**Supplementary Table 1** Prevalence estimates for stunting and test for trend over time by socio-demographic factors in 0-59 months children, 2001-2016

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Gender** | **2001** | |  | **2006** | |  | **2011** | |  | **2016** | | **Wald (χ2)** | **Total N** |
| **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |
| Total both sexes |  | 3685 | 57.2 (55.6-58.8) |  | 2593 | 49.3 (47.1-51.5) |  | 1006 | 40.5 (38.0-43.0) |  | 868 | 35.8 (33.6-38.2) | 401.4\*\*\* | 16606 |
| Total males |  | 1805 | 57.1 (54.8-59.3) |  | 1325 | 49.0 (45-8-52.2) |  | 527 | 41.4 (38.0-44.9) |  | 453 | 36.0 (33.0-39.1) | 192.5\*\*\* | 8395 |
| Total females |  | 1880 | 57.3 (55.0-59.6) |  | 1268 | 49.6 (46.6-52.6) |  | 479 | 39.5 (36.0-43.2) |  | 415 | 35.7 (32.3-39.2) | 209.1\*\*\* | 8211 |
| **Age** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0-5 months | M | 64 | 20.6 (16.4-25.5) |  | 36 | 14 (9.7-19.8) |  | 22 | 17.5 (11.0-26.7) |  | 16 | 14.2 (8.6-22.5) | 2.3 | 803 |
| F | 80 | 24.6 (20.9-28.7) |  | 19 | 8.8 (6.1-12.5) |  | 23 | 21.7 (13.7-32.8) |  | 14 | 12.8 (7.5-21.0) | 6.5\* | 756 |
| 6-11 months | M | 102 | 33.7 (28.9-38.7) |  | 55 | 22.9 (17.1-29.9) |  | 19 | 19.0 (11.8-29.2) |  | 25 | 20.1 (14.0-28.0) | 11.4\*\* | 767 |
| F | 91 | 28.1 (24.1-32.4) |  | 59 | 24.3 (19.3-30.2) |  | 21 | 13.8 (8.5-21.7) |  | 22 | 17.7 (10.7-27.7) | 10.8\*\* | 842 |
| 12-23 months | M | 369 | 58.7 (54.1-63.2) |  | 249 | 48.3 (43.0-53.8) |  | 95 | 39.3 (31.3-47.8) |  | 108 | 37.4 (31.3-43.9) | 45.3\*\*\* | 1675 |
| F | 368 | 54.4 (50.4-58.4) |  | 217 | 46.7 (41.3-52.1) |  | 75 | 30.4 (23.3-38.6) |  | 83 | 37.4 (30.0-45.4) | 38.9\*\*\* | 1613 |
| 24-35 months | M | 408 | 69.0 (65.6-72.3) |  | 325 | 58.6 (53.2-63.9) |  | 127 | 48.7 (41.8-55.7) |  | 105 | 45.5 (39.2-51.9) | 50.5\*\*\* | 1636 |
| F | 368 | 54.4 (50.4-58.4) |  | 217 | 46.7 (41.3-52.1) |  | 75 | 30.4 (23.3-38.6) |  | 83 | 37.4 (30.0-45.4) | 42.3\*\*\* | 1613 |
| 36-47 months | M | 448 | 67.2 (63.4-70.8) |  | 336 | 59.4 (54.2-64.4) |  | 149 | 52.5 (45.4-59.4) |  | 90 | 37.0 (31.1-43.4) | 66.5\*\*\* | 1759 |
| F | 494 | 73.6 (69.8-77.0) |  | 316 | 65.8 (60.4-71.0) |  | 130 | 53.7 (45.8-61.4) |  | 109 | 42.3 (35.4-49.6) | 86.1\*\*\* | 1650 |
| 48-59 months | M | 413 | 62.5 (59.1-65.9) |  | 324 | 57.1 (52.3-61.8) |  | 116 | 43.8 (36.4-51.4) |  | 109 | 42.0 (35.3-48.9) | 43.9\*\*\* | 1754 |
| F | 416 | 64.4 (60.2-68.5) |  | 321 | 57.2 (52.4-61.9) |  | 98 | 43.1 (35.0-51.5) |  | 86 | 39.5 (32.0-47.6) | 54.8\*\*\* | 1651 |
| **Mother's education** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education | M | 1419 | 61.2 (59.0-63.4) |  | 889 | 56.4 (53.0-59.8) |  | 285 | 49.6 (44.5-54.7) |  | 185 | 43.2 (38.3-48.3) | 61.3\*\*\* | 4898 |
