Nutritional Status of Adolescents in Agrarian Crises-Affected Area of Maharashtra

Vijayalaxmi Kathawate, Soumitra Ghosh
Centre for Health Policy, Planning and Management, Tata Institute of Social Sciences, Mumbai, India

Introduction

Adolescence is a period of significant growth spurt and maturation. WHO defines adolescence from age 10th to 19th year. In India, different policies and programs define adolescents differently. While the Integrated Child Development Services (ICDS) program considers adolescents between 11 to 18 years, as per the Draft Youth policy, adolescents are considered in age group of 13 to 19 years.

Maharashtra over the past two decades has achieved spectacular economic growth but has fared poorly in human development indicators and health outcomes. Also, the economic development has not been uniform across regions in the state." Large-scale surveys reveal sharp regional and rural-urban inequalities in health outcomes, with the rural population bearing the burden of mortality, morbidity, and under-nutrition disproportionately. The prevalence of under-nutrition amongst children has remained acceptably high, and it was higher in rural areas (42%) than in urban areas (32%). However, we are not aware of any studies that have examined the issue of under-nutrition amongst the adolescents in rural areas of Vidarbha region of Maharashtra, which continues to be one of the most economically distressed regions of the country because of the severe agrarian crisis faced by the people during the last decade. In view of this, the present study makes an attempt to investigate the levels and differentials of under-nutrition among adolescents in agrarian crises-affected area in Maharashtra.

Materials and Methods

The study used data from the Vidarbha Livelihood project’s baseline survey. The survey collected information on the morbidity profile and nutritional profile of young children, adolescents, and women of reproductive age group and household consumption expenditure information. A sample of 71 villages of the 320 villages proposed for the implementation of the project was selected, and the selected villages were categorized based on 2001 census households into two groups, villages with less than 500 households and villages with more than 500 households. Villages with less than 500 households were merged with neighboring villages. Then, systematic random sampling was performed. The data was collected during August–November 2009 in 6 districts namely, Akola, Amravati, Buldhana, Washim, Wardha, and Yavatmal considered highly economically distressed. The study comprised of 3602 adolescents, out of which 1789 are boys and 1813 are girls aged between 13 to 19 years. For measuring under-nutrition, z-scores BMI for age (BAZ) was used to assess thinness. Criteria for assessment of under-nutrition are as follows: The adolescents between −2 to −3 standard deviation of z-score are categorized as thin, and adolescents below −3 standard deviation of z-score were severely thin.

Statistical techniques

The analysis was comprised of two stages. First, bivariate analysis was undertaken to determine the differences in prevalence of under-nutrition, by individual as well as household socio-economic characteristics. Chi-square analysis was conducted to identify statistical significance. Second, multivariate binary logistic regression model was performed to study independent effects of predictor variables. Variables found associated in binary analysis
Table 1: Prevalence of under-nutrition among adolescents by background characteristics in agrarian crises-affected area in Maharashtra, 2009

| Age (years) | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|------------|----------|-------------------|----------------------|------------|
| 13         | 26       | 34                | 60                   | 540        |
| 14         | 26       | 31                | 57                   | 564        |
| 15         | 28       | 26                | 54                   | 492        |
| 16         | 28       | 23                | 51                   | 549        |
| 17         | 28       | 16                | 44                   | 499        |
| 18         | 27       | 16                | 43                   | 596        |
| 19         | 25       | 12                | 37                   | 362        |

Chi square value=128.5, P=0.000*

| Sex | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|-----|----------|-------------------|----------------------|------------|
| Male| 28       | 32                | 60                   | 1789       |
| Female| 26      | 14                | 40                   | 1813       |

Chi square value=200.65, P=0.000*

| Religion | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|----------|----------|-------------------|----------------------|------------|
| Hindu    | 27       | 22                | 49                   | 2663       |
| Muslim   | 24       | 31                | 55                   | 412        |
| Buddhist | 30       | 22                | 52                   | 518        |
| Others   | 44       | 12                | 56                   | 9          |

Chi square value=26.15, P=0.001*

| Caste | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|-------|----------|-------------------|----------------------|------------|
| SC    | 29       | 22                | 51                   | 659        |
| ST    | 28       | 23                | 51                   | 586        |
| DNT   | 26       | 19                | 45                   | 489        |
| OBC   | 27       | 23                | 50                   | 1316       |
| Other | 26       | 30                | 56                   | 401        |

