**Supplemental material**

**Household air pollution and caste-ethnic differences in undernutrition among children in Nepal**



**Supplemental Figure 1.** Flow chart for the selection of the study population. NDHS, Nepal Demography and Health Survey.





**Supplemental Figure 2.** Nutritional status of children by caste/ethnicity according to the year of Nepal Demographic and Health Surveys (NDHS), 2006-2016. The middle box denotes the middle 50% of scores. The diamond inside each box denotes the median.

**Supplemental Table 1.** Interaction of household air pollution from the use of cooking fuel by caste/ethnicity predicting child nutritional outcomes: linear and logistic regression analyses.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | HAZ |  | WAZ |  | WHZ |
| β (95% CI) | *p-*value |  β (95% CI) | *p-*value | β (95% CI) | *p-*value |
| HAP | -0.17 (-0.33, -0.01) |  |  | -0.03 (-0.16, 0.10) | 0.653 |  | 0.12 (-0.03, 0.26) | 0.120 |
| Caste/ethnicity |  |  |  |  |  |  |  |  |
|  Upper caste | Reference |  |  | Reference |  |  | Reference |  |
|  Indigenous | 0.20 (0.01, 0.39) | 0.041 |  | 0.22 (0.07, 0.38) | 0.005 |  | 0.16 (0.00, 0.33) | 0.049 |
|  Dalits | 0.19 (-0.28, 0.65) | 0.430 |  | 0.30 (0.08, 0.52) | 0.008 |  | 0.27 (-0.09, 0.64) | 0.144 |
| Caste/ethnicity and HAP interaction |  |  |  |  |  |  |  |
|  Indigenous\*HAP | -0.12 (-0.34, 0.09) | 0.252 |  | -0.25 (-0.42, -0.08) | 0.004 |  | -0.28 (-0.46, -0.10) | 0.003 |
|  Dalits\*HAP | -0.17 (-0.64, 0.30) | 0.476 |  | -0.43 (-0.64, -0.20) | < 0.001 |  | -0.47 (-0.83, -0.10) | 0.013 |

HAP: Household air pollution; CI: Confidence interval; HAZ: height-for-age Z score; WAZ: weight-for-age Z score; WHZ:weight-for-height Z score. Models are adjusted for child age, sex, birth order, mother’s age, education, height, working status, mode of delivery, household wealth, development region, type of residence, and survey year.

**Supplemental Table 2.** Interaction of household air pollution from the use of cooking fuel by caste/ethnicity predicting child nutritional outcomes: linear and logistic regression analyses.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Stunting |  | Underweight |  | Wasting |
| OR (95%CI) | *p-*value | OR (95%CI) | *p-*value | OR (95%CI) | *p-*value |
| HAP |  | 1.31 (0.98, 1.76) | 0.066 |  | 1.08 (0.76, 1.55) | 0.655 |  | 0.72 (0.46, 1.13) | 0.155 |
| Caste/ethnicity |  |  |  |  |  |  |  |  |  |
|  Upper caste |  | Reference |  |  | Reference |  |  | Reference |  |
|  Indigenous |  | 0.77 (0.53, 1.12) | 0.178 |  | 0.75 (0.49, 1.16) | 0.197 |  | 0.96 (0.57, 1.60) | 0.872 |
|  Dalits |  | 0.80 (0.37, 1.76) | 0.584 |  | 0.88 (0.42, 1.87) | 0.742 |  | 0.73 (0.29, 1.81) | 0.495 |
| Caste/ethnicity and HAP interaction |  |  |  |  |  |  |  |  |  |
|  Indigenous\*HAP |  | 1.25 (0.85, 1.84) | 0.250 |  | 1.54 (0.98, 2.43) | 0.064 |  | 1.35 (0.77, 2.38) | 0.297 |
|  Dalits\*HAP |  | 1.35 (0.61, 2.99) | 0.462 |  | 1.49 (0.68, 3.29) | 0.321 |  | 2.01 (0.78, 5.19) | 0.150 |

HAP: Household air pollution; OR: Odds ratio; CI: Confidence interval. Models are adjusted for child age, sex, birth order, mother’s age, education, height, working status, mode of delivery, household wealth, development region, type of residence, and survey year.