| F | 1417 | 61.7 (59.3-64.1) |  | 882 | 59.1 (55.9-62.3) |  | 264 | 45.7 (40.3-51.2) |  | 193 | 48.4 (41.8-55.0) | 52.0\*\*\* | 4764 |
| Primary | M | 189 | 47.2 (42.0-52.5) |  | 211 | 46.5 (41.2-52.0) |  | 102 | 39.7 (31.9-48.0) |  | 92 | 39.1 (32.6-46.0) | 6.0\* | 1346 |
| F | 263 | 53.2 (48.6-57.7) |  | 215 | 46.0 (40.7-51.5) |  | 93 | 41.6 (34.8-48.6) |  | 81 | 34.4 (28.6-40.6) | 24.3\*\*\* | 1423 |
| Secondary | M | 118 | 44.9 (40.1-49.8) |  | 166 | 31.8 (27.0-37.1) |  | 112 | 33.1 (27.0-39.8) |  | 127 | 33.3 (28.0-39.0) | 5.1\* | 1502 |
| F | 106 | 38.7 (33.7-43.9) |  | 128 | 27.3 (23.7-31.1) |  | 91 | 28.1 (22.7-34.3) |  | 98 | 26.6 (21.7-32.1) | 7.6\*\* | 1437 |
| Higher | M | 40 | 38.4 (32.3-44.8) |  | 11 | 16.3 (9.9-25.7) |  | 12 | 17.8 (9.4-31.0) |  | 36 | 19.0 (14.0-25.3) | 10.5\*\* | 430 |
| F | 38 | 31.7 (29.0-34.4) |  | 9 | 15.6 (8.4-27.2) |  | 16 | 29.1 (15.4-48.0) |  | 30 | 24.3 (16.4-34.4) | 0.8 | 357 |
| **Wealth quintiles** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Poorest | M | 543 | 68.6 (65.1-71.9) |  | 401 | 61.3 (56.5-66.0) |  | 182 | 55.6 (49.3-61.6) |  | 123 | 50.2 (43.8-56.6) | 34.3\*\*\* | 2019 |
| F | 530 | 66.9 (63.1-70.5) |  | 411 | 61.8 (58.3-65.3) |  | 176 | 56.4 (51.4-61.3) |  | 120 | 48.2 (41.7-54.9) | 30.8\*\*\* | 2019 |
| Poorer | M | 397 | 58.9 (55.3-62.3) |  | 325 | 54.3 (49.9-58.6) |  | 131 | 46.0 (38.0-54.1) |  | 100 | 38.2 (32.2-44.6) | 36.7\*\*\* | 1821 |
| F | 445 | 63.2 (59.9-66.3) |  | 289 | 55.5 (50.9-60.0) |  | 102 | 45.4 (38.2-52.8) |  | 104 | 39.2 (32.2-46.6) | 52.9\*\*\* | 1716 |
| Middle | M | 322 | 52.8 (48.4-57.1) |  | 278 | 50.6 (45.3-56.0) |  | 99 | 37.4 (30.1-45.2) |  | 112 | 37.7 (31.2-44.7) | 26.5\*\*\* | 1722 |
| F | 353 | 55.3 (52.2-58.3) |  | 263 | 50.0 (43.8-56.3) |  | 102 | 32.2 (24.9-40.4) |  | 84 | 33.3 (26.9-40.4) | 56.7\*\*\* | 1733 |
| Richer | M | 312 | 54.3 (51.0-57.5) |  | 193 | 41.6 (36.1-47.2) |  | 63 | 29.6 (21.8-38.9) |  | 92 | 32.6 (26.7-39.0) | 48.8\*\*\* | 1531 |
| F | 312 | 52.3 (48.4-56.1) |  | 189 | 38.1 (33.1-43.3) |  | 66 | 31.4 (23.6-40.4) |  | 79 | 32.3 (25.8-39.5) | 38.7\*\*\* | 1548 |
| Richest | M | 190 | 43.9 (40.5-47.3) |  | 127 | 29.3 (25.0-33.9) |  | 53 | 28.7 (21.5-37.1) |  | 26 | 14.9 (10.0-21.8) | 46.0\*\*\* | 1224 |
| F | 182 | 40.6 (37.5-43.7) |  | 116 | 33.1 (29.5-37.0) |  | 33 | 22.2 (15.5-30.8) |  | 27 | 18.2 (12.0-26.6) | 32.8\*\*\* | 1097 |
| **Supplementary Table 1** *Continued* | | | |  |  |  |  |  |  |  |  |  |  |  |
| **Variables** | **Gender** |  | **2001** |  | **2006** | |  | **2011** | |  | **2016** | | **Wald (χ2)** | **Total N** |
| **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |
| **Type of residence** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | M | 98 | 45.2 (42.3-48.2) |  | 114 | 34.9 (29.1-41.3) |  | 31 | 28.0 (21.7-35.2) |  | 217 | 32.4 (28.4-36.5) | 9.1\*\* | 1323 |
