

## Retrospective reporting of the duration of post-partum amenorrhea: A survival analysis

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### Abstract

**Introduction:** Duration of post-partum amenorrhoea (PPA) is the period from the end of pregnancy to begin of menstruation. It is a temporary infecundable period. The attainment of first menstruation after delivery is treated as the termination of PPA.

**Objectives:** The main aim of this paper is to investigate the differentials of the duration of PPA according to the characteristics of mothers and their child.

**Methods:** The data are taken from a sample survey of Palpa and Rupandehi districts. A total of 1019 ever-married mothers were interviewed. 481 mothers were provided information on the duration of PPA to their last but one born child (retrospective status reporting). Survival analysis technique has been used.

**Results:** It was found that the distribution of PPA showed a heaping at the multiple of three months. Mean duration of PPA was found to be ten months and it was higher among mothers of higher parity, older mothers and higher age at birth of child. Younger mothers have lower duration than that of the older. Mean duration was increased with the increased parity of mothers. A strong positive association was observed between the duration of PPA and breastfeeding (BF). The increased duration of PPA was found with the increased birth interval. The survival status of child was found a strong consequence on amenorrhoeic period. Inverse association was found with education as well as high socioeconomic status of the family. A significant association was found with residential as well as caste/ethnic groups.

**Conclusion:** Mean duration of PPA was found to be 10.6 months. Amenorrhoeic period was found higher among mothers of higher parity, older ages, and higher age at birth of the child. A positive relationship was found with BF whereas inverse association was found with the level of education. Duration of PPA was decreased with the increased level of socio-economic status.

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The duration of Post-partum amenorrhoea (PPA) is the period from the end of pregnancy to begin of menstruation. Obviously it is a temporary infecundable period. The attainment of first menstruation after delivery is treated as the termination of PPA. There are eleven key intermediate variables that affect natural fertility and are categorized mainly three heading viz. intercourse, conception, and gestation variables<sup>1</sup>. The biomedical, demographic and socioeconomic factors identified as explanatory variables and influence fertility through the intermediate variables. PPA is one of the conception variables and considered as one proximate determinant, which affect natural fertility<sup>2,3</sup>.

Duration of PPA showed a unimodal as well as bimodal pattern<sup>4,5,6,7</sup>. A number of studies have so far been conducted to see the distribution of PPA<sup>4,5,6,8</sup>. Fertility is not regulated by the use of contraception in a society, the duration of PPA can exert a powerful fertility inhibiting effect for the reason that a large proportion of the reproductive life spend in an amenorrhoeic period<sup>4,9</sup>. PPA is directly associated

with age of mother and her parity<sup>10, 11, 12</sup>. It is highly correlated with the breastfeeding<sup>13</sup>. Education has been found inversely related with PPA and varied according to religion/caste/ethnic, place of residence and socioeconomic status of mother<sup>4, 12</sup>. A number of studies have shown a declining trend in the PPA duration over time<sup>8,14</sup>. Duration of PPA varies from community to community with respect to some socio-economic and demographic characteristics of mothers<sup>3,11</sup>.

The main objective of this paper is to investigate the differentials of the duration of PPA in relation to the characteristics of mother and her child. A survival analysis technique has been used to identify the differentials of PPA. Mean duration of PPA has also been computed based on survival analysis.

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## Material and methods

The data are taken from a sample survey entitled “Demographic Survey on Fertility and Mobility in rural Nepal (DSFM 2000): A Study of Palpa and Rupandehi Districts”. The data were collected from eight clusters, four clusters from each district. These clusters consisted of wards of the Village Development Committee (VDC), which is the lowest political unit. A VDC consists of nine wards. The clusters were randomly selected and completely enumerated. A total of 811 households were surveyed. The information on fertility and related data were also collected from each household.

A sample of 1019 ever-married women of reproductive age were interviewed. Among them the resumption of the menstruation was collected from each ever-married women who had given at least one birth in the last 7-years preceding the survey date. Each and every mother was asked whether she had resumed menstruation following her last but one born child. A total of 481 mothers provided information on the duration of PPA for their last but one born child. In addition to this, information on socio-economic, demographic and cultural characteristics of the mothers was also collected.

The duration of PPA is taken as the dependent variable and grouped into eight categories (as 0-3, 4-7, 8-11, 11-14, 15-18, 19-21, 22-25 and 26 and above months).

