Socio-economic Patterning of Food Consumption and Dietary Diversity among Indian Children: Evidence from NFHS-4

Running head: *Social Patterning of Food consumption and Child Dietary Diversity in India*

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Extended Abstract

Background/Objectives
Patterns in food consumption and dietary diversity measure nutritional adequacy in children. We aim to describe food consumption pattern and dietary diversity among Indian children, and explore the associations in relation to household wealth status and maternal education.

Subjects/Methods
Using nationally representative, cross-sectional data from India's National Family Health Survey (NFHS-4, 2015-16), we analysed consumption of 21 food items, seven food groups and dietary diversity among 117,648 children aged 6-59 months, collected through 24-hour mother's dietary recall. Multivariable logistic regression models were used to determine the association of household wealth and maternal education with food consumption and dietary diversity after controlling for selected characteristics.

Results
Mean dietary diversity score was low—2.10(95%CI:2.08-2.13)]. One out of five children (21%;n=24,979) had adequately diversified dietary intake (ADDI). ADDI ranged from 16% in the poorest households to 26% in the richest households. ADDI among children of high school and above educated mothers was 2 times higher than that of children of non-educated mothers (16% vs 29%). The highest differential was observed in the consumption of dairy products—both by household wealth (37% vs 69%) and maternal education (41% vs 71%). The odds of consuming dairy products was 2.5 times greater (OR:2.46;95%CI:2.33,2.61;p<0.0001) among children in the richest households and 1.7 times more (OR:1.74;95%CI:1.64,1.84;p<0.0001) among children of mothers with high school education. The odds of ADDI was 1.5 times higher, both in case of richest wealth status household (OR:1.48;95%CI:1.38,1.58;p<0.0001) and among children of high school and above educated mothers (OR:1.46;95%CI:1.37,1.56;p<0.0001).

Conclusion
Maternal education rather than household wealth was strongly associated with consumption of a variety of essential food items, but both were equally important in relation to ADDI. Interventions designed to improve food consumption and dietary diversity among Indian children should take into account socioeconomic conditions to identify children who may be at greater risk of inadequate diversified dietary intake.

Key words: Food consumption; ADDI; children; socio-economic inequalities; India; NFHS-4

Introduction

Food, like air and water, is a must for survival and all people need a variety of food in order to meet dietary requirements for essential nutrients [1]. The value of a diversified diet has long been recognized. An adequately diversified diet, in terms of amount and composition, is critical for optimal growth, development, and long-term health outcomes in children [2]. Most previous research on child nutrition around the world focused on anthropometric failure rather than on dietary diversity [1,3-5]. While dietary diversity and anthropometric failure are related, given that most interventions to improve child growth focus on food quality and quantity [6-7], examining the distribution of dietary diversity and food deprivation across population groups is critical.

Over the last several decades in India, while there has been a substantial reduction in severe malnutrition and micronutrient deficiency and some improvement in the nutritional status including stunting which is 40% currently, inadequate dietary intake is still 70% among children [8]. Despite the significant progress that India has made in improving food production and sufficiency over the last 50 years [9], most rural populations and communities continue to face uncertainty in food security. In aggregate, over one-fifth of India's population still suffers from chronic hunger and India is ranked 100th among 119 countries in the 2017 Global Hunger Index (GHI) rankings [10]. Despite national health and development advances in India [11], the burden of child under nutrition and micronutrient deficiency remains high [12-13]. A number of organizations thus have advocated for dietary diversity strategies to tackle the burden of micronutrient malnutrition among children in India [14]. Apart from the existing schemes aimed at reduction in the levels of malnutrition among women and children, recently, the Government of India has set up National Nutrition Mission or *Poshan Abhiyaan* [15] for improving the nutritional status of children and pregnant women and lactating mothers. The Mission aims to prevent and reduce prevalence of stunting among children (0-6 years) in the country by 6% and undernutrition (underweight) by 6% [16].

Several studies have shown that dietary diversity is positively associated with overall diet quality, micronutrient intake and better nutritional status of young children and household food security [17-19]. Several other studies also have indicated that high socioeconomic status as measured by maternal education and employment, may be associated with healthier overall dietary patterns, dietary quality and adequate dietary diversity in low-and middle income countries [20-23]. A recent study conducted in India with large-scale data suggested that both individual and contextual socio economic factors are associated with diversified dietary intake among children [24]. Studies showed that children in wealthier households are better off and grow better for a number of reasons, but improved nutrient adequacy may be one important way in which household wealth and resources translate into better outcomes for children [21]. Wealthier households are expected to have the resources to purchase more food and thus have diverse diets compared to poor households. A higher educational level is associated with better employment opportunities and higher incomes, and may translate into higher purchasing power and better nutrition knowledge for all household members through improved dietary diversity [25].

Considering that the results of previous studies that point towards the important relationship between socioeconomic status and dietary diversity, in this study, we examined the socioeconomic correlates of food consumption and dietary diversity among children in India by using the most recently conducted nationally representative data (NFHS-4).

Methods

Data

Data for this analysis were obtained from the recently conducted National Family Health Survey 2015-16 (NFHS-4). The NFHS-4 is the fourth survey in a series which provides information on population, health and nutrition for India and each State/Union territory.

NFHS-4, for the first time, provides district-level estimates for many health and nutrition indicators. Details about NFHS-4 is provided elsewhere [26]. Briefly, the NFHS-4 is a cross-sectional, nationally representative survey in which respondents were selected through a stratified multistage random sampling procedure [8]. Four survey questionnaires (Household Questionnaire, Woman's Questionnaire, Man's Questionnaire, and Biomarker Questionnaire) were canvassed in 17 local languages using Computer Assisted Personal Interviewing (CAPI). Additional details concerning the survey's sampling methodology and procedures can be found in the NFHS-4 final report [8]. A total of 628,900 households were selected for the sample, of which 616,346 were occupied. Of the occupied households, 601,509 were successfully interviewed, with a response rate of 98%. In the interviewed households, 723,875 eligible women age 15-49y were identified for individual women's interviews. Interviews were completed with 699,686 women, with a response rate of 97%. Children in each household were identified through a household listing procedure [8].

Study Population and Sample Size

The NFHS-4 gathered data on all children born within 5 years from the survey year in each household selected to participate. Of the entire sample of 259,627 children aged 0-59 months, 22,650 (8.7%) children who were aged below 6 months were excluded to maintain consistency with the WHO/UNICEF Infant and Young Child Feeding (IYCF) guidelines, on which the primary outcome of interest is based [27]. 104,210 children were excluded for whom diet information was not available. The final analytic sample consisted of 117,648 children for whom information on diet was available (**Figure 1**). A comparison of SES characteristics of the final analytical sample vs. missing sample of children (unweighted), is presented in **Table 1**.