| F | 84 | 40.2 (36.7-43.8) |  | 117 | 37.8 (33.6-42.1) |  | 27 | 25.4 (20.2-31.4) |  | 192 | 31.6 (27.5-36.0) | 6.9\*\* | 1235 |
| Rural | M | 1707 | 58.0 (55.8-60.1) |  | 1211 | 51.0 (47.4-54.5) |  | 497 | 42.7 (39.1-46.4) |  | 236 | 40.2 (35.6-44.9) | 111.4\*\*\* | 7072 |
| F | 1796 | 58.5 (56.2-60.7) |  | 1151 | 51.2 (47.9-54.5) |  | 452 | 40.9 (37.1-44.8) |  | 223 | 40.2 (34.9-45.8) | 128.5\*\*\* | 6976 |
| **Ecological zones** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | M | 169 | 65.9 (62.9-68.8) |  | 150 | 62.2 (55.4-68.6) |  | 57 | 54.1 (46.7-61.3) |  | 42 | 46.9 (37.9-56.2) | 11.5\*\* | 691 |
| F | 155 | 66.8 (61.9-71.4) |  | 129 | 62.4 (57.9-66.8) |  | 47 | 51.5 (45.3-57.7) |  | 38 | 46.6 (37.5-56.0) | 13.0\*\*\* | 612 |
| Hill | M | 761 | 58.3 (54.7-61.9) |  | 563 | 51.3 (47.2-55.4) |  | 233 | 43.7 (38.3-49.2) |  | 144 | 33.0 (28.1-38.3) | 92.8\*\*\* | 3370 |
| F | 848 | 61.1 (57.7-64.4) |  | 526 | 49.4 (45.8-53.0) |  | 184 | 40.2 (35.5-45.1) |  | 140 | 31.7 (27.0-36.8) | 138.9\*\*\* | 3351 |
| Terai | M | 875 | 54.7 (51.4-57.9) |  | 612 | 44.9 (39.9-50.0) |  | 237 | 37.4 (32.6-42.4) |  | 267 | 36.4 (32.5-40.6) | 86.1\*\*\* | 4333 |
| F | 877 | 52.8 (49.3-56.3) |  | 612 | 47.7 (42.7-52.7) |  | 248 | 37.4 (32.1-43.1) |  | 238 | 37.1 (32.2-42.2) | 66.8\*\*\* | 4248 |
| **Development regions** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | M | 366 | 51.8 (47.5-56.0) |  | 239 | 39.9 (34.5-45.6) |  | 111 | 38.3 (32.0-45.0) |  | 101 | 35.4 (30.0-41.3) | 27.1\*\*\* | 1880 |
| F | 394 | 50 (45.5-54.5) |  | 228 | 40.6 (36.6-44.7) |  | 110 | 35.7 (27.6-44.7) |  | 76 | 29.5 (22.8-37.1) | 41.0\*\*\* | 1916 |
| Central | M | 608 | 57.4 (53.4-61.3) |  | 443 | 50.2 (43.7-56.7) |  | 139 | 35.6 (29.4-42.4) |  | 144 | 32.8 (28.0-37.9) | 97.2\*\*\* | 2773 |
| F | 625 | 59.6 (54.8-64.2) |  | 410 | 49.9 (42.6-57.2) |  | 155 | 40.9 (34.3-47.7) |  | 157 | 36.6 (30.8-43.0) | 78.2\*\*\* | 2681 |
| Western | M | 330 | 56.4 (50.0-62.5) |  | 233 | 50.1 (43.0-57.2) |  | 107 | 41.9 (34.1-50.2) |  | 103 | 39.9 (32.0-48.4) | 25.3\*\*\* | 1564 |
| F | 360 | 58.6 (53.9-63.1) |  | 259 | 50.7 (45.7-55.8) |  | 67 | 31.9 (24.8-39.9) |  | 71 | 34.4 (27.4-42.2) | 56.5\*\*\* | 1541 |
| Mid-Western | M | 297 | 62 (56.8-67.0) |  | 195 | 58.4 (52.4-64.2) |  | 103 | 53.3 (45.3-61.2) |  | 63 | 39.7 (32.3-47.7 | 22.7\*\*\* | 1165 |
| F | 306 | 62 (56.8-66.9) |  | 189 | 57.4 (51.1-63.5) |  | 85 | 47.1 (39.9-54.3) |  | 76 | 44.0 (35.5-52.8) | 22.2\*\*\* | 1176 |
| Far western | M | 204 | 61.5 (56.5-66.2) |  | 214 | 51.0 (43.4-58.6) |  | 67 | 46.5 (37.8-55.3) |  | 41 | 35.8 (27.1-45.5) | 24.8\*\*\* | 1012 |
| F | 195 | 58.3 (52.2-64.2) |  | 182 | 54.5 (50.1-58.7) |  | 62 | 46.4 (39.0-53.9) |  | 35 | 35.9 (27.8-44.9) | 16.4\*\*\* | 898 |

Note: \**p* <0.05, \*\**p*<0.01, \*\*\* *p* <0.001. M=Male children, F=Female children