Independent variables are included as below. The variables such as parity of mother (PARITY), current age of mother (AGEMOTH), age of mother at the birth of child (AGEMOTHCHB), breastfeeding (BF), close birth interval (CLOSE), current age of child (AGECH), survival status of child (SURVCH), and sex of child (SEXCH) are the Demographic variables whereas education of mother (EDUMOTH), education of husband (EDUHUSBN), working status of mother (OCUMOTH), occupation of husband

(OCUHUSBN), socio-economic status of household (SOECONH), and place of residence (RES) are the Socio-economic variables. Caste/ethnicity (CASTE) is considered as Cultural variable. All these variables are measured at survey date. The details of the measurements of these variables are found in Aryal<sup>2</sup>.

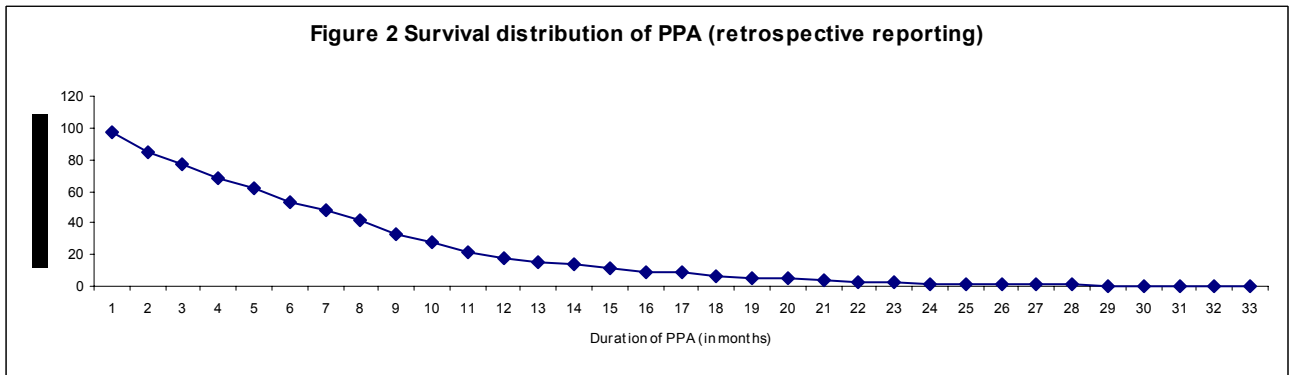
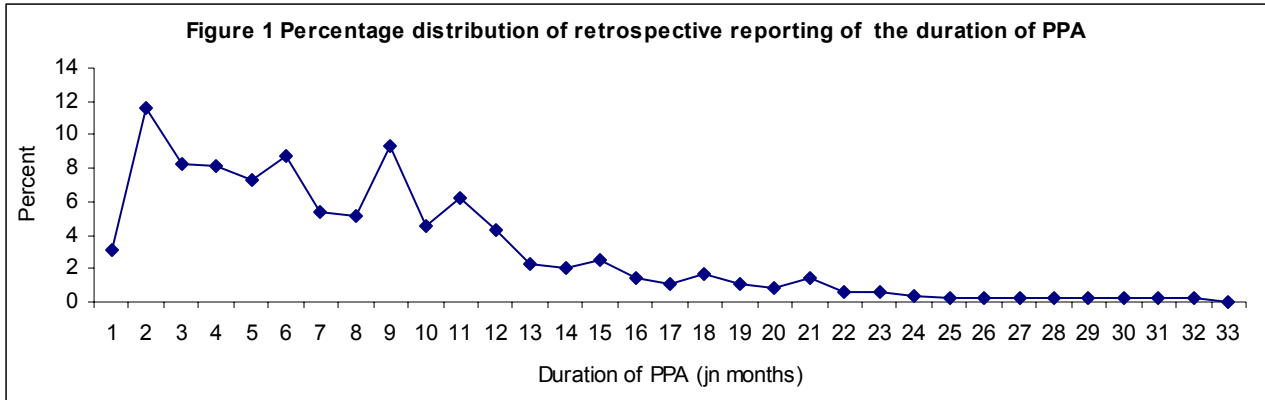
Life table technique is utilized to derive the survival distribution of the duration of PPA. The conventional life table follows the following results.