<Table 1 about here>

Food Consumption and Dietary Diversity

In NFHS-4, mothers were asked to provide a 24-hour recall of foods and food groups consumed by their children under the age of 5 years. A total set of 21 food items namely, Juice; Tinned Powdered/ Fresh milk; Formula milk, Fortified Baby Food; Soup/Clear broth Other Liquids; Chicken, Duck, or Other Birds; Bread, Noodles, Other Grains; Potatoes, Cassava, Tubers; Eggs; Pumpkin, Carrots, Squash; Dark Green Leafy Vegetables; Mangoes, Papayas, Vit A fruits; Any other Fruits; Liver, heart, other organ meat; Fish, Shellfish; Beans, Peas, or Lentils; Cheese, Yogurt, Other Milk Products; Other Solid/Semi-Solid Food; Any Other Meat; and Yogurt – consumed during the 24 hours preceding the survey consisted the food consumption data. Children's dietary diversity, measured as per WHO guidelines [27-28] was constructed by collating information on index child's food consumption from the above set of 21 food items. These 21 items were grouped into the following seven food groups, consistent with WHO's IYCF guidelines : 1) grains, roots and tubers; 2) legumes and nuts; 3) dairy products; 4) flesh foods; 5) eggs; 6) vitamin A rich fruits and vegetables; and 7) other fruits and vegetables. For each child, the outcome variable of interest can take any integer between zero and seven; thus, zero indicates that the child did not consume any of the 21 items while a value of seven indicates that the child was fed at least one food item from each of the seven food groups. A binary variable was constructed from the total dietary diversity score to indicate whether the child diet over the last 24 hours was considered to be adequately diverse. Children are considered to have an adequately diverse diet, if they ate food items from at least four of the seven food groups in a 24 hr time period [27-28], thus a dietary diversity score greater than or equal to four was considered to be adequately diverse, while three or less was considered to be inadequate.

Main explanatory variables

The main explanatory variables related to socioeconomic status include household wealth and maternal education. In NFHS-4, household wealth was calculated from an index of

standard household assets and indicators of housing quality through Principal Component Analysis (PCA) [8,29-30]. Each household is then assigned a weight score, and the resulting asset scores are standardized according to a normal distribution of zero and a standard deviation of one, then divided into quintiles based on rank [31]. Maternal education was specified as a categorical variable that reflects key milestones in educational achievement, and categorized as follows: no education (0 year of education), primary complete (1-5 years of education), secondary complete (6-8 years of education), high school and above (9+ years of education).

Other covariates

A range of additional covariates were also included as they may influence child dietary diversity and food consumption pattern. These variables included child's age (6-11m, 12-23m, 24-36m, 37-59m) and sex, birth order (1, 2, 3, 4+), religion (Muslim, Hindu, Christian or Other/no religion), caste/tribe (scheduled caste, scheduled tribes, other backward class, general), place of residence (rural, urban). To account for differences in dietary preferences, food subsidies, and other factors which may vary regionally, geographic regions was considered which is classified into six zones: north, northeast, central, east, west, south and union territories.

Statistical analyses

All analyses were conducted using STATA statistical software package Version 14 (College Station, Texas). Standard descriptive statistics were calculated for all variables, including means and standard deviations. Differences in categorical variables were tested using χ^2 tests. We assessed the possibility of multicollinearity between the covariates by examining a correlation matrix of covariates. All pairwise Pearson correlation coefficients were less than 0.5, suggesting that multicollinearity is not a concern. Due to the non-proportional allocation

of the sample to the different survey domains and to their urban and rural areas, we included NFHS-4 sampling weights for our analysis to ensure the actual representativeness of the survey results at the national level and as well as at the domain level [8]. Since NFHS-4 sample is a two-stage stratified cluster sample, sampling weights were calculated based on sampling probabilities separately for each sampling stage and for each cluster [8]. A series of multivariable logistic regression models were then used to estimate the odds ratios of household wealth status and mother's education on specific food consumption, consumption from food groups, and ADDI. Model 1 shows the associations between household wealth and maternal education and each outcome after adjusting for child's age and sex only, and Model 2 is additionally adjusted for child's birth order, caste, religion, urban/rural residence and geographical regions.

Ethical considerations

The protocol for the NFHS-4 survey, including the content of all the survey questionnaires, was approved by the IIPS Institutional Review Board and the ICF Institutional Review Board as well as Ministry of Health and Family welfare, Government of India [8]. The protocol was also reviewed by the U.S. Centers for Disease Control and Prevention (CDC). Verbal informed consent was sought from all the study participants before the commencement of any interview.

Results

Table 2 shows the selected characteristics of children 6–59 months of age included in our study. Half of the children belong to the age group of 12-23 months, half were girls, and 44% were first order births. Almost half the mother's had a secondary education and one-third had no education. 27% of the children belonged to the poorest wealth quintile household. A majority (78%) belonged to the Hindu religion, almost half (47%) belonged to other backward

class and 74% had a rural residence. The highest share of the children comes from the Central region (28%), followed by Eastern region (26%), Southern (17%), Northern (13%), Western (12%), North-eastern (3%) and the least share (0.2%) of the children belonged to the Union territories.

<Table 2 about here>

Regarding the distribution of consumption of 21 food items (**Table 3**), 59% of the children consumed bread, noodles, other grains, followed by tinned powdered/fresh milk (38%), dark green leafy vegetables (27%), any other fruits (22%), other liquids (20%), potatoes, casavas, tubers (20%), other solid/semi solid food (19%), pumpkin, carrots, squash (18%), juice (18%), mangoes, papayas, mangoes, papayas, Vit A fruits (17%), soup/clear broth (15%), fortified baby food (14%), and beans, peas and lentils (12%) in the previous 24hrs. With regard to the seven food groups, two-thirds of the children (63%) consumed grain, roots and tubers, half of the children (52%) consumed dairy products, one-third of the children (34%) consumed other fruits and vegetables, one-fourth of the children (27%) consumed Vitamin A rich fruits and vegetables, and one-in-ten (9.4%-13.2%) children consumed either legumes and nuts, eggs or flesh food in the last 24hrs (**Table 3**).

<Table 3 about here>

A substantial differential ($p<0.0001$) was found in the consumption of juice, fortified baby food, soup/clear broth, formula milk, fortified baby food, mangoes, papayas, Vit A fruits, any other fruits, cheese, yogurt, other milk products when examining the consumption of these items by household wealth status (**Table 4).** For example, the percentage of children from the richest households who had consumed juice (9% vs 33%), fortified baby food (6% vs 24%), and yogurt (4% vs15%) was four times greater than percentage of children from the poorest households, while the percentage of children from the richest households that had consumed formula milk (5% vs 14%), soup/clear broth (10% vs 22%), cheese, yogurt and other milk products (6% vs 13%) was twice than that in the poorest households. A similar

pattern was observed with regard to tinned powder/fresh milk (28% vs 51%), vit A fruits (14% vs 21%) and any other fruits (16% vs 28%) between children from the poorest versus richest households, respectively. Food group-wise, the highest differential by household wealth was noticed in the consumption of dairy products (37% vs 69%) followed by Vit A rich fruits and vegetables (24% vs 31%) and any other fruits and vegetables (31% vs 38%) between children from the poorest versus the richest households, respectively. Mean dietary diversity score ranged from 1.8 among poorest households to 2.4 among richest households. 16% of the children from the poorest households consumed an adequately diversified diet compared to 26% among the richest households (**Table 4**).

A substantial differential ($p<0.0001$) was also found in the consumption of several food items by maternal education (**Table 4**). For example, almost four times differential was found in the consumption of fortified baby food (7% vs 27%); three times in the consumption of juice (10% vs 32%), formula milk (5% vs 17%), and yogurt (5% vs14%), twice in soup/clear broth (10% vs 22%), any other fruits (17% vs 30%), fish and shellfish (3% vs 6%), cheese, yogurt, and other milk products (6% vs 13%) between mothers with no education and mothers having completed high school or above. Food group-wise, the largest differential by maternal education was found for the consumption of dairy products (41% vs 71%) followed by Vit A rich fruits and vegetables (23% vs 32%) and any other fruits and vegetables (29% vs 41%). Mean dietary diversity score ranged from 1.8 among children of mothers with no education to 2.5 among those whose mothers have completed high school education or above. 16% children whose mothers were not educated consumed an adequately diversified diet compared to 29% among the children whose mothers had a high school and above education (**Table 4**).

