Impact of maternal nutritional status on lactational amenorrhea in India: A regional analysis

Laxmi Kant Dwivedi[1]

Extended Abstract

The interval between birth of a child and subsequent return of menses is known as lactational amenorrhea. The relationship between maternal nutritional status and lactational amenorrhea is not clearly understood and till date it remains unclear. However, some researchers argued that minimal amount of fat as percentage of body weight is necessary for attaining menarche and maintaining ovarian cycle (Frisch et al. 1973, Frisch and McArthur 1974). But some researchers argued that this relationship is biologically insignificant (Diaz et al. 1988). Therefore, we have tried to examine the independent impact of maternal nutritional status on lactational amenorrhea among breast-feeding women.

An anthropometric measurement, Body Mass Index (BMI) has been used as an indicator for measuring nutritional status of women. Chronic energy deficiency in women is usually indicated by BMI of less than 18.5. BMI is a valid indicator for assessment of nutritional status of women as literatures suggest that BMI is consistently highly correlated with body weight and is relatively independent of the stature or height of the individual (Shetty, 2002). Such type of measurement is very highly reliable than the measurement which is solely based on reporting. However, child weight-for-age has been identified as an indicator for child's nutritional status.

Women who were not pregnant, who were breastfeeding and who were not using any hormonal contraceptives were included in the analysis. Multivariate logistic regression was used to examine this association with the help of National Family Health Survey-2 data. Around 1795 and 4130 cases were missing for body mass index and child nutritional status respectively and

[1] Assistant Professor, School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai, India.
E-mail: laxmikdwivedi@rediffmail.com

were imputed by fitting the linear regression equation. There was no significant difference exist between mean BMI of each region of India before and after imputation.

Table 1 Median duration of postpartum amenorrhea and 95% confidence interval (CI) estimates of women who were currently breast-feeding, not pregnant and were not using any hormonal contraceptives at the time of survey with respect to body mass index of women in India and its regions-1998-99.

Country/Regions	BMI>=18.5 kg/m^2			BMI<18.5 kg/m^2			Log-rank test
	Median	95% CI		Median	95% CI		Test-statistic
India	9.00	8.68	9.32	11.00	10.79	11.21	76.90*
North	7.00	6.49	7.51	8.00	7.14	8.86	5.38***
Central	12.00	11.73	12.27	12.00	11.85	12.15	2.86
East	10.00	9.56	10.44	12.00	11.59	12.41	14.18**
Northeast	8.00	7.48	8.52	9.00	8.01	9.99	3.64
West	6.00	5.36	6.64	11.00	10.39	11.61	45.53*
South	7.00	6.54	7.46	9.00	8.16	9.84	35.62*

Note: *p<=0.00001; ** p<=0.0002; ***p<=0.0204

Table 2 Estimated probabilities of remaining amenorrheic by selected combinations of characteristics in India and its regions.