**Supplementary Table 2** Prevalence estimates for wasting and test for trend over time by socio-demographic factors in 0-59 months children, 2001-2016

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | | **Gender** | | **2001** | | |  | **2006** | |  | **2011** | |  | **2016** | |  | **Wald (χ2)** | | **Total N** |
| **N** | **% (95 % CI)** | |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  |
| Total Both sexes | |  | | 724 | 11.2 (10.2-12.4) | |  | 662 | 12.6 (11.5-13.8) |  | 271 | 10.9 (9.5-12.5) |  | 234 | 9.7 (8.4-11.1) |  | 3.9\* | 16602 | |
| Total males | |  | | 390 | 12.3 (11.1-13.7) | |  | 348 | 12.9 (11.3-14.7) |  | 153 | 12.0 (10.0-14.3) |  | 120 | 9.5 (7.8-11.7) |  | 5.2\* | 8392 | |
| Total females | |  | | 335 | 10.2 (8.6-12.0) | |  | 314 | 12.3 (10.9-13.8) |  | 118 | 9.7 (7.8-12.1) |  | 114 | 9.8 (8.0-12.0) |  | 0.3 | 8210 | |
| **Age** | |  | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| 0-5 months | | M | | 56 | 18.1 (15.0-21.8) | |  | 34 | 13.1 (9.9-17.3) |  | 15 | 12.2 (7.2-20.0) |  | 16 | 15 (8.6-25.0) |  | 1.5 | 801 | |
|  | | F | | 35 | 10.8 (8.2-13.9) | |  | 25 | 11.4 (8.3-15.3) |  | 12 | 11.2 (5.7-20.9) |  | 16 | 15.4 (9.4-24.2) |  | 1.2 | 756 | |
| 6-11 months | | M | | 65 | 21.5 (17.9-25.5) | |  | 42 | 17.4 (11.9-24.7) |  | 27 | 27.2 (16.9-40.7) |  | 24 | 19.3 (11.3-30.9) |  | 0.0 | 767 | |
|  | | F | | 50 | 15.6 (12.7-19.1) | |  | 51 | 21.0 (16.3-26.7) |  | 23 | 15.7 (10.1-23.6) |  | 22 | 17.7 (10.7-27.8) |  | 0.1 | 842 | |
| 12-23 months | | M | | 134 | 21.3 (18.0-25.1) | |  | 97 | 18.8 (15.8-22.3) |  | 51 | 21.3 (15.4-28.6) |  | 34 | 11.8 (8.2-16.6) |  | 8.3\*\* | 1674 | |
|  | | F | | 113 | 16.7 (14.1-19.7) | |  | 80 | 17.2 (13.9-21.0) |  | 30 | 12.0 (7.5-18.7) |  | 29 | 12.9 (8.6-19.0) |  | 3.3 | 1612 | |
| 24-35 months | | M | | 44 | 7.5 (5.9-9.6) | |  | 80 | 14.4 (11.0-18.7) |  | 19 | 7.4 (4.7-11.5) |  | 17 | 7.4 (4.6-11.6) |  | 0.1 | 1636 | |
|  | | F | | 45 | 7.0 (5.2-9.5) | |  | 59 | 10.1 (7.6-13.3) |  | 18 | 7.4 (4.5-11.7) |  | 13 | 5.6 (3.3-9.4) |  | 0.3 | 1701 | |
| 36-47 months | | M | | 37 | 5.6 (3.9-7.9) | |  | 54 | 9.5 (7.3-12.3) |  | 22 | 7.8 (4.8-12.4) |  | 14 | 5.9 (3.5-9.7) |  | 0.3 | 1759 | |
|  | | F | | 46 | 6.9 (5.1-9.2) | |  | 45 | 9.4 (6.6-13.3) |  | 16 | 6.5 (3.9-10.6) |  | 18 | 6.9 (4.2-11.1) |  | 0.0 | 1650 | |
| 48-59 months | | M | | 52 | 7.9 (6.0-10.4) | |  | 42 | 7.3 (5.2-10.2) |  | 19 | 7.0 (4.1-11.9) |  | 14 | 5.4 (3.1-9.1) |  | 1.7 | 1754 | |
|  | | F | | 45 | 7.0 (4.7-10.4) | |  | 53 | 9.5 (7.2-12.3) |  | 20 | 8.7 (4.5-16.2) |  | 16 | 7.3 (4.2-12.3) |  | 0.2 | 1651 | |
| **Mother's education** | | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| No education | | M | | 313 | 13.5 (11.9-15.3) | |  | 238 | 15.1 (12.8-17.7) |  | 78 | 13.5 (10.4-17.5) |  | 57 | 13.2 (9.6-18.0) |  | 0.0 | 4896 | |