<Table 4 about here>

Table 5 gives the adjusted odds ratios (ORs with 95%CIs) of household wealth status on the consumption of 21 specific food items, seven food groups and ADDI in two separate models. After adjusting for child's age and sex (Model 1), the odds of consuming several specific food products were found to be four times or more higher in case of juice (OR:4.68;95%CI:4.44,4.93), fortified baby food (OR:4.85;95%CI:4.56,5.16), yogurt (OR:4.84;95%CI:4.49,5.22), and dairy products (OR:3.96;95%CI:3.79,4.13) when comparing children from the richest versus the poorest households; while the odds of consuming tinned powdered/fresh milk (OR:2.95;95%CI:2.83,3.07), formula milk (OR:2.75;95%CI:2.56,2.95) were almost three times higher when comparing children from the richest versus the poorest households, and 2.4 times higher for soup/clear broth (OR:2.38;95%CI:2.26,2.51), cheese, yogurt, other milk products (OR:2.41;95%CI:2.25,2.58) when comparing children from the richest households to those in the poorest households.

<Table 5 about here>

The ORs presented in **Table 5** remained significant in the fully adjusted model (Model 2). For example, compared to children from the poorest households, those from the richest households were more likely to consume fortified baby food (OR:3.61;95%CI:3.32,3.94), juice (OR:2.58;95%CI:2.40,2.77), tinned powdered/fresh milk (OR:2.05;95%CI:1.93,2.17) formula milk (OR:1.9895%CI:1.80,2.19), yogurt (OR:2.40;95%CI:2.17,2.66), cheese, yogurt other milk product (OR:1.69;95%CI:1.54,1.85), and mangoes, papayas, Vit A fruits (OR:1.69;95%CI:1.57,1.81). Among the food groups, consumption of dairy was 2.5 times higher (OR:2.46;95%CI:2.33,2.61) among children from the richest as compared to children from the poorest households. The age-sex adjusted odds (Model 1) of consuming an adequately diversified diet was 1.8 times higher (OR:1.76;95%CI:1.67,1.84) in the richest household as compared to the poorest household and this association remained robust (OR:1.48;95%CI:1.38,1.58) even after controlling for maternal education and other covariates in the fully adjusted model (Model 2).

Table 6 shows the adjusted ORs with 95%CIs for maternal education on the consumption of 21 specific food items, seven food groups and ADDI in two separate models. After adjusting for child's age and sex (Model 1), the odds of specific food consumption was found to be more than five times higher in case of formula milk (OR:5.26;95%CI:4.94,5.59), more than three times higher for juice (OR:3.81;95%CI:3.61,4.02), tinned powdered/fresh milk (OR:3.36;95%CI:3.13,3.61), dairy products (OR:3.43;95%CI:3.28,3.60); more than two times higher for fortified baby food (OR:2.46;95%CI:2.32,2.60) and yogurt (OR:2.70;95%CI:2.51,2.91), and more than 50% higher for all other food items except other liquids, any other fruits, other solid/semi solid foods, and any other meat among children whose mothers had at least a high school level of education as compared to children whose mothers had no education. The association remained significant after controlling for household wealth and other covariates in the final adjusted model (Model 2). For example, the odds of consuming juice (OR:1.72;95%CI:1.61,1.84), formula milk (OR:1.88;95%CI:1.72,2.06), and fortified baby food (OR:2.32;95%CI:2.15,2.50) were more than 1.5 times higher; tinned powdered/fresh milk (OR:1.49;95%CI:1.41,1.57), soup/clear broth (OR:1.45;95%CI:1.35,1.55), other liquids (OR:1.39;95%CI:1.30,1.48), potatoes, cassava, tubers (OR:1.28;95%CI:1.20,1.37), pumpkin, carrots, squash (OR:1.34;95%CI:1.25,1.43), any other fruits (OR:1.38;95%CI:1.30,1,47), beans, peas, lentils (OR:1.46;95%CI:1.35,1.58), and cheese, yogurt, other milk products (OR:1.42;95%CI:1.30,1.54) were more than one time higher among children whose mother had a high school and above education as compared to the children whose mothers were not educated. Consumption of all the seven food groups were statistically significantly higher (OR ranges from 1.16 in case of grains, roots and tubers, and flesh foods to 1.74 in case of dairy products) among children whose mothers were high school and above educated as compared to the children of not educated mothers. The age-sex adjusted odds of consuming an adequately diversified diet was almost two times higher (OR:1.98;95%CI:1.88,2.09) among children whose mother had at least a high school

education. This remained statistically significant (OR:1.46;95%CI:1.37,1.56) even after controlling for the eight additional covariates in the final model (Model 2).

<Table 6 about here>

References

1. Ruel MT, Arimond M. Dietary diversity and growth: an analysis of recent demographic and health surveys. In: Food Based Approaches for a Healthy Nutrition in West Africa (Brower ED, Traore AS, Treche S, eds.). 2004. University Press, Ouagadougou.

2. Charmarbagwala R, Ranger M, Waddington H, White H. The determinants of child health and nutrition: a meta-analysis. Washington, DC: World Bank. 2004.

3. Khan REA, Raza MA. Nutritional Status of Children in Bangladesh: Measuring Composite Index of Anthropometric Failure (CIAF) and its Determinants. Published in: Pakistan Journal of Commerce and Social Sciences. 2014; 8(1):11-23.

4. McDonald CM, McLean J, Kroeun H, Talukder A, Lynd LD, Green TJ. Household food insecurity and dietary diversity as correlates of maternal and child under nutrition in rural Cambodia. European Journal of Clinical Nutrition. 2015; 69: 242–246.

5. DJ Corsi, I Mejía-Guevara, SV Subramanian. Improving household-level nutrition-specific and nutrition-sensitive conditions key to reducing child undernutrition in India. Social science & Medicine. 2016;157:189

6. Kim R, Mejía-Guevara I, Corsi DJ, Aguayo VM, Subramanian SV. Relative importance of 13 correlates of child stunting in South Asia: Insights from nationally representative data from Afghanistan, Bangladesh, India, Nepal, and Pakistan. Social Science & Medicine 2017; 187:144-154.

7. Emdadul Hauqe S, Sakisaka K, Rahman M. Examining the relationship between socioeconomic status and the double burden of maternal over and child under-nutrition in Bangladesh. European Journal of Clinical Nutrition. 2018; e-pub ahead of print 25 April 2018; doi: 10.1038/s41430-018-0162-6

8. International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey (NFHS-4), 2015-16. 2017. India. Mumbai: IIPS.

9. Pingali P. In Handbook of Agricultural Economics, eds Pingali P, Evenson R (Elsevier, Amsterdam), pp 3867–3894. 2010

10. Grebmer VK, Bernstein J, Hossain N, Brown T, Prasai N, Yohannes Y, et al. Global Hunger Index: The inequalities of hunger: Synopsis, 2017. Washington, D.C.; Bonn; and Dublin: International Food Policy Research Institute, Welthungerhilfe, and Concern Worldwide. Available from: https://doi.org/10.2499/9780896292758

11. Balarajan Y, Selvaraj S, Subramanian SV. Health care and equity in India. Lancet. 2011; 377(9764): 505-15.

12. Kehoe SH, Krishnaveni GV, Veena SR, Guntupalli AM, Margetts BM, Fall CH, et al. Diet patterns are associated with demographic factors and nutritional status in South Indian children. Maternal & child nutrition. 2014; 10(1):145-58.

