Assessment of Nutritional Status of Mothers of Children Under 3 Years of Age and Its Determinants

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Abstract

Objective: The study was conducted to identify associated factors of severe wasting among mothers. Methodology: A prospective 12 months' study was conducted in 30 randomly selected villages of Khutpani Block of West Singhbhum with a sample of 600 households with children between 0 and 3 years of age using the prevalence of wasting in West Singhbhum district National Family Health Survey, precision of 0.05, design effect of 2 and accounting for error of 10%. Data on socioeconomic status, maternal anthropometry mid-upper arm circumference (MUAC), water, sanitation and hygiene (WASH) practices, gender-based violence, and food security were collected. Data collection was done between July 2017 and June 2018. Results: Wasting and severe wasting prevalence using MUAC criteria among mothers were found to be 60% and 17%, respectively. The study showed higher rate of severe maternal wasting among households facing poverty, food insecurity, poor WASH practices especially related to hand washing and toilet use and women who faced gender-based violence. Conclusion: Nonnutritional interventions addressing poverty, household food insecurity, gender violence, and WASH practices are required to address maternal wasting, in addition to existing nutritional programs.

Keywords: Food security, gender-based violence, maternal nutrition, Water, sanitation and hygiene (WASH), seasonality, wasting

Introduction

Jharkhand has a very high prevalence of maternal undernutrition (31.5%) according to the National Family Health Survey (NFHS-4) 2015–16. Recent evidences have shown maternal undernutrition increases the risk of in utero growth retardation and likelihood of babies born with low birth weight, many of whom are stunted or wasted even at birth. This disadvantage continues till later in life. Therefore, addressing maternal nutritional status is extremely important to comprehensively address the twin concerns of maternal and child undernutrition.

Emerging evidences show that household economic status, educational status of women, age and marital status, women’s employment and control over income and decision-making authority, place of residence (rural or urban) affect women’s nutritional status. Studies in India have also shown that women empowerment and decision-making authority are important positive determinants; while the experience of psychological abuse and sexual coercion is negatively associated with women’s nutrition. Further studies show maternal education is correlated with dietary diversity of both mothers and children; maternal dietary diversity is also affected by household food security and socioeconomic status. Moreover, maternal dietary diversity is also a strong predictor of child dietary security and the odds of achieving dietary diversity of more than four food groups among children is higher where mothers themselves consumed four or more food groups. A landmark study by Bhutta et al. highlighted the importance of nutrition sensitive interventions, namely, women empowerment, agriculture and food system, social protection and safety nets, education, and employment as catalysts for accelerating improvement in maternal and child nutritional status.

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The current study was undertaken to understand the determinants of maternal nutrition (severe wasting) in the context of rural, tribal areas of West Singhbhum district in Jharkhand. West Singhbhum has a predominantly tribal population (67%), with female literacy rate of 50% (Census 2011). According to the NFHS-4, 21% girls were married before the age of 18 years and 9% women between 15 and 19 years were already mothers or were pregnant. Thirty-three percent women in the district had body mass index (BMI) <18.5 kg/m² and 73% women were anemic. Full antenatal care for only 4% pregnant women and institutional delivery rate of 37% indicate to poor access to maternal health services in the district. The situation of maternal undernutrition measured as BMI <18.5 kg/m² was worse among Scheduled Tribes and Scheduled castes (35%) as compared to general population (21%) in Jharkhand. Although district-wise data are not available, about 31% women in Jharkhand experience physical or sexual violence, the numbers being almost twice in rural as compared to urban areas, and is much higher among women with low literacy or those who are employed with no cash income. About 60% women whose husbands consumed alcohol often had experienced spousal violence. Further, Jharkhand has alarming rate of hunger, comparable to the hunger index of Madagascar or Central African Republic, which accentuates the poor nutritional status of women and children in the State. The current study has tried to assess and analyze the determinants affecting the nutritional status of mothers in Khuntipani Block of West Singhbhum.