$S_x = l_x / l_0$ ; where  $l_0 = 1$  and  $S_x = l_x$ . So  $S_x$  and  $l_x$  are identical. Then  $S_{x+1} = l_{x+1} = l_x (1 - q_x) = l_x \cdot p_x = S_x \cdot p_x$ , since  $p = 1 - q$ .

Once we know  $q$ , the other columns of the life table can easily be calculated. Mean duration of PPA has been calculated based on the survival analysis.

## Results

Figure 1 displays the percentage distribution of PPA with retrospective status reporting data. Figure clearly showed a heaping at the multiple of three months in the duration of PPA. It was found that only about three per cent mothers were reported their amenorrhoeic period before a month. About 12 per cent mothers had reported their PPA period before 3 months. Similarly about 39 and 55 per cent mothers had reported their amenorrhoeic period before six and nine months respectively. About 78 per cent mothers had reported their amenorrhoeic period before a year. About 92 and 99 per cent mothers had reported their amenorrhoeic period before 18 and 24 months respectively and the rest of about only one per cent mothers had experienced their amenorrhoeic period more than two years. It was found that the mean duration of PPA was 10.6 months. Survival distribution of PPA with retrospective status reporting data is presented in Figure 2. The survival curve clearly showed a declining trend up to 6 months and there after it decline rapidly. It is indicative that only few mothers are remaining to terminate their PPA duration after two years.



***PPA duration with respect to demographic variables***

The results of survival analysis of the duration of PPA are presented in Table 1. Parity of mother, current age of mother and age of mother at the birth of the child were found significantly related with the distribution of PPA. The average duration of PPA was found higher for higher parity, older mothers, and higher age at birth of the child whereas the lower duration was found for lower parity and younger mothers. The average duration of PPA was found about eight months for mothers currently aged below 24 years and it gradually increased to reach about thirteen months for mothers of aged 35-49 years. Duration was found lower among younger mothers than older.

Average duration of PPA was increased from 8.8 months for mothers of parity 1-2 to 11.8 months for mothers of parity 7 and above respectively. The proportion of mothers who terminated their PPA before 6 months was found 42.3, 39.1, 36.2 and 34.4 respectively for parity of 1-2, 3-4, 5-6 and 7 and more. Similarly, the proportion of mothers who terminated their PPA before 18 months was found 95.8, 92.7, 90.2 and 79 respectively for parity of 1-2, 3-4, 5-6 and 7 and more. Mothers belonging to lower parity had higher chance of terminating PPA duration early than higher parity counterparts. The mean duration of PPA increased with the increased parity order. The association between parity and duration of PPA was found significant.

**Table 1:** Survival Analysis of duration post-partum amenorrhea for last but one born child by characteristics of mothers and her child