13. Aurino E. Do boys eat better than girls in India? Longitudinal evidence on dietary diversity and food consumption disparities among children and adolescents. Economics & Human Biology. 2016. e-pub ahead of print 27 October 2016. doi: 10.1038/s41430-018-0162-6

14. Ministry of Health and Population (MOHP), New ERA, ICF International Nepal demographic and health survey 2011, ministry of health and population, Kathmandu, Nepal. Calverton (MD): New ERA, and ICF International; 2012.

15. National Nutrition Mission: Available at https://www.icds-wcd.nic.in/nnm/home.htm

16. Press Information Bureau, Government of India, Ministry of Women and Child Development. National Nutrition Mission to improve the nutritional indicators of women and children. Available at http://pib.nic.in/newsite/PrintRelease.aspx?relid=176441

17. Sawadogo PS, Martin-Prevel Y, Savy M, Kameli Y, Traissac P, Traore AS et al. An infant and child feeding index is associated withthe nutritional status of 6- to 23-month-old children in rural Burkina Faso. J Nutr. 2006; 136: 656–663

18. Steyn N, Nel J, Nantel G, Kennedy G, Labadarios D. Food variety and dietary diversity scores in children: are they good indicators of dietary adequacy? Public health nutrition. 2006; 9(05):644-50.

19. Kennedy GL, Pedro MR, Seghieri C, Nantel G, Brouwer I. Dietary diversity score is a useful indicator of micronutrient intake in non-breast-feeding Filipino children. J Nutr. 2007;137: 472–477.

20. 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. The Journal of Nutrition. 2013;143(7):1176-83.

21. Codjoe SNA, Okutu D, Abu M. Urban Household Characteristics and Dietary Diversity

An Analysis of Food Security in Accra, Ghana. Food and Nutrition Bulletin. 2016; 37(2):202-18.

22. Mayén A-L, Marques-Vidal P, Paccaud 407 F, Bovet P, Stringhini S. Socioeconomic determinants of dietary patterns in low-and middle-income countries: a systematic review. The American Journal of Clinical Nutrition. 2014; 100(6):1520-31.

23. Harris-Fry H, Azad K, Kuddus A, Shaha S, Nahar B, Hossen M, et al. Socio-economic determinants of household food security and women's dietary diversity in rural Bangladesh: a cross-sectional study. Journal of Health, Population and Nutrition. 2015; 33(1):1.

24. Gausman J, Perkins JM, Lee H-Y, Mejia-Guevara I, Nam Y-S, Lee J-K, Oh J, Subramanian SV. Ecological and social patterns of child dietary diversity in India: a population-based study Nutrition. 2018; 53: 77-84.

25. Codjoe SNA, Okutu D, Abu M. Urban Household Characteristics and Dietary Diversity An Analysis of Food Security in Accra, Ghana. Food and Nutrition Bulletin. 2016; 37(2):202-18.

26. The Demographic and Health Surveys. Available at www.dhsprogram.com

27. WHO, UNICEF, USAID, FANTA, AED, UC DAVIS, et al. Indicators for assessing infant and young child feeding practices, Part 2: measurement. Geneva: The World Health Organization; 2010.

28. World Health Organization. Indicators for assessing infant and young child feeding practices part 1 definitions. Washington (DC): World Health Organization, Dept. of Child and Adolescent Health and Development; 2007.

29. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data—or tears: an application to educational enrollments in states of India. Demography. 2001; 38(1):115-32.

30. Howe LD, Hargreaves JR, Huttly SRA. Issues in the construction of wealth indices for the measurement of socio-economic position in low-income countries. Emerg Themes Epidemiol. 2008; 5:3.

31. Gwatkin D, Rutstein S, Johnson K, Pande R, Wagstaff A. Socio-economic differences in health, nutrition and poverty. Washington, DC: World Bank: HNP/Poverty Thematic Group, World Bank. 2000.

Figure 1: Data flow chart - sample size and selection.

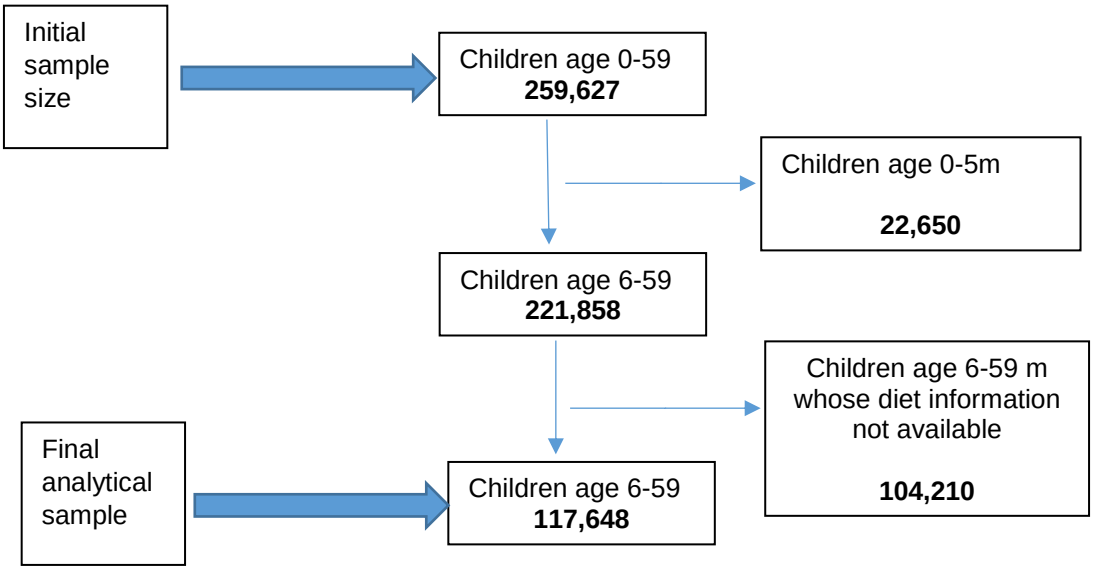

Table 1 Comparison of SES characteristics of analytical vs. missing sample of children (unweighted), NFHS-4, 2015-16

Selected characteristics	Missing sample n=104,210	Analytical sample n=117,648	Total sample children age 6-59m n= 221,858
Sex of the child			
Male	55.1	49.3	52.0
Female	44.9	50.7	48.0
Mother's education[1]			
No education	30.4	31.9	31.2
Primary complete	14.2	14.9	14.6
Secondary complete	45.4	44.5	45.0
High school and above	9.9	8.7	9.3
Household wealth status[2]			
Poorest	23.8	28.0	26.1
Poorer	22.6	24.2	23.5
Middle	20.0	20.0	20.0
Richer	17.9	15.8	16.8
Richest	15.6	12.0	13.7
Religion[3]			
Hinduism	72.6	71.8	72.2
Muslim	15.1	16.3	15.7
Christian	7.9	8.4	8.2
Others/No religion	4.4	3.5	3.9
Caste/tribe[4]			
Scheduled caste	18.9	20.4	19.7
Scheduled Tribe	20.3	21.4	20.9
Other back ward class	40.9	41.3	41.1
General	19.9	17.0	18.3
Place of residence			
Urban	26.3	22.1	24.1
Rural	73.7	77.9	75.9
Total	100.0	100.0	100.0

1Education: No education (0 years of education), primary complete: (1–5 years of education), secondary complete (6–8 years of education), high school and above (9+ years of education); 2 Households are given scores based on the number and kinds of consumer goods they own, ranging from a television to a bicycle or car, and housing characteristics such as source of drinking water, toilet facilities, and flooring materials. These scores are derived using principal component analysis. National wealth quintiles are compiled by assigning the household score to each usual (de jure) household member, ranking each person in the household population by their score, and then dividing the distribution into five equal categories, each with 20% of the population; 3 Others include Sikh, Buddhist, Jain, Jewish, Zoroastrian; 4 Scheduled castes and scheduled tribes are identified by the Government of India as socially and economically backward and needing protection from social injustice and exploitation. Other backward class is a diverse collection of intermediate castes that were considered low in the traditional caste hierarchy but are clearly above scheduled castes. General are thus a default residual group that enjoys higher status in the caste hierarchy.