|  | | F | | 275 | 12.0 (10.0-14.3) | |  | 210 | 14.1 (12.3-16.1) |  | 76 | 13.1 (10.2-16.6) |  | 47 | 11.7 (8.4-16.0) |  | 0.2 | 4766 | |
| Primary | | M | | 48 | 11.9 (9.7-14.6) | |  | 39 | 8.6 (6.1-12.0) |  | 30 | 11.6 (7.4-17.6) |  | 20 | 8.7 (4.8-15.2) |  | 0.8 | 1345 | |
|  | | F | | 36 | 7.2 (5.3-9.7) | |  | 38 | 8.2 (5.6-11.9) |  | 25 | 11.0 (6.2-18.7) |  | 22 | 9.2 (5.9-14.2) |  | 1.8 | 1423 | |
| Secondary | | M | | 16 | 6.2 (3.7-10.2) | |  | 56 | 10.7 (8.3-13.8) |  | 30 | 9.0 (6.0-13.2) |  | 27 | 7.1 (4.8-10.3) |  | 0.1 | 1504 | |
|  | | F | | 16 | 6.0 (3.9-9.1) | |  | 57 | 12.1 (9.2-15.7) |  | 12 | 3.7 (2.0-6.9) |  | 37 | 10.1 (7.2-14.1) |  | 0.1 | 1435 | |
| Higher | | M | | 4 | 3.6 (2.0-6.4) | |  | 6 | 8.7 (5.7-13.1) |  | 11 | 15.2 (6.7-30.9) |  | 15 | 8.1 (4.7-13.7) |  | 1.7 | 429 | |
|  | | F | | 3 | 2.1 (2.1-2.1) | |  | 4 | 6.9 (3.5-13.0) |  | 4 | 7.1 (2.1-21.0) |  | 7 | 5.8 (2.5-13.0) |  | 1.6 | 357 | |
| **Wealth quintiles** | | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| Poorest | | M | | 112 | 14.2 (12.2-16.4) | |  | 78 | 12.0 (9.6-14.8) |  | 44 | 13.3 (10.1-17.4) |  | 23 | 9.5 (6.6-13.5) |  | 2.7 | 2017 | |
|  | | F | | 93 | 11.8 (9.4-14.6) | |  | 73 | 11.0 (8.6-14.0) |  | 36 | 11.6 (7.8-17.0) |  | 20 | 8.0 (4.9-13.0) |  | 1.8 | 2018 | |
| Poorer | | M | | 94 | 14.0 (11.4-17.0) | |  | 88 | 14.7 (12.5-17.3) |  | 34 | 11.8 (7.8-17.5) |  | 25 | 9.7 (6.2-14.9) |  | 3.3 | 1819 | |
|  | | F | | 85 | 12.0 (9.9-14.5) | |  | 81 | 15.6 (12.9-18.6) |  | 21 | 9.3 (6.1-14.1) |  | 24 | 9 (5.8-13.8) |  | 2.3 | 1717 | |
| Middle | | M | | 86 | 14.1 (11.2-17.7) | |  | 92 | 16.7 (13.1-21.1) |  | 33 | 12.3 (7.6-19.3) |  | 26 | 8.7 (5.6-13.2) |  | 5.4\* | 1723 | |
|  | | F | | 64 | 10.1 (7.6-13.3) | |  | 71 | 13.6 (10.6-17.3) |  | 42 | 13.3 (9.7-18.0) |  | 32 | 12.8 (8.7-18.5) |  | 2.0 | 1733 | |
| Richer | | M | | 58 | 10.2 (8.0-12.8) | |  | 54 | 11.6 (8.5-15.6) |  | 24 | 11.3 (7.4-17.0) |  | 36 | 12.6 (8.9-17.6) |  | 1.1 | 1531 | |
|  | | F | | 58 | 9.8 (7.7-12.4) | |  | 69 | 13.9 (10.9-17.6) |  | 13 | 6.3 (3.4-11.4) |  | 24 | 9.8 (6.3-14.8) |  | 0.4 | 1547 | |
| Richest | | M | | 30 | 6.9 (4.9-9.6) | |  | 36 | 8.3 (6.1-11.2) |  | 19 | 10.4 (6.5-16.4) |  | 10 | 5.6 (2.6-11.6) |  | 0.0 | 1223 | |
|  | | F | | 29 | 6.4 (4.7-8.5) | |  | 19 | 5.5 (3.7-8.2) |  | 5 | 3.6 (1.3-9.4) |  | 14 | 9.1 (5.1-15.7) |  | 0.2 | 1097 | |
| **Supplementary Table 2** *Continued* | | | | | | |  |  |  |  |  |  |  |  |  |  |  |  | |
| **Variables** | **Gender** | | **2001** | | | |  | **2006** | |  | **2011** | |  | **2016** | |  | **Wald (χ2)** | **Total N** | |
| **N** | | | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  | **N** | **% (95 % CI)** |  |
| **Type of residence** | | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| Urban | | M | | 19 | 8.6 (6.8-10.9) | |  | 24 | 7.4 (5.0-10.8) |  | 12 | 10.9 (6.7-17.3) |  | 60 | 8.9 (6.7-11.6) |  | 0.2 | 1322 | |