Chi square value=24.28, P=0.019*

| Type of family | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|----------------|----------|-------------------|----------------------|------------|
| Joint family   | 23       | 23                | 46                   | 375        |
| Coupleless family | 25     | 17                | 42                   | 293        |
| Nuclear family | 28       | 23                | 51                   | 2934       |

Chi square value=11.34, P=0.023*

| District | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|----------|----------|-------------------|----------------------|------------|
| Akola    | 27       | 25                | 52                   | 976        |
| Amravati | 23       | 27                | 50                   | 901        |
| Buldhana | 28       | 24                | 52                   | 120        |
| Wardha   | 28       | 18                | 46                   | 452        |
| Washim   | 30       | 15                | 45                   | 294        |
| Yavatmal | 29       | 22                | 51                   | 859        |

Chi square value=31.6, P=0.000**

| Occupation of the head of the household | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|----------------------------------------|----------|-------------------|----------------------|------------|
| No work                                | 24       | 29                | 53                   | 232        |
| Own farming                            | 28       | 21                | 49                   | 1244       |
| Agricultural laborers                  | 28       | 24                | 52                   | 1565       |
| Non agricultural laborers              | 23       | 25                | 48                   | 155        |
| Others                                 | 23       | 22                | 45                   | 406        |

Chi square value=14.6, P=0.07

| Monthly per capita expenditure quartile | Thin (%) | Severely thin (%) | Total prevalence (%) | Sample (n) |
|---------------------------------------|----------|-------------------|----------------------|------------|
| 1                                     | 28       | 25                | 53                   | 927        |
| 2                                     | 28       | 24                | 52                   | 927        |
| 3                                     | 27       | 23                | 50                   | 904        |
| 4                                     | 25       | 20                | 45                   | 844        |
| Total                                 | 27       | 23                | 50                   | 3602       |

Chi square value=14.7, P=0.02**
Results

Results of bi-variate analysis
Prevalence of thinness amongst adolescents is described in Table 1. Inverse relationship was observed between age and prevalence of under-nutrition. Interestingly, the results suggest that the prevalence of thinness among boys (60%) was more than girls (40%), and the difference is statistically significant. Shahabuddin et al., (2000) also reported that boys were affected more than the girls in Bangladesh.

As expected, the prevalence of under-nutrition was found to be lowest amongst the adolescents from highest annual per capita consumption expenditure (APCCE) quartile (45%) and highest (53%) amongst adolescents belonging to lowest APCCE quartile. Surprisingly, the analysis indicates that prevalence of under-nutrition was higher amongst adolescents belonging to ‘others’ (56%) category followed by SC and ST (51%), OBCs (50%), and 45% amongst De Notified Tribes (DNTS). The prevalence of under-nutrition was found to be higher amongst adolescents where the head of the household was not employed (53%) and lowest amongst adolescents whose occupation was included amongst ‘others’ (45%).

We also analyzed the differences by districts as level of economic development and health outcomes are expected to vary across districts. It was found that