Table 2 Selected characteristics of children 6–59 months in NFHS-4

Selected characteristics	Number	Percentage
Age of child (months)		
6-11	25,462	21.6
12-23	49,291	41.9
24-36	11,620	9.9
37-59	31,274	26.6
Sex of the child		
Male	58,068	49.4
Female	59,580	50.6
Birth order		
1	51,726	44.0
2	35,474	30.2
3	16,145	13.7
4+	14,302	12.2
Mother's education		
No education	36,482	31.0
Primary complete	16,884	14.4
Secondary complete	52,936	45.0
High school and above	11,346	9.6
Household wealth status		
Poorest	31,797	27.0
Poorer	26,666	22.7
Middle	23,640	20.1
Richer	20,343	17.3
Richest	15,202	12.9
Religion		
Hinduism	92,080	78.3
Muslim	20,174	17.2
Christian	2,395	2.0
Others/No religion	3,000	2.6
Caste/tribe		
Scheduled caste	25,999	23.1
Scheduled Tribe	12,762	11.3
Other back ward class	52,561	46.6
General	21,462	19.0
Place of residence		
Urban	31,011	26.4
Rural	86,637	73.6
Geographic Regions[1]		
Northern	15,311	13.0
Central	32,814	27.9
Eastern	30,656	26.1
North eastern	3,681	3.1
Western	14,558	12.4
Southern	20,414	17.4
Union Territories	215	0.2
Total*	117,648	100.0

*Includes only those children whose diet information was available

[1]Regions: North: Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttaranchal; Northeast: Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura; Central: Chhattisgarh, Madhya Pradesh, Uttar Pradesh; East: Bihar, Jharkhand, West Bengal, Orissa; West: Maharashtra, Goa, Gujarat; South: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu; Union Territories: Andaman and Nicobar Island, Daman and Diu, Dadra Nagar Haveli, Puduchhery, Chandigarh, Delhi

Table 3 Consumption of specific food items, food groups and diversified dietary intake in last 24 hours among children aged 6-59 months, NFHS-4, India, 2015-16

Consumption of specific food items by the child in the last 24 hours	Number	Percentage
Juice	20,873	17.8
Tinned Powdered/ Fresh milk	44,284	37.7
Formula milk	11,063	9.4
Fortified Baby Food	15,998	13.6
Soup/Clear broth	17,950	15.3
Other Liquids	23,528	20.0
Chicken, Duck, or Other Birds	5,469	4.7
Bread, Noodles, Other Grains	69,262	58.9
Potatoes, Cassava, Tubers	23,408	19.9
Eggs	15,507	13.2
Pumpkin, Carrots, Squash	21,491	18.3
Dark Green Leafy Vegetables	31,442	26.7
Mangoes, Papayas, Vit A fruits	20,155	17.1
Any other Fruits	26,044	22.2
Liver, heart, other organ meat	5,084	4.9
Fish, Shellfish	5,260	4.5
Beans, Peas, or Lentils	14,473	12.3
Cheese, Yogurt, Other Milk Products	10,399	8.8
Other Solid/Semi-Solid Food	22,791	19.4
Any Other Meat	4,433	3.8
Yogurt	10,527	9.0
Consumption from specific food groups		
Grains, Roots and Tubers	74,246	63.1
Legumes and Nuts	14,473	12.3
Dairy products	60,577	51.6
Flesh Foods	11,059	9.4
Eggs	15,507	13.2
Vit A rich fruits and vegetables	31,138	26.5
Other fruits and vegetables	40,137	34.1
Diversified Dietary Intake Score (mean, SD)	117,348	2.10 (1.83)
Diversified Dietary Intake		
Inadequate	92,369	78.7
Adequate	24979	21.3
Total*	117,648	100.0

*Includes only those children whose diet information was available

Table 4 Consumption of specific food items, food groups and diversified dietary intake in last 24 hours among children aged 6-59 months by household wealth status and mother's education, NFHS-4, India, 2015-16

