilities along with the result of home deliveries occurring among woman having lower educational level and the other way around (25, 26).

In the similar terms, CS rate has also been varied among the setting of stay too, these differences might be the results of economical deprivations in the rural part where peoples are mostly engaged in activities for basic survival having no access to the education and awareness regarding maternal health care and CS. The urbanization in Nepal is dominated by very few large cities with massive population concentration in Kathmandu valley creating the maldistributions of health care services and health care providers too (27). Similar results regarding health service accessibility have been shown in researches conducted at other South-Asian countries (28, 29). Some studies suggests that enrollment in birth preparedness and raising awareness programs motivates the pregnant mother to visit and ask for maternal health services (30).

The negligible difference in the proportion of CS among different religions puts the light over the effectiveness of sensitization programs launched by Nepal government to break the stereotype that exist among different religions (31, 32). Likewise, the greater proportion of the CS among the primigravid mothers like that of other studies illustrates the raising consciousness among the early pregnant mothers regarding the risk associated with early pregnancy (33). Moreover, the lowest rate of CS among the poorest early child bearing women and its increasing trend as we move to higher class of wealth index is alike the past results from multiple studies (34). Having said that, the current rate of CS among the underprivileged groups are also the new achievement for the developing countries like Nepal. Similarly, increasing ANC visits represent the gradual awareness of Nepalese women regarding the risks and complications of early pregnancy (35, 36).

Overall, the results suggest the ongoing necessity of establishment of knowledge sharing platform like different clubs and groups among woman from all provinces to clarify the need and importance of ANC visit, maternal and reproductive health along with pregnancy and scope of CS (37, 38).

Conclusion

This study revealed that early pregnancy is significantly associated with CS whether due to complication or to protect maternal and neonatal health. All in all, there is the paramount need of strong policies and programs to connects all these dots that exist in utilization of MCH services by young mothers.

Strength And Limitation

The findings of present study are useful in closing the gap that is prevalent among early pregnant women of different socio-demographic classes from using the existing maternal health care facilities. However, due to the small count of CS we could not perform model fitting including interaction of early pregnancy with major confounders. Similarly, due lack of information on indication of CS we were not able to analyze reasons for preferring CS.

In contempt of these limitation present study stands to be mirror image for evaluation of present status of Nepal showing the outcomes of different programs commenced to end early pregnancy and availability of impartial health care services to all citizens.

Abbreviations

CS: cesarean section; NDHS: National demographic and health survey; MCH: Maternal and child health; UNICEF: United Nations International Children's Emergency Fund; USAID: United States Agency for International Development; WHO: World Health Organization; BMI: Body mass index; ANC: Antenatal care; MMR: Maternal Mortality Rate; FHD: Family Health Division; NAHDS: National Adolescent Health Development Strategy; GDP: Gross Domestic Product; aOR: adjusted odds ratio; OR: odds ratio; cOR: crude odds ratio; CI: confidence interval

Declarations

Ethical approval and consent to participate

This study analyzed data extracted from the NDHS 2016. The ethical clearance for DHS survey was obtained from Nepal Research Council and ICF Macro Institutional Review Board in Calverton, Maryland, USA. The DHS data are publicly accessible, and we obtained the permission to use it in May 2019 after DHS reviewed our proposal and we accepted the terms and conditions attached with data sharing policy. Informed consent was taken by DHS with the participants prior to this survey (25).

Consent for publication

Not applicable

Availability of data and materials

The National Demographic and Health Survey data of Nepal can be obtained from the USAID's official website (25).

Competing interests

The authors declare no competing interests.

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Author contributions

Conceptualization AB, MR; Methodology AB, MR; Validation AB; Formal analysis AB; Investigation AB; Resources AB, AA, MS; Data curation AB, MR; Writing - original draft preparation AB, AA, MS; Writing -

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review and editing AB, AA, MS, MR; Visualization AB; Supervision MR; Project administration AB, AA, MS. All authors have read and approved the final manuscript.