|  | | F | | 20 | 9.4 (7.2-12.2) | |  | 24 | 7.6 (5.2-11.0) |  | 6 | 5.4 (3.3-8.8) |  | 58 | 9.5 (7.2-12.4) |  | 0.2 | 1235 | |
| Rural | | M | | 371 | 12.6 (11.4-13.9) | |  | 324 | 13.6 (11.9-15.6) |  | 141 | 12.1 (10.0-14.6) |  | 60 | 10.3 (7.6-13.8) |  | 1.5 | 7070 | |
|  | | F | | 315 | 10.3 (8.6-12.1) | |  | 290 | 12.9 (11.4-14.6) |  | 112 | 10.2 (8.1-12.7) |  | 56 | 10.2 (7.5-13.7) |  | 0.0 | 6976 | |
| **Ecological zones** | | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| Mountain | | M | | 22 | 8.6 (6.8-10.8) | |  | 25 | 10.3 (7.1-14.7) |  | 12 | 11.7 7.3-18.1 |  | 6 | 6.3 (3.1-12.4) |  | 0.0 | 691 | |
|  | | F | | 16 | 7.1 (4.7-10.5) | |  | 17 | 8.4 (3.8-17.5) |  | 9 | 9.9 6.9-14.1 |  | 5 | 5.9 (2.5-13.0) |  | 0.0 | 612 | |
| Hill | | M | | 101 | 7.8 (6.2-9.6) | |  | 77 | 7 (5.5-9.0) |  | 66 | 12.3 9.6-15.6 |  | 29 | 6.6 (4.5-9.6) |  | 0.7 | 3368 | |
|  | | F | | 77 | 5.6 (4.2-7.4) | |  | 104 | 9.8 (7.9-12.1) |  | 39 | 8.5 5.7-12.7 |  | 28 | 6.3 (4.0-9.7) |  | 1.8 | 3349 | |
| Terai | | M | | 266 | 16.6 (14.6-18.9) | |  | 246 | 18.0 (15.6-20.8) |  | 75 | 11.8 8.8-15.7 |  | 85 | 11.7 (9.1-14.8) |  | 14.2\*\*\* | 4333 | |
|  | | F | | 241 | 14.5 (11.9-17.6) | |  | 192 | 14.9 (13.0-17.1) |  | 70 | 10.5 7.9-14.0 |  | 82 | 12.7 (10.0-16.0) |  | 3.9\* | 4249 | |
| **Development regions** | | | |  |  | |  |  |  |  |  |  |  |  |  |  |  |  | |
| Eastern | | M | | 64 | 9.0 (7.2-11.3) | |  | 63 | 10.4 (8.1-13.3) |  | 30 | 10.4 6.8-15.8 |  | 28 | 9.7 (6.3-14.7) |  | 0.3 | 1879 | |
|  | | F | | 67 | 8.5 (5.8-12.2) | |  | 54 | 9.6 (7.5-12.3) |  | 31 | 10 6.0-16.2 |  | 44 | 16.9 (12.0-23.1) |  | 11.3\*\* | 1916 | |
| Central | | M | | 170 | 16.1 (13.4-19.2) | |  | 116 | 13.2 (9.7-17.7) |  | 47 | 12 8.2-17.3 |  | 49 | 11.2 (7.8-15.8) |  | 7.6\*\* | 2773 | |
|  | | F | | 156 | 14.9 (11.4-19.2) | |  | 120 | 14.6 (11.8-17.8) |  | 42 | 11.1 7.4-16.3 |  | 37 | 8.6 (5.9-12.3) |  | 11.6\*\* | 2681 | |
| Western | | M | | 64 | 11.0 (9.0-13.4) | |  | 53 | 11.3 (8.6-14.8) |  | 34 | 13.2 8.9-19.2 |  | 18 | 7.1 (4.3-11.5) |  | 1.1 | 1563 | |
|  | | F | | 33 | 5.4 (3.7-7.8) | |  | 54 | 10.6 (7.9-14.0) |  | 14 | 6.9 3.9-11.9 |  | 10 | 4.6 (2.3-9.3) |  | 0.0 | 1540 | |
| Mid-Western | | M | | 47 | 9.7 (6.6-14.2) | |  | 42 | 12.6 (9.5-16.5) |  | 22 | 11.5 8.3-15.8 |  | 11 | 7.1 (4.4-11.4) |  | 0.2 | 1165 | |
|  | | F | | 40 | 8.0 (4.5-13.9) | |  | 35 | 10.5 (7.9-13.9) |  | 20 | 11.1 7.8-15.6 |  | 18 | 10.3 (6.8-15.3) |  | 1.4 | 1176 | |
| Far western | | M | | 45 | 13.5 (11.4-16.0) | |  | 75 | 17.8 (15.3-20.5) |  | 20 | 13.8 9.3-20.1 |  | 13 | 11.6 (7.3-18.0) |  | 0.2 | 1011 | |
|  | | F | | 39 | 11.7 (9.6-14.1) | |  | 52 | 15.4 (11.4-20.5) |  | 10 | 7.8 5.0-11.9 |  | 6 | 6.5 (3.2-12.9) |  | 2.5 | 898 | |