Consumption of specific food items	Household Wealth Status					Mother's Education			
	Poorest %[95%CI]	Poorer %[95%CI]	Middle %[95%CI]	Richer %[95%CI]	Richest %[95%CI]	No education %[95%CI]	Primary %[95%CI]	Secondary %[95%CI]	Higher %[95%CI]
Juice	9.0[8.7-9.3]	12.6[12.2-13.0]	19.0[18.5-19.5]	25.6[25.0-26.2]	32.6[31.8-33.3]	10.4[10.0-10.7]	13.7[13.2-14.2]	21.2[20.8-21.5]	31.6[30.7-32.4]
Tinned Powdered/ Fresh milk	28.2[27.7-28.7]	34.8[34.2-35.3]	38.9[38.3-39.5]	45.0[44.2-45.7]	50.8[50.0-51.7]	31.9[31.4-32.3]	34.9[34.2-35.6]	39.7[39.3-40.1]	51.0[50.0-51.9]
Formula milk	5.2[4.9-5.4]	7.3[7.0-7.6]	10.8[10.4-11.2]	13.7[13.2-14.2]	14.0[13.4-14.6]	5.2[5.0-5.4]	7.0[6.6-7.3]	11.5[11.3-11.8]	16.6[15.9-17.3]
Fortified Baby Food	5.5[5.2-5.7]	10.4[10.0-10.7]	15.9[15.4-16.3]	20.2[19.6-20.8]	23.9[23.2-24.6]	6.5[6.2-6.7]	9.5[9.0-9.9]	17.0[16.7-17.3]	26.8[25.9-27.7]
Soup/Clear broth	10.0[9.7-10.3]	12.2[11.8-12.5]	17.3[16.8-17.7]	20.5[20.0-21.1]	21.6[20.9-22.2]	10.4[10.0-10.7]	12.6[12.1-13.1]	18.0[17.7-18.3]	22.3[21.5-23.1]
Other Liquids	17.1[16.6-17.5]	18.3[17.8-18.7]	21.0[20.5-21.5]	23.0[22.4-23.6]	23.7[23.0-24.4]	16.1[15.8-16.5]	19.0[18.4-19.6]	22.1[21.7-22.4]	24.4[23.6-25.3]
Chicken, Duck, or Other Birds	4.6[4.4-4.9]	4.6[4.4-4.9]	4.7[4.4-4.9]	4.8[4.5-5.1]	4.4[4.0-4.7]	4.1[3.9-4.3]	4.7[4.4-5.0]	5.1[4.9-5.4]	4.5[4.1-4.9]
Bread, Noodles, Other Grains	57.5[56.9-58.0]	58.5[57.9-59.0]	58.9[58.2-59.5]	60.0[59.0-60.7]	61.1[60.3-61.9]	56.4[55.9-56.9]	59.8[59.2-60.1]	59.7[59.3-60.1]	61.6[60.7-62.6]
Potatoes, Cassava, Tubers	20.1[19.7-20.6]	19.7[19.2-20.1]	19.2[18.7-19.7]	20.4[19.9-21.0]	20.2[19.6-20.9]	18.2[17.8-18.6]	19.1[18.6-19.7]	20.9[20.6-21.3]	21.8[21.0-22.6]
Eggs	10.1[9.8-10.4]	12.7[12.3-13.1]	14.5[14.0-14.9]	16.7[16.2-17.2]	13.7[13.2-14.3]	9.4[9.1-9.7]	12.9[12.4-13.4]	15.3[15.0-15.7]	15.8[15.1-16.5]
Pumpkin, Carrots, Squash	16.9[16.5-17.3]	17.9[17.4-18.3]	17.5[17.1-18.0]	19.9[19.3-20.5]	20.8[20.1-21.4]	15.6[15.2-15.9]	17.5[16.9-18.0]	19.7[19.3-20.0]	21.7[20.9-22.5]
Dark Green Leafy Vegetables	27.0[26.5-27.5]	26.9[26.3-27.4]	26.0[25.4-26.7]	27.4[26.8-28.1]	26.2[25.5-26.9]	24.0[23.5-24.4]	26.2[25.6-26.9]	28.4[28.0-28.8]	28.7[27.8-29.5]
Mangoes, Papayas, Vit A fruits	13.5[13.2-13.9]	15.6[15.1-16.0]	17.5[17.0-17.9]	21.4[20.8-22.0]	21.2[20.6-21.9]	13.6[13.3-13.9]	15.0[14.4-15.5]	19.2[18.8-19.5]	22.3[21.5-23.1]
Any other Fruits	16.4[16.0-16.8]	20.5[20.0-20.9]	23.6[23.0-24.1]	27.7[27.0-28.3]	27.6[26.9-28.3]	16.7[16.3-17.0]	19.2[18.6-19.8]	25.2[24.8-25.5]	29.9[29.0-30.8]
Liver, heart, other organ meat	4.5[4.3-4.7]	4.5[4.3-4.8]	5.3[50-5.5]	5.8[5.4-6.1]	5.0[4.6-5.3]	4.2[4.0-4.4]	4.5[4.2-4.8]	5.6[5.4-5.8]	4.7[4.3-5.1]
Fish, Shellfish	3.3[3.1-3.5]	4.4[4.2-4.7]	4.6[4.3-4.8]	5.8[5.4-6.1]	5.2[4.8-5.5]	2.8[2.7-3.0]	3.9[3.6-4.2]	5.4[5.2-5.6]	6.2[5.7-6.6]
Beans, Peas, or Lentils	10.5[10.2-10.8]	12.0[11.6-12.4]	12.4[13.5-14.5]	14.0[13.8-14.9]	14.3[13.8-14.9]	9.6[9.3-9.9]	10.9[10.4-11.4]	13.7[13.4-14.0]	16.6[15.9-17.3]
Cheese, Yogurt, Other Milk Products	6.0[5.7-6.2]	7.8[7.5-8.1]	8.9[8.5-9.3]	11.8[11.3-12.2]	12.7[12.2-13.3]	6.2[5.9-6.4]	7.4[6.9-7.7]	10.3[10.0-10.5]	13.1[12.4-13.7]
Other Solid/Semi-Solid Food	15.6[15.2-16.0]	18.8[18.4-19.3]	21.0[20.5-21.6]	22.5[21.9-23.1]	21.5[20.9-22.2]	14.8[14.4-15.1]	19.1[18.5-19.6]	22.0[21.6-22.3]	22.8[22.0-23.6]
Any Other Meat	3.2[3.0-3.4]	3.5[3.3-3.7]	4.2[3.9-4.4]	4.5[4.2-4.8]	3.8[3.5-4.1]	3.2[3.0-3.3]	4.1[3.9-4.4]	4.3[4.1-4.4]	3.0[2.7-3.4]
Yogurt	3.9[3.6-4.1]	6.4[6.1-6.6]	10.7[10.3-11.1]	13.6[13.1-14.0]	15.3[14.7-15.8]	5.4[5.2-5.7]	8.1[7.7-8.5]	10.5[10.2-10.7]	14.3[13.6-15.0]
Consumption from specific food groups									
Grains, Roots and Tubers	60.4[59.9-61.0]	62.7[62.1-63.2]	64.0[63.3-64.6]	65.1[64.4-65.8]	65.6[64.9-66.4]	59.6[59.1-60.0]	63.6[62.8-64.3]	64.8[64.4-65.2]	66.3[65.3-67.2]
Legumes and Nuts	10.5[10.2-10.8]	12.0[11.6-12.3]	12.4[11.9-12.8]	14.0[13.4-14.5]	14.3[13.8-14.9]	9.6[9.3-9.9]	10.9[10.4-11.4]	13.7[13.4-14.0]	16.6[15.9-17.3]
Dairy products	37.1[36.5-37.6]	47.1[46.5-47.7]	55.3[54.7-55.9]	62.9[62.2-63.6]	68.9[68.1-69.7]	41.2[40.7-41.7]	47.3[46.6-48.0]	56.0[55.5-56.4]	70.9[70.0-71.7]
Flesh Foods	8.2[7.9-8.5]	9.2[8.8-9.5]	9.7[9.3-10.1]	10.9[10.4-11.3]	9.8[9.3-10.3]	7.5[7.2-7.7]	9.0[8.6-9.4]	10.6[10.4-10.9]	10.5[9.9-11.1]
Eggs	10.1[9.8-10.4]	12.7[12.3-13.1]	14.5[14.0-14.9]	16.7[16.1-17.2]	13.7[13.2-14.3]	9.4[9.1-9.7]	12.9[12.4-13.4]	15.3[15.0-15.7]	15.8[15.1-16.5]
Vit A rich fruits and vegetables	23.5[23.0-24.0]	24.9[24.0-25.4]	26.0[25.4-26.6]	30.3[29.6-30.9]	31.1[30.3-31.9]	22.7[22.3-23.1]	24.9[24.3-25.6]	28.3[27.9-28.7]	32.4[31.5-33.3]
Other fruits and vegetables	31.4[30.9-31.9]	33.0[32.4-33.5]	34.3[33.7-34.9]	37.1[36.4-37.8]	37.6[36.8-38.4]	29.5[29.1-30.0]	32.3[31.6-33.0]	36.5[36.1-36.9]	40.6[39.6-41.5]
Mean Dietary Diversity Score	1.81[1.79-1.83]	2.01[1.99-2.04]	2.16[2.14-2.18]	2.37[2.34-2.39]	2.41[2.37-2.44]	1.79[1.78-1.81]	2.01[1.98-2.03]	2.25[2.23-2.28]	2.53[2.49-2.56]
Adequately Diversified Dietary Intake	16.2[15.8-16.6]	19.7[19.2-20.2]	22.0[21.4-22.5]	26.8[26.2-27.4]	26.3[25.5-27.0]	15.8[15.4-16.1]	19.0[18.4-19.5]	24.2[23.8-24.6]	29.0[28.1-29.9]
Number of children	31,797	26,666	23,640	20,343	15,202	36,482	16,884	52,936	11,346

Table 5 Adjusted odds ratios (ORs with (95%CIs) of household wealth on consumption of specific food items, food groups and dietary diversity among children aged 6-59 months, India, NFHS-4 2015-16