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References

1. UNFPA - United Nations Population Fund. Adolescent pregnancy [Internet]. 2020 [cited 2020 Dec 14]. Available from: <https://www.unfpa.org/adolescent-pregnancy>
2. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: Global, regional and national estimates: 1990-2014. PLoS One [Internet]. 2016 Feb 1 [cited 2020 Dec 13];11(2). Available from: </pmc/articles/PMC4743929/?report=abstract>
3. Betran AP, Torloni MR, Zhang J, Ye J, Mikolajczyk R, Deneux-Tharaux C, Oladapo OT, Souza JP, Tunçalp Ö, Vogel JP GA. No Title.
4. UNICEF. Ending child marriage: Progress and prospects. New York: UNICEF, 2013
5. WHO | What is the Global Strategy? [Internet]. [cited 2020 Dec 14]. Available from: <https://www.who.int/life-course/partners/global-strategy/global-strategy-2016-2030/en/>
6. WHO. Adolescent pregnancy: Factsheets. 2014. [Internet]. [cited 2020 Dec 14]. Available from: <https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy>
7. Abebe AM, Fitie GW, Jember DA, Reda MM, Wake GE. Teenage Pregnancy and Its Adverse Obstetric and Perinatal Outcomes at Lemlem Karl Hospital, Tigray, Ethiopia, 2018. Biomed Res Int. 2020 Jan 19;2020:3124847. doi: 10.1155/2020/3124847. PMID: 32051825; PMCID: PMC6995314.
8. Santos NL, Costa MC, Amaral MT, Vieira GO, Bacelar EB, de Almeida AH. Gravidez na adolescência: análise de fatores de risco para baixo peso, prematuridade e cesariana [Teenage pregnancy: analysis

- of risk factors for low birth weight, prematurity and cesarean delivery]. *Cien Saude Colet*. 2014 Mar;19(3):719-26. Portuguese. doi: 10.1590/1413-81232014193.18352013. PMID: 24714887.
9. Yussif AS, Lassef A, Ganyaglo GYK, Kantelhardt EJ, Kielstein H. The long-term effects of adolescent pregnancies in a community in Northern Ghana on subsequent pregnancies and births of the young mothers. *Reprod Health* [Internet]. 2017 Dec 29 [cited 2020 Dec 14];14(1):178. Available from: <https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-017-0443-x>
 10. Katz Eriksen JL, Melamed A, Clapp MA, Little SE, Zera C. Cesarean Delivery in Adolescents. *J Pediatr Adolesc Gynecol*. 2016 Oct;29(5):443-447. doi: 10.1016/j.jpag.2016.01.123. Epub 2016 Feb 1. PMID: 26836505.
 11. Rahman MM, Haider MR, Moinuddin M, Rahman AE, Ahmed S, Mahmud Khan M. Determinants of caesarean section in Bangladesh: Cross-sectional analysis of Bangladesh demographic and health survey 2014 data [Internet]. Vol. 13, PLoS ONE. Public Library of Science; 2018 [cited 2020 Dec 21]. Available from: </pmc/articles/PMC6135390/?report=abstract>
 12. Adolescent pregnancy | UNFPA - United Nations Population Fund [Internet]. [cited 2020 Dec 14]. Available from: <https://www.unfpa.org/adolescent-pregnancy>
 13. 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? *Reprod Health* [Internet]. 2012 [cited 2020 Dec 13];9(1):25. Available from: </pmc/articles/PMC3538619/?report=abstract>
 14. Shahabuddin ASM, Delvaux T, Nöstlinger C, Sarker M, Bardají A, Sharkey A, et al. Maternal health care-seeking behaviour of married adolescent girls: A prospective qualitative study in Banke District, Nepal. *PLoS One* [Internet]. 2018 Apr 1 [cited 2020 Dec 13];14(6). Available from: </pmc/articles/PMC6592531/?report=abstract>
 15. Gurung R, Målqvist M, Hong Z, Poudel PG, Sunny AK, Sharma S, et al. The burden of adolescent motherhood and health consequences in Nepal. *BMC Pregnancy Childbirth* [Internet]. 2020 May 24 [cited 2020 Dec 13];20(1):318. Available from: <https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-020-03013-8>
 16. Khem D, Karki B, Maiya T, Mr S, Aryal B. Child Marriage in Nepal Research Report Design and Print Horizon Creation Child Marriage in Nepal [Internet]. 2012 [cited 2020 Dec 14]. Available from: www.plan-international.org
 17. Collin SM, Marshall T, Filippi V. Cesarean section and subsequent fertility in sub-Saharan Africa. Vol. 113, *BJOG: An International Journal of Obstetrics and Gynaecology*. 2006. p. 276–83.
 18. Karlström A, Engström-Olofsson R, Nystedt A, Thomas J, Hildingsson I. Swedish caregivers' attitudes towards caesarean section on maternal request. *Women and Birth* [Internet]. 2009 Jun [cited 2020 Dec 13];22(2):57–63. Available from: <https://pubmed.ncbi.nlm.nih.gov/19195958/>
 19. Bhattarai A, Dharel D, Kumar N. The Safe Delivery Incentive Program in Nepal: towards women's empowerment. *Int J Med Sci public Heal* [Internet]. 2016;5(10):2108–13. Available from: <https://www.bibliomed.org/mnsfulltext/67/67-1457002221.pdf?1602905273>