**Methodology**

A prospective 12 months’ survey was conducted in Khuntipani Block of West Singhbhum district of Jharkhand to assess maternal nutritional status and its determinants. Six hundred randomly selected households with mothers of children aged up to 3 years were selected from 30 randomly selected villages of the block, using prevalence of wasting in West Singhbhum district as per NFHS-4, precision of 0.05, design effect of 2, and accounting for error of 10%. Lists of eligible households were collected from Anganwadi centers. As this was the prospective 12 months’ survey, the sample size for each month was divided evenly and every month, 50 eligible households were surveyed.

Data on socioeconomic status, anthropometry (mid-upper arm circumference [MUAC] of mothers), water, sanitation and hygiene (WASH) practices, domestic violence, and food security were collected. Data were collected between July 2017 and June 2018 through house to house visits.

Maternal MUAC has been shown to have a positive correlation with pregnancy outcomes. MUAC <23 cm was taken for wasting and 21 cm was taken for severe wasting. Food security was measured as per the nine indicators on the Household Food Insecurity Access Scale (HFIAS). Respondents were asked if in the past 30 days, they had worried about food shortages in the family or had to compromise on the quality of food they preferred or had to take smaller meals or skipped meals.

Gender-based violence included any form of physical, verbal, mental, or sexual violence.

**Statistical analysis**

Data entry was done in a tool designed into MS-excel. All statistical analyses were performed in, (IBM SPSS Statistics for Windows, Version 20.0. Armonk, New York, USA: IBM Corp). We created wealth index of households based on reported asset ownership with quintile-1 as poorest quintile and quintile-5 as least poor quintile using principal component analysis in SPSS. The Food and Nutrition Technical Assistance project guideline for HFIAS indicators were categorized into four levels of household food insecurity: food secure, mildly food insecure, moderately food insecure, and severely food insecure to assess the prevalence of household food insecurity (access component) and its pattern. Data collected over the period of 12 months were divided into three seasons (summer, winter, and monsoon) to understand seasonal variations in maternal severe wasting. Pattern of severe wasting based on maternal MUAC was examined across WASH practice, mothers’ years of education, mothers’ experience of any form of gender-based violence, seasonality, food security status, and wealth-index using cross-tab analysis in SPSS.

Binary logistic regression analyses were performed to identify associated factors of severe wasting among mothers. Independent variables taken in the analyses were households with ration cards, mothers’ educational status, WASH practices, mothers’ experience of any form of gender-based violence, seasonality, households’ wealth index, and households’ food security status.

**Results**

Demographic characteristics showed that 82% families were Scheduled Tribes, 3% Scheduled Caste and 14% were from other backward classes. About 52% households had family size of <5 members. 78% households had ration cards. Only around 18% households were using toilet facilities. 60% mothers were found to be illiterate, 35% had attained up to 10 years of education, and only 5% had attained more than 10 years of education. 63% mothers had experienced any form of gender-based violence. 73% households were found to be food insecure of whom 26% were severely food insecure [Table 1].

Overall prevalence of wasting (MUAC <23 cm) was 60% while severe wasting (MUAC <21 cm) was 17%. Bivariate analysis [Table 2] showed significant association of severe wasting among mothers with household poverty status ($P=0.01$). Mothers from households in the poorest wealth quintile had the highest risk (21%) of being severely wasted compared to those from the least poor households (6.3%). Further multivariate analysis [Table 3] also showed mothers from the poorest wealth quintile being thrice at risk (adjusted odds ratio [aOR] 3.36; $P<0.05$) of severe wasting compared...
to least poor quintile (quintile 5). Even mothers in quintile 2 (aOR 3.22; P < 0.05) and quintile 3 (aOR 2.91; P < 0.05) had elevated risk of severe wasting. Mothers from quintile 4 also had almost twice (aOR 1.96) the risk of being severely wasted compared to those in quintile 5; however, it was not statistically significant.

Both bivariate and multivariate analysis showed elevated risk of severe wasting among mothers in food insecure families. Bivariate analysis showed that mothers from households facing severe food insecurity had the highest prevalence (23.8%) of severe wasting compared to 12.4% in food secure families (P = 0.04). Further multivariate analysis showed mothers from severely food insecure families were 1.33 times more predisposed to being severely wasted, in reference to food secure families however, the finding was not statistically significant [Tables 2 and 3].