Consumption of specific food items	Model 1*				Model 2**			
	Poorer OR[95%CI]	Middle OR[95%CI]	Richer OR[95%CI]	Richest OR[95%CI]	Poorer OR[95%CI]	Middle OR[95%CI]	Richer OR[95%CI]	Richest OR[95%CI]
Juice	1.55[1.47,1.63]	2.45[2.33,2.58]	3.25[3.09,3.42]	4.68[4.44,4.93]	1.19[1.13,1.26]	1.61[1.52,1.70]	1.91[1.80,2.04]	2.58[2.40,2.77]
Tinned Powdered/ Fresh milk	1.39[1.34,1.44]	1.76[1.70,1.83]	2.15[2.07,2.23]	2.95[2.83,3.07]	1.34[1.29,1.39]	1.60[1.53-1.67]	1.81[1.72,1.90]	2.05[1.93,2.17]
Formula milk	1.38[1.29,1.48]	2.08[1.95,2.22]	2.63[2.47,2.81]	2.75[2.56,2.95]	1.22[1.13,1.39]	1.60[1.48,1.72]	1.89[1.73,2.05]	1.98[1.80,2.19]
Fortified Baby Food	1.85[1.74,1.97]	3.01[2.83,3.19]	3.97[3.74,4.22]	4.85[4.56,5.16]	1.62[1.52,1.74]	2.36[2.20,2.54]	2.95[2.74,3.18]	3.61[3.32,3.94]
Soup/Clear broth	1.32[1.26,1.39]	1.90[1.81,1.99]	2.19[2.09,2.31]	2.38[2.26,2.51]	1.02[0.97,1.08]	1.27[1.20,1.34]	1.36[1.28,1.45]	1.43[1.33,1.54]
Other Liquids	1.07[1.03,1.12]	1.23[1.18,1.29]	1.30[1.24,1.36]	1.37[1.31,1.44]	0.97[0.93,1.02]	1.07[1.02,1.16]	1.09[1.03,1.16]	1.11[1.04,1.19]
Chicken, Duck, or Other Birds	1.24[1.16,1.33]	1.24[1.15,1.33]	1.14[1.06,1.23]	0.83[0.76,0.92]	0.96[0.89,1.03]	0.93[0.85,1.01]	0.88[0.80,0.98]	0.79[0.69,0.89]
Bread, Noodles, Other Grains	1.01[0.98,1.05]	1.03[1.00,1.07]	1.04[1.00,1.08]	1.04[0.99,1.08]	1.02[0.99,1.06]	1.06[1.02,1.10]	1.09[1.04,1.14]	1.08[1.02,1.14]
Potatoes, Cassava, Tubers	0.97[0.93,1.00]	0.97[0.93,1.01]	0.94[0.90,0.98]	0.90[0.86,0.95]	0.97[0.93,1.01]	0.98[0.94,1.03]	0.98[0.93,1.04]	0.99[0.92,1.06]
Eggs	1.38[1.31,1.45]	1.61[1.53,1.69]	1.67[1.59,1.76]	1.26[1.18,1.34]	1.04[0.98,1.10]	1.09[1.03,1.17]	1.12[1.04,1.21]	0.97[0.88,1.06]
Pumpkin, Carrots, Squash	1.06[1.01,1.10]	1.11[1.06,1.15]	1.14[1.09,1.19]	1.15[1.09,1.21]	1.01[0.97,1.06]	1.04[0.99,1.10]	1.07[1.01,1.13]	1.10[1.02,1.18]
Dark Green Leafy Vegetables	1.00[0.96,1.03]	1.00[0.96,1.04]	0.97[0.93,1.01]	0.89[0.85,0.93]	0.95[0.92,0.99]	0.96[0.92,1.00]	0.96[0.91,1.01]	0.92[0.87,0.98]
Mangoes, Papayas, Vit A fruits	1.18[1.13,1.23]	1.40[1.34,1.47]	1.59[1.51,1.67]	1.65[1.57,1.74]	1.16[1.10,1.21]	1.35[1.28,1.43]	1.53[1.43,1.62]	1.69[1.57,1.81]
Any other Fruits	1.30[1.25,1.35]	1.58[1.52,1.65]	1.74[1.67,1.82]	1.85[1.77,1.94]	1.11[1.06,1.16]	1.22[1.16,1.28]	1.30[1.23,1.37]	1.38[1.29,1.47]
Liver, heart, other organ meat	1.18[1.10,1.27]	1.29[1.20,1.38]	1.21[1.12,1.30]	0.92[0.84,1.01]	0.98[0.91,1.06]	1.03[0.94,1.12]	0.97[0.88,1.08]	0.91[0.80,1.03]
Fish, Shellfish	1.50[1.39,1.63]	1.73[1.60,1.88]	1.83[1.68,1.98]	1.34[1.22,1.48]	1.03[0.94,1.13]	1.07[0.97,1.18]	1.12[1.00,1.25]	1.02[0.89,1.17]
Beans, Peas, or Lentils	1.19[1.14,1.25]	1.23[1.17,1.29]	1.28[1.21,1.35]	1.23[1.16,1.31]	1.00[0.94,1.05]	0.99[0.93,1.05]	1.05[0.98,1.12]	1.04[0.96,1.13]
Cheese, Yogurt, Other Milk Products	1.44[1.35,1.53]	1.80[1.69,1.92]	2.22[2.08,2.36]	2.41[2.25,2.58]	1.19[1.11,1.27]	1.33[1.23,1.43]	1.57[1.45,1.70]	1.69[1.54,1.85]
Other Solid/Semi-Solid Food	1.29[1.23,1.34]	1.43[1.37,1.49]	1.35[1.29,1.42]	1.23[1.17,1.29]	1.06[1.01,1.11]	1.10[1.05,1.16]	1.07[1.01,1.14]	1.08[1.01,1.16]
Any Other Meat	1.37[1.27,1.48]	1.37[1.27,1.49]	1.28[1.18,1.40]	0.89[0.81,0.99]	1.01[0.92,1.10]	0.98[0.89,1.08]	0.95[0.85,1.06]	0.80[0.70,0.93]
Yogurt	1.64[1.52,1.77]	2.67[2.48,2.87]	3.45[3.21,3.72]	4.84[4.49,5.22]	1.18[1.08,1.28]	1.53[1.40,1.67]	1.80[1.64,1.97]	2.40[2.17,2.66]
Consumption from food groups								
Grains, roots and Tubers	1.07[1.03,1.11]	1.12[1.08,1.16]	1.13[1.08,1.17]	1.08[1.03,1.13]	1.03[1.00,1.07]	1.08[1.04,1.13]	1.12[1.06,1.17]	1.10[1.04,1.17]
Legumes and Nuts	1.19[1.14,1.25]	1.23[1.17,1.29]	1.28[1.21,1.35]	1.23[1.16,1.31]	1.00[0.94,1.05]	0.99[0.93,1.05]	1.05[0.98,1.12]	1.04[0.96,1.13]
Dairy products	1.52[1.47,1.57]	2.17[2.10,2.25]	2.91[2.80,3.02]	3.96[3.79,4.13]	1.36[1.31,1.41]	1.74[1.67,1.81]	2.12[2.02,2.22]	2.46[2.33,2.61]
Flesh Foods	1.32[1.25,1.39]	1.40[1.32,1.48]	1.38[1.30,1.46]	1.02[0.96,1.10]	1.01[0.95,1.08]	1.03[0.96,1.10]	1.03[0.95,1.11]	0.91[0.82,1.00]
Eggs	1.38[1.29,1.46]	1.61[1.53,1.69]	1.67[1.59,1.76]	1.26[1.18,1.34]	1.04[0.98,1.10]	1.09[1.03,1.17]	1.12[1.04,1.21]	0.97[0.88,1.06]
Vit A rich fruits and vegetables	1.08[1.04,1.12]	1.19[1.15,1.24]	1.31[1.26,1.37]	1.37[1.31,1.43]	1.06[1.02,1.10]	1.17[1.12,1.22]	1.29[1.23,1.36]	1.40[1.31,1.49]
Other fruits and vegetables	1.08[1.05,1.12]	1.18[1.14,1.22]	1.21[1.16,1.26]	1.24[1.19,1.29]	1.00[0.97,1.04]	1.06[1.02,1.11]	1.10[1.04,1.15]	1.14[1.07,1.21]
Adequately Diversified Dietary Intake	1.33[1.28,1.39]	1.56[1.49,1.63]	1.78[1.70,1.86]	1.76[1.67,1.84]	1.15[1.10,1.20]	1.25[1.19,1.32]	1.42[1.34,1.51]	1.48[1.38,1.58]

Note: In all Models, poorest is taken as a reference category; *Model 1 adjusted for child's age and sex only; **Model 2 adjusted for child age, sex, birth order, mother education, caste, religion, urban/rural residence and geographical regions.