Variable	Probability ± Standard Deviation						
	India	North	Central	East	Northeast	West	South
Average	0.418±0.282	0.388±0.284	0.457±0.283	0.445±0.275	0.392±0.266	0.406±0.301	0.394±0.296
Maternal BMI & Child age							
<18.5Kg/m^2 and 13-35month	0.169±0.043	0.132±0.033	0.148±0.034	0.215±0.048	0.204±0.049	0.216±0.068	0.134±0.028
<18.5Kg/m^2 and <=12 month	0.546±0.078	0.472±0.076	0.525±0.072	0.566±0.071	0.580±0.075	0.627±0.100	0.569±0.060
>=18.5Kg/m^2 and <=12 month	0.570±0.077	0.543±0.077	0.530±0.072	0.601±0.070	0.628±0.073	0.578±0.103	0.560±0.060
>=18.5Kg/m^2 and 13-35 month	0.136±0.036	0.112±0.028	0.140±0.033	0.170±0.040	0.150±0.038	0.134±0.046	0.088±0.020
Maternal BMI & Child age with Breast-feeding status							
Breast-feeding with supplements							
+ <18.5Kg/m^2 and 13-35month	0.176±0.072	0.140±0.062	0.202±0.073	0.240±0.080	0.173±0.058	0.154±0.080	0.116±0.050
+ <18.5Kg/m^2 and <=12 month	0.543±0.129	0.472±0.133	0.600±0.119	0.589±0.115	0.525±0.102	0.509±0.150	0.510±0.122
+ >=18.5Kg/m^2 and <=12 month	0.566±0.128	0.540±0.134	0.605±0.118	0.623±0.113	0.573±0.100	0.461±0.149	0.500±0.122
+ >=18.5Kg/m^2 and 13-35 month	0.143±0.061	0.120±0.054	0.191±0.070	0.192±0.068	0.127±0.045	0.094±0.052	0.076±0.034
Exclusive breast-feeding							
+ <18.5Kg/m^2 and 13-35month	0.471±0.128	0.422±0.129	0.433±0.116	0.576±0.116	0.416±0.099	0.561±0.149	0.438±0.120
+ <18.5Kg/m^2 and <=12 month	0.831±0.079	0.796±0.095	0.818±0.080	0.861±0.064	0.789±0.070	0.880±0.067	0.859±0.062
+ >=18.5Kg/m^2 and <=12 month	0.844±0.074	0.837±0.081	0.821±0.079	0.877±0.059	0.820±0.063	0.857±0.077	0.854±0.064
+ >=18.5Kg/m^2 and 13-35 month	0.412±0.123	0.380±0.124	0.417±0.114	0.508±0.116	0.333±0.090	0.428±0.147	0.332±0.108
Breast-feeding with plain water only							
+ <18.5Kg/m^2 and 13-35month	0.319±0.109	0.271±0.102	0.335±0.103	0.387±0.107	0.302±0.086	0.374±0.141	0.227±0.085
+ <18.5Kg/m^2 and <=12 month	0.719±0.109	0.665±0.124	0.748±0.099	0.740±0.097	0.694±0.088	0.770±0.110	0.696±0.105
+ >=18.5Kg/m^2 and <=12 month	0.738±0.105	0.723±0.114	0.752±0.098	0.766±0.092	0.734±0.082	0.733±0.120	0.688±0.107
+ >=18.5Kg/m^2 and 13-35 month	0.269±0.099	0.237±0.093	0.321±0.101	0.324±0.098	0.232±0.072	0.258±0.116	0.157±0.065

Note: The other controlled variables are breast-feeding status, place of residence, respondent's education, standard of living, sex of child, maternal age, parity and child wt-for-age.

Further, the estimated probability to remain amenorrhoeic has been calculated to get better understanding of the impact of maternal nutritional status on postpartum amenorhoea.

The Kaplan-Meier survival analysis indicates that at the first month of postpartum period, 88 percent of better-nourished women and 90 percent of mal-nourished women in India were still amenorrheic and at 6 months, 57 percent and 63 percent respectively, were still amenorrheic. At the end of 12 months, these rates were 26 percent and 32 percent respectively. At the end of 32 months, the corresponding figure was eight percent and six percent respectively. It is clear from this analysis that undernourished women tended to be more likely to amenorrheic than better-nourished women.

In case of better-nourished women, the percent of women who were still amenorrheic at the end of first month was highest in northeastern region and lowest in northern region. But for mal-nourished women, the percent of women who were still amenorrheic at the end of first month was highest in southern region and lowest in northern region. The percent of women remain amenorrheic at the end of first month was found to be relatively higher among mal-nourished women in the entire region except in northeastern region where the corresponding percent was equal for both better-nourished and mal-nourished women. But, the percent of women who were amenorrheic at the end of 12 months was considerably higher among mal-nourished women in the entire region of India. At the end of 20 months also, similar pattern was observed. But, the difference in percentages to remain amenorrheic between better-nourished and mal-nourished women was remarkably higher in western and southern regions. For example, at the end of 12 month, the percentages to remain amenorrheic among undernourished women were 31 percent as opposed to 18 percent among well-nourished women in the western region of India.

Log-rank test showed that there was a significant difference in the duration of amenorrhea between two groups under study. The women with undernourished had significantly longer duration of PPA than well-nourished women in India ($p=0.00001$).

The median duration of PPA was significantly longer for mal-nourished women in northern, eastern, western and southern regions. This difference was significantly more apparent in western and southern regions. However, there was no significant difference in the median duration of PPA between better-nourished and mal-nourished women in central and northeastern regions.

Socioeconomic status of women was found to be inversely associated with lactational amenorrhea. Mothers who had children who were underweight were insignificantly associated with lactational amenorrhea except central region. The interaction term between maternal nutritional status and duration of breast-feeding was significantly associated with the likelihood to have resumed menstruation after controlling for breast-feeding practices, child nutritional status and other socio-economic and demographic covariates. The effect of maternal nutritional status on lactational amenorrhea was insignificant when women have been breastfeeding since last 12 months except northern region of India. However, after 12 months of breast-feeding, the probability of undernourished women remain amenorrheic was likely to be greater and this trend was highly consistent across all six regions included in the analysis.