**Online Supplementary Material**

**Supplementary Note:** *Discussion of district level estimates obtained from the India National Sample Survey*

District level estimates from the India National Sample Survey-Consumer Expenditure Survey (NSS-CES) have been used to construct data panels in previous studies and have thus provided credible estimates to exploit district level variations for regression analysis(1-3). However, since the NSS data are not sampled to be representative at the district level, there may be measurement errors in the district mean estimates due to inadequate sample sizes. Such errors, if high, would likely weaken associations between dietary factors and outcomes. We checked the degree of this measurement error by comparing correlations between a set of household variables common to the District Level Household Survey (DLHS) and NSS. The results show that there are strong correlations on average (>0.8), between district mean estimates obtained from the DLHS (which are sampled to be representative at the district level) and NSS-CES. Therefore, the deviation in the estimated population mean (from the true mean) for the variables used from the NSS is likely to be small.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Correlation matrix to establish validity of district level estimates from National Sample Survey\* | | | | | |
|  | District Level Household Survey rounds 2 (2002-2004) and 4 (2012-2013) | | | | |
| National sample survey rounds 61 (2004-2005) and 68 (2011-2012) |  | Sewing machine | Bicycle | Motorcycle | Electricity |
| Sewing machine | 0.87 |  |  |  |
| Bicycle |  | 0.81 |  |  |
| Motorcycle |  |  | 0.78 |  |
| Electricity |  |  |  | 0.86 |

\*Numbers are correlation coefficients

References:

Spears D, Ghosh A, Cumming O (2013) Open Defecation and Childhood Stunting in India: An Ecological Analysis of New Data from 112 Districts. *PLoS One* **8**:1–9. doi: 10.1371/journal.pone.0073784

Duflo. E & R. Pande (2007). Dams. *The Quarterly Journal of Economics*, Volume 122, Issue 2, 1 May 2007, Pages 601–646, https://doi.org/10.1162/qjec.122.2.601

Kaur. S. Nominal Wage Rigidity in Village Labor Markets. National Bureau of Economic Research Paper No. 20770. Issued in December 2014. http://www.nber.org/papers/w20770