Note: \**p* <0.05, \*\**p*<0.01, \*\*\* *p* <0.001. M=Male children, F=Female children

**Supplementary Table 3** Prevalence estimates for underweight and test for trend over time by socio-demographic factors in 0-59 months children, 2001-2016

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Gender** | **2001** | |  | **2006** | |  | **2011** | |  | **2016** | | **Wald (χ2)** | **Total N** |
| **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |
| Total Both sexes |  | 2753 | 42.7 (41.1-44.4) |  | 2028 | 38.6 (36.5-40.7) |  | 716 | 28.8 (26.6-31.2) |  | 656 | 27 (24.8-29.3) | 247.2\*\*\* | 16613 |
| Total males |  | 1331 | 42.1 (39.6-44.7) |  | 1013 | 37.5 (34.4-40.7) |  | 377 | 29.6 (26.4-33) |  | 337 | 26.7 (23.9-29.6) | 118.8\*\*\* | 8399 |
| Total females |  | 1421 | 43.3 (41.3-45.4) |  | 1015 | 39.7 (36.9-42.6) |  | 339 | 28 (25.0-31.2) |  | 319 | 27.4 (24.0-31.0) | 135.4\*\*\* | 8214 |
| **Age** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0-5 months | M | 88 | 28.2 (23.2-33.7) |  | 48 | 18.5 (13.8-24.3) |  | 23 | 18.7 (12.3-27.4) |  | 17 | 15.5 (9.4-24.5) | 9.4\*\* | 804 |
|  | F | 83 | 25.3 (22.0-28.9) |  | 29 | 13.4 (9.6-18.4) |  | 18 | 17.6 (11.0-26.9) |  | 13 | 12.1 (7.0-20.0) | 10.1\*\* | 756 |
| 6-11 months | M | 123 | 40.5 (35.8-45.3) |  | 72 | 29.7 (22.0-38.7) |  | 31 | 31.3 (21.3-43.5) |  | 26 | 21 (13.4-31.5) | 14.4\*\*\* | 767 |
|  | F | 101 | 31.4 (27.1-36.0) |  | 77 | 31.5 (25.2-38.6) |  | 24 | 16.3 (10.5-24.3) |  | 31 | 24.6 (16.9-34.4) | 6.9\*\* | 842 |
| 12-23 months | M | 309 | 49.1 (44.5-**53**.7) |  | 191 | 37 (31.9-42.4) |  | 94 | 38.8 (31.1-47.3) |  | 83 | 28.4 (23.0-34.6) | 33.3\*\*\* | 1677 |
|  | F | 296 | 43.8 (40.1-47.5) |  | 192 | 41.2 (36.5-46.1) |  | 55 | 22.2 (16.3-29.4) |  | 65 | 29 (22.1-37.1) | 32.1\*\*\* | 1613 |
| 24-35 months | M | 259 | 43.8 (39.8-47.8) |  | 228 | 41.2 (37.1-45.4) |  | 75 | 28.8 (23.2-35.1) |  | 65 | 27.9 (49.4-80.1) | 26.0\*\*\* | 1636 |
|  | F | 307 | 48.1 (43.9-52.3) |  | 244 | 41.5 (36.3-46.8) |  | 78 | 32.4 (25.4-40.3) |  | 79 | 33.5 (26.9-40.8) | 23.2\*\*\* | 1702 |
| 36-47 months | M | 273 | 41 (37.1-44.9) |  | 243 | 43.1 (38.0-48.3) |  | 77 | 27.2 (21.4-33.9) |  | 61 | 25 (19.8-31.2) | 28.0\*\*\* | 1761 |
|  | F | 341 | 50.8 (47.3-54.4) |  | 213 | 44.5 (39.1-49.9) |  | 83 | 34.2 (27.4-41.7) |  | 72 | 27.8 (22.0-34.5) | 47.6\*\*\* | 1650 |
| 48-59 months | M | 281 | 42.4 (38.9-46.0) |  | 232 | 40.8 (35.4-46.4) |  | 77 | 28.9 (22.5-36.3) |  | 85 | 32.7 (26.4-39.7) | 14.3\*\*\* | 1754 |
|  | F | 293 | 45.5 (41.3-49.7) |  | 259 | 46.2 (41.9-50.6) |  | 81 | 35.5 (28.2-43.6) |  | 60 | 27.6 (21.2-35.0) | 23.1\*\*\* | 1651 |
| **Mother's education** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| No education | M | 1089 | 46.9 (44.4-49.5) |  | 706 | 44.8 (41.2-48.5) |  | 223 | 38.7 (33.7-43.9) |  | 161 | 37.4 (32.4-42.6) | 20.9\*\*\* | 4900 |