| Table 2: Odds ratios from logistic regression analysis for differentials of nutritional status of adolescents |
| Predictors                          | B    | SE  | Sig.  | Exp (B) |
|-------------------------------------|------|-----|-------|---------|
| **Age**                             |      |     |       |         |
| 19(R)                               |      |     |       |         |
| 13                                  | 0.945| 0.148| 0.000**| 2.573   |
| 14                                  | 0.804| 0.146| 0.000**| 2.234   |
| 15                                  | 0.660| 0.150| 0.000**| 1.934   |
| 16                                  | 0.552| 0.146| 0.000**| 1.737   |
| 17                                  | 0.281| 0.149| 0.059  | 1.325   |
| 18                                  | 0.280| 0.144| 0.052  | 1.323   |
| **Sex**                             |      |     |       |         |
| Female (R)                          |      |     |       |         |
| Male                                | 0.874| 0.071| 0.000**| 2.395   |
| **Religion**                        |      |     |       |         |
| Hindu (R)                           |      |     |       |         |
| Muslim                              | –0.102| 0.181| 0.574  | 0.903   |
| Buddhist                            | 0.175| 0.190| 0.358  | 1.191   |
| **Caste**                           |      |     |       |         |
| Others (R)                          |      |     |       |         |
| SC                                  | –0.435| 0.241| 0.071  | 0.647   |
| ST                                  | –0.290| 0.198| 0.143  | 0.748   |
| DNT                                 | –0.476| 0.192| 0.013  | 0.621   |
| OBC                                 | –0.307| 0.178| 0.083  | 0.735   |
| **Type of family**                  |      |     |       |         |
| Joint family (R)                    |      |     |       |         |
| Couple less family                  | –0.335| 0.169| 0.048**| 0.715   |
| Nuclear family                      | 0.051| 0.120| 0.670  | 1.052   |
| **Annual per capita expenditure quartile** |      |     |       |         |
| Expenditure quartile 4 (R)          |      |     |       |         |
| Expenditure quartile 1              | 0.254| 0.105| 0.016**| 1.289   |
| Expenditure quartile 2              | 0.254| 0.102| 0.013**| 1.289   |
| Expenditure quartile 3              | 0.165| 0.103| 0.109  | 1.180   |
| **District**                        |      |     |       |         |
| Wardha (R)                          |      |     |       |         |
| Akola                               | 0.227| 0.127| 0.074  | 1.255   |
| Amravati                            | 0.123| 0.125| 0.325  | 1.131   |
| Buldhana                            | 0.185| 0.224| 0.409  | 1.203   |
| Washim                              | 0.183| 0.124| 0.142  | 1.200   |
| Yavatmal                            | –0.036| 0.171| 0.835  | 0.965   |
| Constant                            | –0.977| 0.252| 0.000  | 0.376   |

Note: *(R)* refers to reference category P<0.05**
prevalence of thinness was highest in Akola (52%) and Buldhana (52%) followed by Yavatmal (51%), Amravati (50%), Wardha (46%), and Washim (45%). When prevalence of under-nutrition was compared in types of families, the prevalence of under-nutrition appeared to be higher in nuclear families (51%) and lowest in couple less families (42%). Prevalence of under-nutrition was 46% in joint families.

**Results of multivariate analysis**

Table 2 presents odds ratios of multivariate logistic regression analysis for adolescents. Results from multivariate analysis show that age of adolescents had significant effects on the risk of being undernourished. Gender differentials were observed, the boys were 2.4 times more likely to be thin than their female counterparts. Interestingly, NMMB survey also found that a higher percentage of adolescent girls was consuming adequate amounts of protein and energy than adolescent males.3

The annual per capita consumption expenditure (APCCE) was chosen as an indicator for measuring the economic status of the household; the analysis suggests a negative relationship between APCCE and under-nutrition. The likelihood of being undernourished was 30% higher amongst adolescents from bottom two APCCE quartiles than adolescents from highest APCCE quartile.

Caste, religion, and region were not found to be significant predictors after controlling for other socio-economic variables. However, the effect of type of family was significant with a lower likelihood of under-nutrition amongst couple less families than in joint families.

**Discussion**

The overall prevalence of thinness and severe thinness amongst adolescents was 27% and 23%, respectively. Notably, the rate of severe thinness was significantly higher in early adolescence period. This is in consonance with the findings of previous studies.4(5)

From the statistical analysis, it emerges that there is significant evidence of socio-economic inequalities in the prevalence of under-nutrition amongst adolescent population in the study areas. Hence, clear strategies with nutrition budget are necessary to target this population with the objective of reducing the incidence and disparity in under-nutrition amongst different sections of adolescent population in the agrarian crises-affected areas of Vidhrabha.

**References**

1. Srijit M, Duggal R, Lingam L, Pitre A. On measuring group-differential displayed by socio-economic Indicators: An Extension. Appl Econ Lett 2008;15:935-8.
2. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005-06. Maharashtra. Mumbai: IIPS; 2007.
3. Shahabuddin AK, Talukdar K, Talukdar MK, Hassan M, Seal A, Rahman Q, et al. Adolescent nutrition in a rural community in Bangladesh. Indian J Pediatr 2000;67:93-8.
4. National Nutrition Monitoring Bureau. Diet and Nutritional Status of Population and Prevalence of Hypertension among Adults in Rural Areas. NNMB Technical Report No. 24. National Institute of Nutrition. Hyderabad: Indian Council of Medical Research; 2006.
5. Hesketh T, Ding QJ, Tomkins AM. Disparities in economic development in Eastern China: Impact on nutritional status of adolescents. Public Health Nutr 2002;5:313-8.