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| --- | --- | --- | --- | --- | --- |
| **Table S1.** *Micronutrient content in Indian foods* | | | | | |
|  | Food category | B9 (folic acid) | Vitamin B12 | Iron | Phytic acid |
|  |  | *μg/100g* | *μg/100g* | *mg/100g* | *mg/100g* |
| *Cereals* |  |  |  |  |  |
| Rice [subsidized] | ‘rice, raw, milled’ | 9.32 | NA | 0.65 | 266 |
| Rice [market] | ‘rice, flakes’ | 9.32 | NA | 0.65 | 266 |
| Chira | ‘rice, flakes’ | 8.46 | NA | 4.46 | 474 |
| Muri | ‘rice, puffed’ | BDL | NA | 4.55 | 115 |
| Wheat [subsidized] | ‘wheat, whole’ | 30.09 | NA | 3.97 | 638 |
| Wheat [market] | ‘wheat, flour’ | 30.09 | NA | 3.97 | 638 |
| Maida | ‘wheat, white, refined’ | 16.25 | NA | 1.77 | 123 |
| Suji | ‘wheat, semolina, white’ | 25.68 | NA | 2.98 | 549 |
| Bread [brown] |  | NA | NA | 2.2^ | NA |
| Bread [white] |  | NA | NA | 1.1^ | NA |
|  |  |  |  |  |  |
| *Coarse grains* |  |  |  |  |  |
| Jowar | ‘sorghum, whole’ | 39.42 | NA | 3.95 | 549 |
| Bajra | ‘pearl millet, whole’ | 36.11 | NA | 6.42 | 485 |
| Maize |  | 62.96 | NA | 0.71 | 148 |
| Ragi | ‘finger millet, whole’ | 34.66 | NA | 4.62 | 306 |
|  |  |  |  |  |  |
| *Pulses* |  |  |  |  |  |
| Arhar | ‘red gram, dal’ | 108 | NA | 3.90 | 277 |
| Gram split | ‘bengal gram, whole’ | 233 | NA | 6.78 | 578 |
| Moong | ‘green gram, dal’ | 92.11 | NA | 3.93 | 170 |
| Masur | ‘lentil, dal’ | 49.99 | NA | 7.06 | 218 |
| Urad | ‘black gram, whole’ | 134 | NA | 5.97 | 679 |
| Peas |  | 110 | NA | 5.09 | 413 |
| Besan | ‘bengal gram, whole’ | 233 | NA | 6.78 | 578 |
| *Dairy* |  |  |  |  |  |
| Milk | ‘milk, whole, cow’ | 7.03 | 0.4 | 0.15 | BDL |
| Milk powder | ‘whole milk powder, cow’s milk’ | NA^ | 3.3 | 0.6^ | NA^ |
| Cur | ‘curd, cow’s milk’ | 12.5^ | 0.4 | 0.2^ | NA^ |
| Ghee | ‘ghee, cow’s milk | NA^ | 0.2 | NA^ | NA^ |
| Butter |  | NA^ | 0.2 | NA^ | NA^ |
|  |  |  |  |  |  |
| *Salt and sμgar* |  |  |  |  |  |
| Salt |  | NA | NA | NA | NA |
| Sugar subsidized |  | NA | NA | NA | NA |
| Sugar market |  | NA | NA | NA | NA |
| Gur | ‘jaggery, cane’ | NA | NA | 4.63 | NA |
| Misri | ‘rock sugar’ | NA | NA | NA | NA |
| Honey |  | NA | NA | 0.696^ | NA^ |
|  |  |  |  |  |  |
| *Oils* |  |  |  |  |  |
| Vanaspati | ‘margarine’ | NA | NA | NA | NA |
| Mustard oil | ‘mustard seeds’ | NA^ | NA | 7.9^ | NA^ |
| Groundnut oil | ‘groundnut’ | NA^ | NA | 2.5^ | NA^ |
| Coconut oil | ‘coconut dry’ | 16.5^ | NA | 7.8^ | NA^ |
| Safflower seeds | ‘mustard seeds’ | NA^ | NA | 4.6^ | NA^ |
|  |  |  |  |  |  |
| *Animal meat* |  |  |  |  |  |
| Eggs | ‘egg, poultry, whole, boiled’ | 48.25 | 1.0 | 1.87 | NA |
| Fish | ‘rohu’ | 1263 | 1.52 | 1.19 | NA |
| Mutton meat | ‘goat, leg’ | 2.25 | 1.1 | 1.77 | NA |
| Beef | ‘beef, (round) leg’ | 2.11 | 2.1 | 2.30 | NA |
| Pork | ‘pork, shoulder’ | 6.70 | 0.5 | 0.91 | NA |
| Chicken | ‘country hen, breast, with skin’ | 12.98 | 0.3 | 1.09 | NA |
|  |  |  |  |  |  |
| *Vegetables* |  |  |  |  |  |
| Potato |  | 15.51 | NA | 0.57 | 55.77 |
| Onion |  | 28.88 | NA | 0.43 | 13.90 |
| Tomato |  | 19.46 | NA | 0.30 | 2.39 |
| Brinjal |  | 33.93 | NA | 0.37 | 12.28 |
| Radish |  | 29.75 | NA | 0.36 | 1.75 |
| Carrot |  | 24.04 | NA | 0.60 | 19.60 |
| Leafy green vegetables |  | 142.00 | NA | 2.95 | 12.01 |
| Green chili |  | 21.50 | NA | 1.20 | 13.38 |
| Lady finger | ‘okra’ | 63.68 | NA | 0.84 | 3.63 |
| Parwal | ‘pointed gourd’ | 19.96 | NA | 0.50 | 29.19 |
| Cauliflower |  | 45.95 | NA | 0.96 | 18.48 |
| Cabbage |  | 46.36 | NA | 0.35 | 11.77 |
| Pumpkin gourd |  | 24.14 | NA | 0.36 | 19.72 |
| Pea |  | 54.77 | NA | 1.58 | 162 |
| French beans |  | 47.45 | NA | 1.25 | 6.11 |
| Lemon |  | 12.43 | NA | 0.12 | BDL |
|  |  |  |  |  |  |
| *Fruits* |  |  |  |  |  |
| Banana |  | 16.81 | NA | 0.28 | 13.98 |
| Jackfruit |  | 32.15 | NA | 0.36 | 52.94 |
| Watermelon |  | 5.88 | NA | 0.22 | 0.61 |
| Pineapple |  | 18.21 | NA | 0.08 | 8.59 |
| Coconut green |  | 10.88 | NA | 0.06 |  |
| Guava |  | 29.76 | NA | 0.32 | 55.36 |
| Singara | ‘water chestnut’ | 9.80 | NA | 0.77 | 25.86 |
| Orange |  | 19.46 | NA | 0.81 | BDL |
| Papaya |  | 60.9 | NA | 0.23 | 25.44 |
| Mango |  | 82.05 | NA | 1.91 | 84.83 |
| Kharbooza | ‘muskmelon, yellow flesh’ | 20.23 | NA | 0.21 | 11.11 |
| Pears |  | 5.28 | NA | 0.28 | 4.83 |
| Berries |  | 8.91 | NA | 0.36 | 25.07 |
| Litchi |  | 15.69 | NA | 0.46 | 2.57 |
| Apple |  | 3.04 | NA | 0.26 | 0.57 |
| Grapes |  | 8.31 | NA | BDL | 0.85 |
| Coconut copra | ‘coconut, kernel, dried’ | 25.41 | NA | 1.30 | 136 |
|  |  |  |  |  |  |
| *Nuts and dried fruits* |  |  |  |  |  |
| Groundnut |  | 90.87 | NA | 3.44 | 582 |
| Dates |  | NA | NA | NA | NA |
| Cashew nut |  | 25.2 | NA | 5.95 | 929 |
| Walnut |  | 57.95 | NA | 3.21 | 1001 |
| Raisin |  | 38.30 | NA | 6.81 | 20.34 |
|  |  |  |  |  |  |
| *Spices* |  |  |  |  |  |
| Garlic |  | 85.77 | NA | 1.05 | 36.55 |
| Ginger |  | 10.82 | NA | 1.9 | 14.5 |
| Turmeric |  | 13.86 | NA | 46.08 | 358 |
| Black pepper |  | 21.89 | NA | 11.91 | 383 |
| Dry chilies |  | 51.50 | NA | 6.23 | 264 |
| Tamarind |  | 91.82 | NA | 2.84 | 33.87 |
| Curry powder |  | NA | NA | NA | NA |
| Oilseeds |  | NA | NA | NA | NA |
| Abbreviations: BDL, below detectable limit; NA, not applicable (not available in tables) | | | | | |

