

Factors Affecting Post-Partum Amenorrhea in Nepalese Women

Ira Shrestha¹, Shital Bhandary²

¹Assistant professor, Department of Physiology, School of Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal

²Assistant professor, Department of Community Health Sciences, School of Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

Introduction: Postpartum Amenorrhea (PPA) is important method of birth control and birth spacing especially in developing countries. Following a live birth, a woman generally experiences a 6-week period of amenorrhea related to the hormonal concomitants of pregnancy but not much work has been done in Nepal regarding the effects of various demographic factors and socioeconomic statuses of women on their postpartum amenorrhea.

Methods: This study was based on the 2011 Nepal Demographic and Health Survey (NDHS) datasets. The duration of PPA was the response variable whereas key demographic and socio-economic variables of women and her children were explanatory variables. Since PPA period was not defined for some of women as they were still going through the PPA at the time of the survey, their data were censored. Therefore, survival analysis techniques: Life Tables and Semi-Parametric Hazard (Cox) Models were used.

Results: All the demographic and socio-economic variables except the sex of child had statistically different median PPA durations. The bivariate cox models also revealed similar result in terms of relative risk associated with the reference categories. However, multivariate cox model revealed breast feeding, parity, birth interval, survival of the child, education of the mother and wealth quintile of the mother influenced the PPA after controlling the effect of other variables.

Conclusions: This study revealed that longer the duration of breastfeeding, greater the delay in the return of menstrual cycle. Survival of child was the most important indicator for PPA among Nepalese women. The gender of the child and place of residence did not make any difference with respect to PPA. Mothers with birth interval of 3-4 years had lesser risk of return of monthly cycle.

Key words: Breastfeeding, NDHS, Postpartum amenorrhea, Survival Analysis

Correspondence

Name: Ira Shrestha

Address: Department of Physiology, School of Medicine

Patan Academy of Health Sciences, Lagankhel-5, Lalitpur, Nepal

Email: irashrestha@pahs.edu.np

INTRODUCTION

Post partum amenorrhea (PPA) is the duration between the birth of a child and resumption of menstrual cycle during which the risk of pregnancy is much reduced.¹ PPA is an important method of birth control and birth spacing especially in developing countries like Nepal where the use of contraceptive is not so prevalent.² In developing countries where prolonged breast-feeding is practiced, PPA has been observed to last 18 to 24 months on the average.⁴

The mechanisms by which breastfeeding and other variables affect the length of PPA across or within a population are not well established. It is probably associated with diverse biological characteristics and specific social norms.⁶

Not much work has been done in Nepal regarding the effects of various demographic factors and socioeconomic statuses of women on their PPA. Therefore, this study aims to relate the effects of demographic and socioeconomic parameters on PPA of Nepalese women.

METHODS

This study was based on the 2011 Nepal Demographic and Health Survey (NDHS), which is a nationally representative cross-sectional (two-stage cluster sampling) survey of all the women aged 15-49 residing in the country. The duration of PPA was taken as the response (dependent) variable whereas key demographic and socio-economic variables of these women and her children were used as explanatory (independent) variables in this study. Thus, 2011 NDHS children dataset was used as it contained details of the PPA exposure of all the surveyed women who gave birth to at least one live child in the past. Since PPA period was not defined for some of women as they were still going through the PPA at the time of the survey, their data were censored. Therefore, survival analysis techniques were used to find the effect of independent variables on PPA.

Life Tables were created to find the median PPA durations where Log-Rank tests were used to test whether the obtained medians were different across categories of the explanatory variables. In addition, bivariate (unadjusted) and multivariate (adjusted) Semi-Parametric Hazard (Cox) models were fitted using the IBM SPSS 20.0 software to find the “relative risk” associated with the independent variables. Explanatory variables with statistically significant results (p -value < 0.05) in the bivariate models and absence of multi collinearity (Variance Inflation Factor < 2) were included in the final multivariate model.

RESULTS

Table1: Effect of demographic and socioeconomic variables on median duration of post-partum amenorrhea, 2011 NDHS

Background Variable	Median PPA	Wilcoxon (Gehan) Test	
Demographic	(Months)	Chi-square	p-value
Breastfeeding			
0 - 5	4.0	105.82	< 0.0001
6 - 10	7.8		
11 - 14	7.8		
15+	8.2		
Ever Breastfed, not currently	5.4		
Not Breastfed	3.4		
Mother's age at birth			
< 20	6.7	56.77	< 0.0001
20 - 24	6.8		
25 - 29	8.2		
> 30	9.7		
Parity			
1	5.9	132.2	< 0.0001
2	6.9		
3	8.6		
4+	10.7		
Birth Intervals			
< 12	9.6	13.1	< 0.05
12 - 23	8.4		
24 - 35	9.3		
36 - 47	9.9		
48+	7.7		
Sex of Child			
Male	7.5	0.0	> 0.05
Female	7.4		
Survival status of child			
Dead	3.4	88.3	< 0.001
Alive	7.7		
Socioeconomic			
Place of residence			
Urban	6.4	21.4	< 0.001
Rural	7.8		
Educational levels			
No education	9.4	108.5	< 0.001
Primary	7.9		
Secondary	6.1		
Higher	5.0		
Wealth Quintiles			
Poorest	9.9	166.0	< 0.001
Poor	8.5		
Middle	6.9		
Rich	5.9		
Richest	5.0		