Household’s access to ration card (for subsidized food supplies from the government) had a significant association with maternal nutritional status in both bivariate (OR 2.22; P = 0.009) and multivariate analysis (aOR 2.42; P < 0.01). It could mean that a family having a ration card is indicative of its poor economic status; however, it does not translate to regular food supplies to the family to enhance its food security [Table 2].

Among WASH practices, bivariate analysis showed hand washing with soap after toilet use (OR 0.66; P = 0.06) and before cooking meals (OR 0.59; P = 0.02) had significant association with maternal severe wasting. However, WASH practices were not found significantly associated with maternal severe wasting in the multivariate analysis [Tables 2 and 3].

Mothers who faced any form of gender violence had 1.5 times higher risk (OR 1.51; P = 0.08) of severe wasting compared to those who did not face any violence. Multivariate analysis also showed an elevated risk of severe wasting (aOR 1.31) for mothers facing gender violence, however, it was not statistically significant [Tables 2 and 3].

Seasonality pattern was observed in maternal wasting, with multivariate analysis showing lower risk of severe wasting during monsoon (aOR 0.62, P < 0.1) compared to winter season [Table 3].

Mothers with more than 10 years of schooling had lower risk of severe wasting compared to mothers with no schooling, however, the difference was not statistically significant in bivariate or multivariate analysis [Tables 2 and 3].

**DISCUSSION**

Maternal wasting is strongly associated with poverty, household food security, WASH practices, and gender-based violence. There is a dearth of literature on determinants of maternal nutrition. A similar study in Bangladesh also found significant association of maternal wasting with poverty, years of schooling and age less than or above 35 years.[14] Another study from southern India found evidence of negative impact of psychological abuse and sexual coercion on maternal nutritional status.[6] The current study also found higher risk of severe wasting among households who were resource poor, who faced food insecurity or those who had a ration card. The later could be a proxy indicator for poor economic status of the households, however, possessing a ration card did not guarantee regular food supplies to the families.

Seasonality pattern was also observed in severe wasting among mothers, with lower risk of severe wasting observed in monsoons compared to winters. In a population, where 73% households were food insecure and 26% households faced severe food insecurity, monsoon seasons bring respite in form of forest collections. Jharkhand is primarily monocropped and tribal people are dependent on wage labor, collecting forest produces, leaf plate and dona making and rearing poultry and goats in small numbers to supplement their food basket. During monsoon, the food basket is supplemented with forest products such as wild mushroom, chironji, mango, mahua, jackfruit, and bamboo. These forest produces are either consumed or sold in local markets. Most of the forest produces are collected and sold by women, adding some financial resources to their kitty, and perhaps acts as a protective factor against starvation.

Gender-based violence too had a significant adverse impact on maternal nutrition. The study found widespread alcoholism in the population and as many as six in ten women experienced some form of domestic violence. Alcoholism and domestic violence could be a manifestation of poverty and affects women
empowerment and decision making ability, in turn affecting nutritional status of both mother and child.\[^{[6]}\]

Improved WASH practices could potentially reduce severe wasting through illness prevention and should be promoted. Educational status of women had a positive impact on maternal nutrition, possibly due to its empowering effect and delaying age of marriage, however, in tribal society which is generally more disadvantaged socioeconomically, women need more access to information and resources to prevent undernutrition.

**Limitations of the study**
The study has considered only wasting by mid upper arm circumference as indicator of maternal undernutrition which may have missed cases of wasting detected by other anthropometric criteria. Maternal stunting and micronutrient deficiencies were not within the scope the study. The study only shows association cannot establish the cause-effect relationship between different variables. The study was conducted only in one Block of West Singhbhum district; hence, the findings cannot be generalized. A large scale study can be planned to provide a more generalized findings.