Data sources:

Unmarked: India Food Composition Tables, 2017

^Nutritive value of Indian Foods was used to obtain conversion factors.   
For vitamin B12 [www.nutritiondata.self.com](http://www.nutritiondata.self.com) were used for the following. Milk (milk, whole, 3.25% milkfat), Milk powder (milk, dry, whole), Curd (cheese, cottage, creamed, large or small curd), Ghee (clarified butter), Butter (butter, without salt), Eggs, Fish (fish, carp, raw), Mutton (meat, goat, raw), Beef (Beef, ground, 75% lean meat / 25% fat, raw), Pork (pork, fresh, ground, cooked), Sheep (Lamb, domestic, rib, separable lean and fat, trimmed to 1/4" fat, choice, cooked, roasted), Chicken (chicken, broilers or fryers, meat and skin, cooked, roasted).

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| **Online Supplementary Table 2.** *Construction of the district panel data set* | | | | |
| Dataset | Dataset name | Step | Exclusion | Sample size after exclusion |
| DLHS-2 | pregnant women | 1 | - | 41,225 women |
|  |  | 2 | non-pregnant or missing pregnancy status or missing Hb | 23,899 women |
|  | women | 3 | - | 507,622 women |
|  |  | 4 | non-pregnant or missing pregnancy status | 44,638 women |
|  | merged datasets from steps 2 and 4 | 5 | states not covered in DLHS-4 | 8,206 women |
| DLHS-4 | clinical anthropometry and biochemical | 6 | - | 1,610,571 women |
|  |  | 7 | non-pregnant or missing pregnancy status or missing Hb | 10,904 women |
|  | women | 8 | - | 319,695 women |
|  |  | 9 | non-pregnant or missing pregnancy status | 15,475 women |
|  | merged datasets from steps 7 and 9 | 10 | - | 9,112 women |
| Combined DLHS-2 and DLHS-4 | appended datasets from steps 5 and 10 | 11 | - | 17,138 women |
|  | collapsed dataset from step 11 to district level | 12 | - | 489 districts |
| NSS-61 | food consumption | 13 | - | 124,644 women |
|  | collapsed dataset from step 13 to district level | 14 | - | 489 districts |
| NSS-68 | food consumption | 15 | - | 101,662 women |
|  | collapsed dataset from step 15 to district level | 16 | - | 625 districts |
| Combined NSS-61 and NSS-68 | appended datasets from steps 14 and 16 | 17 | - | 1,210 districts |
|  |  | 18 | districts not covered in DLHS-4 | 466 districts |
| Final dataset with both DLHS and NSS data | Merged datasets from steps 12 and 18 | 19 | - | 466 districts |