Table 2: Bivariate and Multivariate Survival Analysis of PPA using Cox Model, 2011 NDHS

Background Variable	Unadjusted						Adjusted					
Breastfeeding	Coeff (B)	Wald Test	p-value	RR	95%CI of RR		Coeff (B)	Wald Test	p-value	RR	95%CI of RR	
Not Breastfed		88.33	0.00					51.727	.000			
0 - 5	-1.03	36.66	0.00	0.36	0.26	0.50	-.890	12.528	.000	.410	.251	.672
6 - 10	-0.77	27.41	0.00	0.46	0.35	0.62	-.497	5.227	.022	.609	.398	.932
11 - 14	-0.77	28.07	0.00	0.46	0.35	0.62	-.468	4.857	.028	.626	.413	.950
15+	-0.71	27.29	0.00	0.49	0.38	0.64	-.371	3.461	.063	.690	.466	1.020
Ever Breastfed, not currently	-0.37	7.06	0.01	0.69	0.53	0.91	.028	.021	.885	1.028	.703	1.504
Mother's age at birth												
> 30		57.32	0.00					1.129	.770			
< 20	0.45	42.20	0.00	1.57	1.37	1.80	.120	.867	.352	1.128	.875	1.453
20 - 24	0.41	44.55	0.00	1.50	1.33	1.69	.081	.897	.343	1.084	.917	1.281
25 -29	0.23	12.08	0.00	1.26	1.11	1.44	.051	.431	.512	1.052	.905	1.223
Parity												
4+		126.64	0.00					10.911	.004			
1	0.62	111.69	0.00	1.87	1.66	2.10	--	--	--	--	--	--
2	0.46	62.59	0.00	1.59	1.42	1.79	.270	10.910	.001	1.310	1.116	1.537
3	0.21	9.73	0.00	1.24	1.08	1.41	.158	4.114	.043	1.172	1.005	1.366
Birth Intervals												
48+		9.90	0.04					6.878	.142			
< 12	0.17	0.40	0.52	1.19	0.70	2.02	.152	.300	.584	1.164	.675	2.008
12 - 23	0.01	0.01	0.91	1.01	0.87	1.17	.011	.018	.893	1.011	.859	1.191
24 - 35	-0.12	3.22	0.07	0.89	0.78	1.01	-.092	1.621	.203	.912	.792	1.051
36 - 47	-0.19	6.40	0.01	0.83	0.71	0.96	-.164	4.519	.034	.849	.730	.987
Sex of last child												
Female												
Male	-0.03	0.36	0.55	0.98	0.90	1.06	-0.01	0.01	0.91	0.99	0.85	1.15
Survival status of last child												
Alive												
Dead	0.8	80.1	0.0	2.3	1.9	2.7	.455	10.302	.001	1.576	1.194	2.082
Place of residence												
Rural												
Urban	0.23	19.99	0.00	1.25	1.14	1.38	-.086	1.300	.254	.918	.792	1.063
Mother's educational level												
Higher		123.30	0.00					17.073	.001			
No education	-0.72	73.83	0.00	0.49	0.41	0.57	-.644	15.982	.000	.525	.383	.720
Primary	-0.51	32.87	0.00	0.60	0.50	0.71	-.550	10.997	.001	.577	.417	.798
Secondary	-0.27	10.06	0.00	0.76	0.65	0.90	-.472	9.508	.002	.624	.462	.842
Wealth Quintiles												
Richest		134.92	0.00					18.824	.001			
Poorest	-0.69	111.61	0.00	0.50	0.44	0.57	-.399	13.166	.000	.671	.541	.832
Poorest	-0.54	58.64	0.00	0.58	0.51	0.67	-.351	9.839	.002	.704	.566	.877
Middle	-0.34	23.53	0.00	0.71	0.62	0.81	-.173	2.417	.120	.842	.677	1.046
Rich	-0.23	9.86	0.00	0.80	0.69	0.92	-.120	1.301	.254	.887	.722	1.090

UNIVARIATE ANALYSIS

The demographic variables that had highly significant association with the duration of PPA were the longer duration of breastfeeding, higher age of mother and higher parity. The birth interval did not show any sequential association with the duration of PPA, although the relation was significant. The sex of the child was the only variable, among the explanatory variables, that did not affect the duration of PPA. The survival of the previous child also had significant relation with the duration of PPA.