**Conclusion**
As the study showed association of poverty, household food security, gender-based violence, WASH practices on maternal wasting; a comprehensive program to address maternal nutrition should take into account these variables.
Table 3: Multivariate analysis showing association between mothers with severe wasting and different indicators

| Determinants of maternal severe wasting                                      | OR       |
|------------------------------------------------------------------------------|----------|
| Constant                                                                     | 0.032*** |
| Ration card                                                                  | 2.420*** |
| HH treating water before drinking and cooking                                | 0.844    |
| Hand washing before cooking meal                                             | 0.683    |
| Hand washing after using toilet                                              | 0.975    |
| Household using toilets                                                      | 0.767    |
| Mothers faced any form of gender-based violence                              | 1.305    |
| Mothers with no education                                                    | 1.488    |
| Mothers’ education up to 10th standard                                        | 1.646    |
| HH experienced mild food insecurity in the last month                        | 1.001    |
| HH experienced moderate food insecurity in the last month                    | 0.936    |
| HH experienced severe food insecurity in the last month                      | 1.334    |
| HH in Quintile 1 (poorest quintile)                                          | 3.362**  |
| HH in Quintile 2                                                             | 3.216**  |
| HH in Quintile 3                                                             | 2.907**  |
| HH in Quintile 4                                                             | 1.964    |
| Monsoon                                                                      | 0.615*   |
| Summer                                                                       | 0.658    |

*CI<90%, ** CI<95%, *** CI<99%. OR: Odds ratio, CI: Confidence interval, HH: Households

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Conflicts of interest
There are no conflicts of interest.

References
1. Sharma D, Shastri S, Sharma P. Intrauterine growth restriction: antenatal and postnatal aspects. Clinical Medicine Insights: Pediatrics 2016;10, CMPed-S40070.
2. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. Paediatr Int Child Health 2014;34:250-65.
3. Christian P, Lee SE, Donahue Angel M, Adair LS, Arifeen SE, Ashorn P, et al. Risk of childhood undernutrition related to small-for-gestational age and preterm birth in low-and middle-income countries. Int J Epidemiol 2013;42:1340-55.
4. Girma W, Genebo T. Determinants of Nutritional Status of Women and Children in Ethiopia; 2002.
5. Teller CH, Yimer G. Levels and determinants of malnutrition in adolescent and adult women in Southern Ethiopia. Ethiop J Health Develop 2000;14:57-66.
6. Sethuraman K, Lansdown R, Sullivan K. Women’s empowerment and domestic violence: The role of socio-cultural determinants in maternal and child undernutrition in tribal and rural communities in South India. Food Nutrit Bulletin 2006;27:128-43.
7. Nguyen PH, Avula R, Ruel MT, Saha KK, Ali D, Tran LM, et al. Maternal and child dietary diversity are associated in Bangladesh, Vietnam, and Ethiopia. J Nutrit 2013;143:1176-83.
8. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S; Maternal and Child Nutrition Study Group. Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? Lancet 2013;382:452-77.
9. International Institute of Population science, National Family Health Survey (NFHS-4), 2015-16, District Factsheet: Pashchimi Singhbum. Mumbai, India: International Institute of Population Sciences; 2016 available at http://rchiips.org/nfhs/FCTS/JH/JH_Factsheet_368_Pashchimi%20Singhbhum.pdf. [Last accessed on 2020 Feb 25].
10. International Institute for Population Sciences. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai, India: International Institute for Population Sciences; 2016.
11. Menon P, Deolalikar A, Bhaskar A. India State Hunger Index: Comparison of Hunger Across States. IFPRI, Welthungerhilfe, Riverside; 2009. p. 15-9.
12. Ricalde AE, Velasquez-Melendez G, Tanaka AC, de Siqueira AA. Mid-upper arm circumference in pregnant women and its relation to birth weight. Revista de Saude Publica 1998;32:112-7.
13. Kumar P, Sareen N, Agrawal S, Kathuria N, Yadav S, Sethi V. Screening maternal acute malnutrition using adult mid-upper arm circumference in resource-poor settings. Indian J Community Med 2018;43:132-4.
14. Ahmed SM, Adams A, Chowdhury AM, Bhuiya A. Chronic energy deficiency in women from rural Bangladesh: Some socioeconomic determinants. J Biosoc Sci 1998;30:349-58.