Variables	Variable categories	% terminating of PPA up to months					Mean
		6	12	18	24	30	
PARITY	1-2	42.3	81.9	95.8	99.1	99.9	8.8
	3-4	39.1	78.6	92.7	98.5	100.0	11.0
	5-6	36.2	75.3	90.2	98.2	100.0	12.1
	7+	34.4	70.9	79.1	98.2	100.0	11.8
AGEMOTH	<25	43.1	79.9	96.6	99.1	100.0	9.4
	25-34	37.3	76.8	92.5	98.7	99.6	11.5
	35-49	36.0	75.3	89.9	96.9	99.8	12.0
AGEMOTH HB	<25	42.9	80.1	96.9	99.3	99.9	10.1
	25-34	38.3	76.4	92.4	98.9	99.8	11.8
	35-49	36.4	75.9	90.0	96.6	99.8	11.8
BF	0-6	77.8	88.7	95.9	99.3	99.9	6.1
	7-12	58.8	81.3	95.4	98.9	99.9	7.4
	13-18	33.5	73.3	87.7	98.8	99.8	9.8
	19-24	34.9	58.6	86.9	96.5	96.4	12.0
	25-30	32.3	53.6	77.6	96.4	96.2	13.6
	31-36	32.6	44.8	75.1	94.5	98.4	13.7
	37-42	30.6	40.8	64.2	87.8	95.9	11.5
	43-48	29.9	39.9	62.1	87.1	94.6	14.6
49+	28.0	42.8	54.9	85.1	93.1	12.0	
CLOSE	0-24	58.9	78.3	97.7	98.9	100.0	9.8
	24-35	37.1	77.5	89.0	98.0	100.0	11.7
	36-47	35.6	68.0	78.7	93.1	96.8	12.8
	48+	34.7	48.8	70.5	83.9	96.7	9.6
SEX	Male	38.3	77.8	92.3	98.5	99.9	10.5
	Female	38.9	79.0	92.2	98.4	99.8	10.7
CHALIVE	Alive	31.0	53.2	71.4	84.7	93.4	11.4
	Dead	67.4	81.5	96.5	99.8	100.0	6.4
EDUMOTH	Illiterate	32.6	51.8	79.7	88.0	97.9	11.3
	Literate & Primary	50.0	62.5	78.2	89.1	99.9	9.6
	Mid-high school	55.8	77.1	86.6	97.3	100.0	8.6
	Inter and above	57.2	79.2	96.3	99.8	99.9	8.0
EDUHUSBN	Illiterate	31.6	50.8	78.9	87.9	97.9	11.5
	Literate & Primary	49.6	60.5	79.2	89.5	99.9	10.0
	Mid-high school	56.8	78.1	85.6	96.9	99.9	9.0
	Inter and above	56.9	79.2	96.9	98.8	100.0	8.7
OCUMOTH	Household work	37.8	78.2	92.6	98.3	99.9	10.1
	Employed work	39.78	77.5	91.9	98.5	99.9	11.7
OCUHUSBN	Agri. & Labour	34.2	74.2	89.3	95.4	98.7	11.0
	Service	36.9	77.6	92.1	96.9	98.8	10.4
	Others (business, abroad, etc.)	40.7	78.8	95.9	98.7	99.9	9.3
SOECOHH	Low	28.7	69.8	75.7	95.9	97.9	11.7
	Middle	37.2	70.2	88.4	98.3	99.2	10.0
	High	55.7	80.9	96.1	98.9	99.9	7.0
RES	Tarai	43.2	79.9	95.8	99.4	100.0	9.6
	Hills	36.8	76.6	89.9	97.4	99.2	10.7
CASTE	Brahmin	40.3	79.2	96.2	98.5	98.9	10.6
	Chhetry	35.0	75.1	84.9	90.7	97.4	10.6
	Dalits & Ethnic*	39.5	80.0	91.8	98.1	100.0	6.6
Total		38.46	77.96	92.31	98.54	99.98	10.6

\*Dalits=Kami, Damain and Sarki; Ethnic=Gurung, Magur, Tharu, Choudhary and Tamang

Average duration of PPA increased from a minimum of 6.1 months in low BF category (0-6 months) to a maximum of 14.6 months in higher BF category (43-48 months). Lower chance of terminating PPA was found with the prolonged duration of BF. A positive and strong association was found between the duration of PPA and BF. Average duration of PPA varied with birth interval. About 10 months duration of PPA was found for mothers' birth interval less than two years and about 12 months for mothers' birth interval 24-36 months. About 59 per cent mothers were terminated their PPA before six months whose birth interval was 0-24 months whereas 36 per cent mothers were terminated PPA before six months whose birth interval was 36-47 months. It was found that the increased duration of PPA with the increased close birth interval. The PPA duration was found early among mothers with shorter close birth interval than longer close birth interval.

The effect of sex of the child on the duration of PPA did not provide any significant difference. However, the survival status of the child had showed a strong effect on the duration of PPA. A very low increment of terminating PPA was found for mothers of alive child than dead child. About 31, 53 and 71 per cent mothers had terminated PPA period before 6, 18 and 30 months respectively with mothers of alive child whereas about 67, 82 and 97 per cent mothers had terminated PPA period with mothers of dead child. The longer duration of PPA was found with mothers who have alive child (11.4 months) than mothers who experienced dead child (6.4 months).

#### ***PPA duration with respect to socioeconomic variables***

Education variable showed an inverse relationship with the duration of PPA. About 33, 80 and 98 per cent mothers were terminated their PPA period before 6, 18 and 30 months respectively among illiterate mothers whereas about 57, 96 and 100 per cent mothers were terminated their PPA period among intermediate and more educated mothers. Average duration of PPA was about 11 months among illiterate whereas it was about 8 months among intermediate and more educated mothers. Study indicated that the higher is the educational level of the families the lower is the duration of PPA.

Working mothers showed a slightly lower duration (10.1 months) than housewife (11.7 months). About 34, 89 and 99 per cent mothers were terminated their PPA before 6, 18, 30 months respectively whose husbands engaged in agri-cultural & labourer whereas about 41, 96 and 100 per cent mothers were

terminated their PPA whose husbands engaged in business/trade/abroad.