Among the socioeconomic variables: education level, wealth quintile of the mothers had strong and inverse association with the duration of PPA whereas mothers residing in the rural area had significantly longer duration of PPA as compared to the mothers of urban area.

BIVARIATE ANALYSIS

Mothers who breastfed their children had significantly lesser risk of resumption of menstrual cycle as compared to mothers who did not breastfed their children. The mothers who breastfed their children for up to 5 months were 64% less likely, mothers who breastfed up to 6-14 months were 54% less likely and mothers who breastfed their babies for more than 15 months were 51% less likely to resume their monthly cycle than mothers who never breastfed their children. The 95% relative risk for these breastfeeding groups ranged between 50%-74%, 38%-65% and 36%-62% respectively.

Younger mothers were at higher risk of resumption of her monthly cycle as compared to older mothers. As compared to mothers who were 30 years old; mothers of age less than 20 years had 57% higher risk, mothers between the ages of 20-24 had 50% higher risk whereas mothers between ages 25-29 had only 26% higher risk of return of their cycle. The 95% relative risk range for the three age groups was 137-180%, 133%-169% and 111%-144% respectively.

Mothers with lesser parity had higher risk of beginning of their monthly cycle as compared to mothers with higher parity. Mothers with only 1 child were 87% more likely, mothers with 2 children were 59% more likely and mothers with 3 children were 24% more likely to resume their cycle compared to mothers with 4 or more children. The 95% risk for these parity groups ranged from 166%-210%, 142%-179% and 108%-141% respectively. On the other hand, mothers with birth interval of 36-47 months were 17% less likely of resumption of monthly cycle as compared to mothers with birth interval of 48 months or more. The 95% relative risk for this birth interval ranged from 4%-29%.

Mothers whose previous child was dead had 130% higher risk of return of menstrual cycle as compared to mother with live previous child. The 95% relative risk for these mothers ranged from 190%-270%. Urban mothers had 25% higher risk of resumption of menstrual cycle as compared to rural mothers and the 95% relative risk range for them was between 114%-138%.

Higher education had greater risk of resumption of monthly cycle. Mothers with no education were 51% less likely, mothers with primary education were 40% less likely, and mothers with secondary education were 24% less likely of resumption of their cycle as compared to mothers with higher education. The 95% relative risk for these education categories ranged from 43% - 59%, 29%-50% and 10%-35% respectively.

Better household wealth status had greater risk of resumption of monthly cycle. Mothers with poorest wealth index had 50% less risk, mothers with poorer wealth index had 42% less risk, mothers with middle wealth index had 29% and mothers with rich wealth index had 20% less risk of return of menses compared to mothers with richest wealth index. The 95% relative risk for these wealth categories ranged from 43%-56%, 23%-49%, 19%-28% and 8%-31% respectively.

MULTIVARIATE ANALYSIS

Multivariate survival analysis gave the adjusted risk ratios i.e. it showed risk ratio/s of an independent variable after holding all other variables constant. This study found breast feeding, parity, birth interval, survival of the child as well as education of the mother and household wealth status of the mother still influenced the duration of PPA after controlling the effect of other variables.

As compared to mothers who did not breastfed their child; mothers who breastfed for 0-5 months had 59% less risk, mothers who breastfed for 6-10 months had 39% less risk, mothers who breastfed for 11-14 months had 37% less risk of return of menstrual cycle. The 95% risk ratios for these breastfeeding categories were 33%-75%, 7%-60% and 5%-59% respectively. Similarly, mothers with parity 2 and 3 had 31% and 17%, respectively, higher risk of resumption of monthly cycle as compared to mothers of parity 4 or more. The 95% relative risk range for these parity categories were 112%-154% and 100.5%-137% respectively.

Among the birth intervals, only the birth interval of 36-47 months influenced the duration of PPA. These mothers had 15% less risk of return of monthly cycle and the 95% range of risk for this category was 1.3%-27%, when compared with the birth interval of more than 48 months. On the other hand, mothers who had a dead child had 58% higher risk of return of menses as compared to mothers who had a living child and the 95% risk for this category ranged from 119% - 208%. As compared to mothers with higher education; mothers with no education had 48% less risk of return of menses, mothers with primary education had 42% less risk and mothers with secondary education had 38% less risk of return of menses. The 95% risk range for these education categories were 28% - 62%, 20% - 58% and 16%-54% respectively. Similarly, mothers with poorest wealth index had 33% less risk while the mothers with poorer wealth index had 30% less risk of return of menstrual cycle compared to mothers with richest wealth index. The 95%

relative risk ranges for these wealth categories were 17% 46% and 12%-43% respectively.