20. Little MO, Lyerly AD, Mitchell LM, Armstrong EM, Harris LH, Kukla R, et al. Mode of delivery: Toward responsible inclusion of patient preferences [Internet]. Vol. 112, Obstetrics and Gynecology. NIH Public Access; 2008 [cited 2020 Dec 13]. p. 913–8. Available from: /pmc/articles/PMC2643019/?report=abstract
21. Sarmiento A. Trends in Cesarean Section. In: Caesarean Section [Internet]. InTech; 2018 [cited 2020 Dec 21]. Available from: <http://www.intechopen.com/books/caesarean-section/trends-in-caesarean-section>.
22. Janoudi G, Kelly S, Yasseen A, Hamam H, Moretti F, Walker M. Factors Associated With Increased Rates of Cesarean Section in Women of Advanced Maternal Age. *J Obstet Gynecol Can* 2015;37(6):517-26.
23. Myer L, Mlobeli R, Cooper D, Smit J, Morroni C. Knowledge and use of emergency contraception among women in the western cape province of South Africa: a cross-sectional study. *BMC Womens Health*. 2007;07:14.
24. Rosenberg M, Pettifor A, Miller WC, Thirumurthy H, Emch M, Afolabi SA et al. R between school dropout and teen pregnancy among rural south A young women. *IJE* 2015;44:928–36.
25. DHS: Nepal Demographic and Health Survey 2006. Maryland Calverton: Population Division, Ministry of Health and Population, Government of Nepal, Kathmandu, Nepal and Macro International; 2007
26. Bhandari, A.K.C., Dhungel, B. & Rahman, M. Trends and correlates of cesarean section rates over two decades in Nepal. *BMC Pregnancy Childbirth* 20 763 (2020). <https://doi.org/10.1186/s12884-020-03453-2>.
27. Urbanisation and urban growth in Nepal - GSDRC [Internet]. [cited 2020 Dec 19]. Available from: <https://gsdrc.org/publications/urbanisation-and-urban-growth-in-nepal/>
28. Anwar I, Kalim N, Koblinsky M. Quality of obstetric care in public-sector facilities and constraints to implementing emergency obstetric care services: evidence from high-and low-performing. *JHealPopul* . . . 2009; 27:139–55. <https://doi.org/10.3329/jhpn.v27i2.3327> PMID: 19489412
29. Islam F, Rahman A, Halim A, Eriksson C, Rahman F DKP of health care providers and patients on quality of care in maternal and neonatal health in fourteen B government health-care facilities: a mixed-method study. *BmchS* 15:237. <https://doi.org/10.1186.s12913-0>. PMID: 26084893
30. Parkhurst JO, Rahman SA SFO access barriers for facility-based delivery in low-income settings Insights from Bangladesh and Uganda. *J Heal Popul Nutr* 2006; 24:438–45.
31. Subedi M. Caste system: theories and practices in Nepal. *Himalayan J Sociol Anthropol*. 2010;4:134–59
32. Langer JA, Ramos JV, Ghimire L, Rai S, Kohrt BA BMG and child behavior problems in rural N differential expectations and responses. *SR* 2019;9(1):7662.
33. Saha L, Chowdhury SB. Study on primary cesarean section. *Mymensingh Med J*. 2011;20(2):292-7
34. Government of Nepal. Progress of the health sector FY 2017/28. https://www.nhssp.org.np/Resources/HPP/Socio_economic_differentials_in_CS.pdf (accessed

35. Pradhan A, Kathmandu Medical College, Sinamangal: Situation of antenatal care and delivery practices. Kathmandu Uni Med J 2005 11(3):266–270. 3..
36. Klaki CU, Inaku JU, Ekabua JE, Ekanem EI, Udo AE. Perinatal outcome in unbooked teenage pregnancies in the university of calabar teaching hospital, calabar NIOG 2012;2012:246983.
37. Zambon A, Morgan A, Vereecken C, Colombini S, Boyce W, Mazur J et al. T contribution of club participation to adolescent health: evidence from six countries. Je 64:89– 95. <https://doi.org/10.1136/jech.2009.08844.P20007634> .
38. WHO. Making Health Services Adolescent Friendly—Developing National Quality Standards for Adolescent Friendly Health Services. World Health Organization2012;;3.http://www.who.int/iris/bitstream/10665/75217/1/9789241503594_eng.pdf?ua=1

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