**Supplemental Table 3.** Association of household air pollution with HAZ, WAZ, and WHZ among children, stratified by caste/ethnicity: linear regression analysis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Upper caste (n = 3729) |  | Indigenous (n = 4366) |  | Dalits (n = 1769) |
| β (95% CI) | *p-*value | β (95% CI) | *p-*value | β (95% CI) | *p-*value |
| **HAZ** |  |  |  |  |  |  |  |  |
|  Model 1 | -0.67 (-0.83, -0.52) | < 0.001 |  | -0.74 (-0.91, -0.57) | < 0.001 |  | -0.85 (-1.33, -0.37) | 0.001 |
|  Model 2 | -0.62 (-0.78, -0.47) | < 0.001 |  | -0.68 (-0.83, -0.52) | < 0.001 |  | -0.77 (-1.26, -0.28) | 0.002 |
|  Model 3 | -0.47 (-0.61, -0.32) | < 0.001 |  | -0.60 (-0.74, -0.45) | < 0.001 |  | -0.79 (-1.17, -0.40) | < 0.001 |
|  Model 4 | -0.19 (-0.37, -0.01) | 0.038 |  | -0.30 (-0.46, -0.14) | < 0.001 |  | -0.49 (-0.99, 0.01) | 0.056 |
|  Model 5 | -0.17 (-0.34, 0.01) | 0.057 |  | -0.28 (-0.45, -0.11) | 0.001 |  | -0.34 (-0.86, 0.17) | 0.187 |
| **WAZ** |  |  |  |  |  |  |  |  |
|  Model 1 | -0.55 (-0.68, -0.43) | < 0.001 |  | -0.75 (-0.89, -0.62) | < 0.001 |  | -1.00 (-1.26, -0.73) | < 0.001 |
|  Model 2 | -0.48 (-0.61, -0.35) | < 0.001 |  | -0.69 (-0.82, -0.56) | < 0.001 |  | -0.93 (-1.19, -0.68) | < 0.001 |
|  Model 3 | -0.37 (-0.49, -0.25) | < 0.001 |  | -0.59 (-0.72, -0.47) | < 0.001 |  | -0.94 (-1.16, -0.73) | < 0.001 |
|  Model 4 | -0.07 (-0.20, 0.07) | 0.348 |  | -0.29 (-0.44, -0.15) | < 0.001 |  | -0.58 (-0.89, -0.26) | < 0.001 |
|  Model 5 | -0.02 (-0.16, 0.12) | 0.749 |  | -0.28 (-0.43, -0.13) | < 0.001 |  | -0.43 (-0.75, -0.12) | 0.007 |
| **WHZ** |  |  |  |  |  |  |  |  |
|  Model 1 | -0.22 (-0.34, -0.09) | 0.001 |  | -0.48 (-0.63, -0.33) | < 0.001 |  | -0.70 (-1.07, -0.34) | < 0.001 |
|  Model 2 | -0.16 (-0.29, -0.03) | 0.014 |  | -0.44 (-0.59, -0.29) | < 0.001 |  | -0.68 (-1.04, -0.32) | < 0.001 |
|  Model 3 | -0.13 (-0.26, -0.01) | 0.059 |  | -0.37 (-0.51, -0.24) | < 0.001 |  | -0.69 (-1.05, -0.32) | < 0.001 |
|  Model 4 | 0.11 (-0.05, 0.26) | 0.183 |  | -0.19 (-0.35, -0.03) | 0.019 |  | -0.41 (-0.78, -0.03) | 0.035 |
|  Model 5 | 0.15(-0.01, 0.31) | 0.064 |  | -0.20 (-0.36, -0.03) | 0.019 |  | -0.32 (-0.69, 0.06) | 0.097 |

HAZ: height-for-age Z score; WAZ: weight-for-age Z score; WHZ weight-for-height Z score

Model 1: unadjusted

Model 2: adjusted for child age, sex, and birth order

Model 3: Model 2 + adjusted for mode of delivery, mother’s age, height, and smoking status

Model 4: Model 3 + adjusted for maternal education and working status and household wealth

Model 5: Model 4 + adjusted for development region, type of residence (rural and urban), and survey year