DISCUSSION

Postpartum amenorrhea was found to be prolonged by duration of breastfeeding, parity, birth interval, survival status of the last child and inversely affected by mother's education and the wealth status of the family when analyzed separately. The risk of resumption of menstrual cycle was the lowest for mothers who breastfed their babies for up to 5 months. Although the risk of resumption of monthly cycle increased with increase in duration of breastfeeding; breastfeeding for up to 11-14 months still significantly delayed the return of menstrual cycle as compared to the mothers who did not breastfed. The reason for suppression of their menstrual cycle is hormonal. Suckling stimulates neuroendocrine reflex that causes the release hormone prolactin which suppresses the release of gonadotropin releasing hormone (GnRH). GnRH further inhibits the secretion of follicle stimulating hormone (FSH) and luteinizing hormone (LH), resulting in amenorrhea.^{7,8} Longer the duration of breastfeeding, greater is the secretion of prolactin and thus longer will be the duration of PPA.⁵

In Nepal, most of the mothers exclusively breastfed their babies for about 6 months.^{1,9} Thereafter the babies are fed with complimentary food. This may be a reason for least risk of resumption of monthly cycle for the mothers of 0-5 month breastfeeding category. This result is similar to that found in Bangladesh where weaning begins at the end of fourth month and the risk of return of menstrual cycle increases thereafter.¹⁰ This study also showed that mothers of a male child experienced a longer duration of lactational amenorrhea whereas in our study gender of the child did not affect the duration of PPA. Our result of prolonged duration of breastfeeding with prolonged postpartum amenorrhea was consistent with other studies.¹¹⁻¹⁶

Age of the mother showed positive association with the duration of postpartum amenorrhea but the relation was not statistically significant. However, other studies have found positive and statistically significant relationship between age of the mother at birth of the child and postpartum amenorrhea.^{12, 13,15} Women with 4 or more children had significantly longer duration of PPA as compared to women with 2 or 3 children. This was similar to other findings.^{5,6,12,17,18} The effect of parity on longer duration of amenorrhea may be related to earlier experiences of breastfeeding which increases the confidence in women to breastfeed the next child for longer duration. This in turn may result in prolonged amenorrhea.⁵

Women with birth interval of 48 months and longer had the shortest duration of amenorrhea while the women of birth interval of 36-47 months had the longest duration of postpartum amenorrhea. It was consistent with another study which also states that birth interval of more than 3 years had

significant effect of delaying the return of regular menstrual cycle.¹¹ However, another study found birth interval of 24-36 months to be most effective in delaying the cycle.¹⁵

Women with living child experience delayed return of her monthly cycle as compared to the women with a dead child. It may due to the fact that the death of the child removes the neuroendocrine reflex of hormonal mechanism resulting in earlier resumption of monthly cycle.¹⁴ This finding was consistent with other findings.^{11,13,15}

The place of residence did not affect the duration of postpartum amenorrhea in our study after controlling for other variables. However, it was contradictory to other findings where the urban women had shorter duration of amenorrhea as compared to the rural women.^{10,19}

Mother's education was inversely related with the duration of postpartum amenorrhea. Mothers with no education had the longest duration of postpartum amenorrhea as compared with mothers with higher education. This finding was consistent with other findings.^{8,13,15,20,21} Lower education of the mother has been linked to poor economic and nutritional status which leads to prolonged duration of intense breastfeeding resulting in delayed return of menses.⁶ Mothers with poorest wealth index had the longest duration of postpartum amenorrhea as compared to the mothers with richest wealth index. This finding was also consistent with other findings.^{13,15,19,21} Mothers with low socioeconomic status may have less food for their children and so may spend more time breastfeeding their child resulting in longer duration of amenorrhea.²¹

Higher education and higher household wealth index may act as proxies for better nutritional status of the mother¹² and other findings have shown better nutrition related inversely to duration of postpartum amenorrhea.²² It has been supposed that women with poor nutritional status may exhibit greater hormonal suppression from the same amount of suckling as compared to women with good nutritional status resulting in prolonged amenorrhea. Also children of nutritionally deficient mothers suckle more to get adequate amount of milk.²³ The prolactin hormone also has been observed to decrease with improvement of maternal nutrition.²⁴

CONCLUSION

This study revealed that longer the duration of breastfeeding, greater the delay in the return of menstrual cycle. Survival of child was the most important indicator for PPA among Nepalese women. Mothers with birth interval of 3-4 years had lesser risk of return of monthly cycle. These variables should be re-enforced among the women to have longer duration of PPA naturally, so that they can ensure better health to their children. The gender of the child and place of residence did not make any difference in the duration of PPA. Also, women with no education and living in the poorest household had the lowest risk of return of monthly cycle.

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