Socioeconomic status exhibits its effect on the duration of PPA. About 29, 76 and 98 per cent mothers were terminated PPA period before 6, 18 and 30 months respectively among low socio-economic status mothers whereas about 56, 96 and 100 per cent mothers were terminated PPA among high socioeconomic status family. It was found that mothers belongs to high socio-economic status had experienced shorter duration of PPA (7.0 months) than mothers belongs to low socio-economic category (11.7 months). The association between socio-economic status and duration of PPA was found significant. The study revealed that the PPA duration was decreased with the increased level of socio-economic status.

Residential status sowed a significant relationship with PPA duration About 37, 90 and 99 per cent mothers were terminated PPA before 6, 18 and 30 months respectively for mothers residing in the Terai whereas about 43, 96 and 100 per cent mothers were terminated PPA for mothers residing in the Hills. Terai mothers were found to have shorter duration of PPA (9.6 months) as compared to Hills (10.7 months).

#### ***PPA duration with respect to caste/ethnicity***

Caste/ethnicity variable exhibits a highly significant difference on the duration of PPA. It was found that the duration of PPA slightly higher among Brahmin (10.6 months) than Dalits & Ethnic (6.6 months) category. About 40, 96 and 99 per cent mothers were terminated their PPA duration before 6, 18 and 30 months respectively among Brahmin category whereas about 35, 95 and 97 per cent mothers among Chhetri category.

#### **Discussion**

The distribution of PPA clearly showed a heaping at the multiple of three months, which is consistent with other findings<sup>8</sup>. Some other studies reported a heaping at the multiple of six months<sup>12</sup>. It is less likely to be real that may be due to the resumption of menstruation is not under the voluntary control of mothers<sup>4,13</sup>. The heaping may perhaps be happened due to the mis-reporting, misconception, culturally prescribed norms and traditions, and memory lapse and selection bias<sup>2</sup>. This study exhibits a consistent average duration of PPA (10.6 months against 11.7 months as reported by MOH<sup>15</sup>). The main advantage for applying survival analysis is that it provides summary measures and survival probabilities.

Survival curve gives the declining trend of survival probabilities of the PPA duration (Figure 2). A considerable percentage of mothers reported their duration of PPA before a month, which may perhaps be due to the lack of differentiation between post-partum bleeding and resumption of menstruation<sup>16</sup>.

PPA duration was higher for higher parity, older mothers and higher age at birth of child. While lower PPA duration was for younger mothers as compared to the older mothers. It varied with respect to age of mother and her parity<sup>10, 11,12,14</sup>. PPA duration was increased with the increased open birth interval. A positive relationship was noted with birth interval<sup>16</sup>. A strong association was observed between PPA and BF among Nepalese mothers, which is consistent result to the other findings<sup>4,12,13</sup>.

Both education and occupation variables showed an inverse association with the duration of PPA. PPA duration varied with caste/ethnicity, place of residence and socioeconomic status. The survival status of the child had showed a strong effect on the duration of PPA. These findings are consistent with the other findings<sup>11,12</sup>. It is expected that a higher socioeconomic status probably demonstrate a better health, better education and a better nutrition of mothers. It was argued that a better health of mother provides a better quality and more quantity of breast-milk, and if the mother feeds her child for longer duration, her length of PPA would be prolonged<sup>4</sup>. A shorter duration of PPA was noticed among the healthy mothers<sup>6</sup>.

### Conclusions

The important differentials of PPA have been investigated. PPA distribution showed a heaping at the multiple of three months. It was found that the average duration of PPA was 10.6 months. PPA duration was found higher for the higher parity, older mother and higher age at birth of the child. It was also found that the younger mothers have lower PPA duration than older counterparts. PPA duration increased with the increased parity. A positive and strong relationship was found with BF. PPA duration was found increased with the increased birth interval. The survival status of the child had showed a strong effect on the duration of PPA.

It was found that the higher is the educational attainment the lower is the duration of PPA, which indicates an inverse association with PPA duration. Working mothers showed a slightly lower duration of PPA than housewife. Occupational status also exhibits strong association with the duration of PPA.

It was found that the PPA duration was decreased with the increased level of socio-economic status of the family. Residential status and caste/ethnicity sowed a significant relationship with PPA. It was found that the mean duration PPA was higher for Brahmin than Dalits and Ethnic category.

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