Table 6 Adjusted odds ratios (ORs with 95%CIs) of mother's education on consumption of specific food items, food groups and dietary diversity among children aged 6-59 months, India, NFHS-4 2015-16

Consumption of specific food items	Model 1*			Model 2**		
	Primary complete	Secondary complete	High school and above	Primary complete	Secondary complete	High school and above
Juice	1.34[1.28,1.42]	2.20[2.12,2.30]	3.81[3.61,4.02]	1.09[1.03,1.16]	1.36[1.30,1.43]	1.72[1.61,1.84]
Tinned Powdered/ Fresh milk	1.34[1.24,1.44]	2.18[2.06,2.30]	3.36[3.13,3.61]	1.04[1.00,1.08]	1.13[1.10,1.17]	1.49[1.41,1.57]
Formula milk	1.63[1.53,1.75]	2.97[2.83,3.12]	5.26[4.94,5.59]	1.21[1.12,1.31]	1.50[1.41,1.60]	1.88[1.72,2.06]
Fortified Baby Food	1.35[1.28,1.43]	1.84[1.77,1.92]	2.46[2.32,2.60]	1.32[1.23,1.42]	1.73[1.64,1.84]	2.32[2.15,2.50]
Soup/Clear broth	1.23[1.17,1.28]	1.38[1.33,1.43]	1.59[1.51,1.68]	1.13[1.07,1.19]	1.28[1.22,1.34]	1.45[1.35,1.55]
Other Liquids	1.16[1.07,1.25]	1.36[1.28,1.43]	1.01[0.92,1.12]	1.16[1.11,1.22]	1.23[1.18,1.28]	1.39[1.30,1.48]
Chicken, Duck, or Other Birds	1.11[1.07,1.15]	1.12[1.09,1.16]	1.15[1.10,1.21]	0.99[0.91,1.08]	1.18[1.10,1.27]	1.11[0.98,1.26]
Bread, Noodles, Other Grains	1.10[1.04,1.14]	1.19[1.15,1.23]	1.20[1.14,1.27]	1.12[1.07,1.16]	1.13[1.09,1.17]	1.17[1.11,1.24]
Potatoes, Cassava, Tubers	1.32[1.25,1.40]	1.63[1.56,1.70]	1.54[1.44,1.64]	1.10[1.05,1.15]	1.20[1.15,1.25]	1.28[1.20,1.37]
Eggs	1.16[1.10,1.21]	1.31[1.27,1.36]	1.43[1.36,1.52]	1.11[1.05,1.19]	1.23[1.16,1.29]	1.29[1.18,1.40]
Pumpkin, Carrots, Squash	1.12[1.07,1.17]	1.25[1.22,1.29]	1.17[1.10,1.23]	1.11[1.06,1.17]	1.22[1.17,1.28]	1.34[1.25,1.43]
Dark Green Leafy Vegetables	1.18[1.12,1.23]	1.50[1.45,1.56]	1.70[1.60,1.80]	1.11[1.06,1.16]	1.25[1.20,1.29]	1.28[1.20,1.36]
Mangoes, Papayas, Vit A fruits	1.17[1.12,1.22]	1.57[1.52,1.62]	1.91[1.81,2.00]	1.07[1.01,1.13]	1.18[1.13,1.23]	1.22[1.13,1.30]
Any other Fruits	1.06[0.98,1.15]	1.34[1.26,1.42]	1.07[0.97,1.18]	1.05[1.00,1.10]	1.23[1.18,1.28]	1.38[1.30,1.47]
Liver, heart, other organ meat	1.43[1.31,1.57]	1.99[1.86,2.12]	1.83[1.66,2.02]	0.94[0.86,1.03]	1.14[1.06,1.22]	1.06[0.94,1.20]
Fish, Shellfish	1.18[1.11,1.24]	1.47[1.41,1.53]	1.58[1.49,1.69]	1.04[0.94,1.15]	1.25[1.15,1.36]	1.26[1.11,1.43]
Beans, Peas, or Lentils	1.20[1.12,1.28]	1.71[1.62,1.80]	2.26[2.10,2.42]	1.09[1.03,1.16]	1.31[1.25,1.38]	1.46[1.35,1.58]
Cheese, Yogurt, Other Milk Products	1.31[1.25,1.37]	1.55[1.49,1.60]	1.44[1.37,1.53]	1.05[0.98,1.13]	1.24[1.17,1.32]	1.42[1.30,1.54]
Other Solid/Semi-Solid Food	1.18[1.08,1.29]	1.42[1.33,1.51]	0.89[0.80,1.01]	1.13[1.08,1.19]	1.20[1.15,1.26]	1.24[1.15,1.33]
Any Other Meat	0.98[0.85,1.08]	1.16[1.03,1.34]	0.87[0.76,1.01]	0.94[0.85,1.03]	1.12[1.03,1.21]	0.87[0.76,1.01]
Yogurt	1.32[1.22,1.42]	1.81[1.71,1.91]	2.70[2.51,2.91]	1.08[0.99,1.17]	1.07[1.00,1.14]	1.07[0.97,1.17]
Consumption from food groups						
Grains, roots and Tubers	1.15[1.11,1.20]	1.23[1.20,1.27]	1.21[1.15,1.27]	1.12[1.07,1.16]	1.16[1.13,1.20]	1.16[1.09,1.23]
Legumes and Nuts	1.18[1.11,1.25]	1.47[1.41,1.53]	1.58[1.49,1.69]	1.09[1.03,1.16]	1.31[1.25,1.38]	1.46[1.35,1.58]
Dairy products	1.23[1.19,1.28]	1.77[1.72,1.82]	3.43[3.28,3.60]	1.09[1.05,1.14]	1.26[1.22,1.30]	1.74[1.64,1.84]
Flesh Foods	1.21[1.14,1.28]	1.50[1.43,1.57]	1.25[1.16,1.34]	0.99[0.92,1.06]	1.18[1.12,1.25]	1.16[1.06,1.28]
Eggs	1.32[1.25,1.40]	1.63[1.56,1.70]	1.54[1.44,1.64]	1.11[1.05,1.19]	1.23[1.16,1.29]	1.29[1.18,1.40]
Vit A rich fruits and vegetables	1.18[1.13,1.23]	1.35[1.31,1.40]	1.55[1.47,1.63]	1.11[1.06,1.16]	1.17[1.13,1.22]	1.26[1.18,1.33]
Other fruits and vegetables	1.13[1.09,1.18]	1.35[1.31,1.39]	1.46[1.39,1.53]	1.08[1.04,1.13]	1.22[1.18,1.26]	1.32[1.24,1.39]
Adequately Diversified Dietary Intake	1.26[1.21,1.32]	1.69[1.63,1.75]	1.98[1.88,2.09]	1.11[1.06,1.17]	1.31[1.26,1.37]	1.46[1.37,1.56]

Note: In all Models No education taken as reference category; *Model 1 adjusted for child's age and sex only; **Model 2 adjusted for child age, sex, birth order, household wealth, caste, religion, urban/rural residence and geographical regions