|  | F | 1118 | 48.7 (46.3-51.1) |  | 722 | 48.4 (44.8-51.9) |  | 220 | 38 (34.4-41.9) |  | 144 | 36 (30.3-42.1) | 32.0\*\*\* | 4767 |
| Primary | M | 133 | 33.2 (29.7-37.0) |  | 138 | 30.4 (26.0-35.1) |  | 69 | 26.9 (20.8-34.0) |  | 67 | 28.2 (22.3-34.9) | 2.8 | 1346 |
|  | F | 175 | 35.4 (32.1-38.9) |  | 149 | 31.7 (26.7-37.2) |  | 56 | 25.2 (19.5-31.9) |  | 66 | 27.7 (22.2-34.0) | 7.4\*\* | 1423 |
| Secondary | M | 72 | 27.6 (24.0-31.5) |  | 123 | 23.7 (19.8-28.0) |  | 69 | 20.5 (14.9-27.5) |  | 81 | 21.2 (17.2-25.9) | 4.0\* | 1504 |
|  | F | 65 | 24 (21.3-26.9) |  | 114 | 24.3 (20.4-28.6) |  | 50 | 15.5 (11.1-21.3) |  | 79 | 21.3 (17.0-26.3) | 2.7 | 1437 |
| Higher | M | 19 | 17.9 (15.4-20.6) |  | 7 | 10.8 (6.9-16.6) |  | 6 | 9.3 (3.5-22.8) |  | 24 | 12.2 (8.2-17.8) | 1.4 | 432 |
|  | F | 25 | 21.2 (18.5-24.0) |  | 7 | 11.9 (4.9-25.9) |  | 4 | 7.6 (3.7-15.0) |  | 20 | 16.3 (10.9-23.8) | 1.2 | 357 |
| **Wealth quintiles** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Poorest | M | 412 | 52 (47.6-56.4) |  | 305 | 46.7 (42.3-51.1) |  | 134 | 41 (35.7-46.6) |  | 79 | 31.8 (25.7-38.6) | 33.8\*\*\* | 2021 |
|  | F | 409 | 51.7 (48.8-54.5) |  | 314 | 47.3 (43.3-51.4) |  | 123 | 39.6 (34.7-44.7) |  | 85 | 34 (27.8-40.8) | 29.6\*\*\* | 2020 |
| Poorer | M | 311 | 46 (42.3-49.8) |  | 264 | 44.1 (38.8-49.6) |  | 91 | 31.9 (25.3-39.2) |  | 76 | 29 (23.1-35.7) | 30.6\*\*\* | 1821 |
|  | F | 334 | 47.3 (43.5-51.2) |  | 249 | 48 (43.0-53.0) |  | 70 | 31.2 (25.5-37.6) |  | 74 | 27.6 (21.1-35.0) | 39.1\*\*\* | 1717 |
| Middle | M | 260 | 42.6 (39.3-46.0) |  | 232 | 42.2 (37.2-47.4) |  | 81 | 30.7 (24.1-38.2) |  | 99 | 33 (26.7-40.1) | 13.0\*\*\* | 1724 |
|  | F | 299 | 46.8 (43.3-50.3) |  | 216 | 41.1 (36.0-46.4) |  | 86 | 27.1 (21.6-33.5) |  | 82 | 32.6 (25.9-40.1) | 30.8\*\*\* | 1733 |
| Richer | M | 214 | 37.4 (33.3-41.6) |  | 133 | 28.7 (23.7-34.2) |  | 45 | 21.4 (15.4-29.0) |  | 66 | 23.4 (18.9-28.6) | 23.7\*\*\* | 1531 |
|  | F | 232 | 38.8 (34.8-43.0) |  | 165 | 33.2 (28.6-38.2) |  | 51 | 24.3 (17.8-32.4) |  | 58 | 23.7 (17.1-31.9) | 24.2\*\*\* | 1548 |
| Richest | M | 116 | 26.7 (23.0-30.8) |  | 79 | 18 (15.0-21.5) |  | 25 | 13.6 (8.3-21.5) |  | 18 | 10.2 (6.1-16.7) | 26.3\*\*\* | 1226 |
|  | F | 109 | 24.4 (21.2-27.9) |  | 70 | 20 (16.6-23.9) |  | 8 | 5.7 (3.4-9.2) |  | 20 | 13.1 (8.2-20.4) | 19.9\*\*\* | 1097 |
| **Supplementary Table 3** *Continued* | | | |  |  |  |  |  |  |  |  |  |  |  |
| **Variables** | **Gender** | **2001** | |  | **2006** | |  | **2011** | |  | **2016** | | **Wald (χ2)** | **Total N** |
| **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |  | **N** | **% (95% CI)** |
| **Type of residence** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Urban | M | 62 | 28.4 (24.6-32.6) |  | 70 | 21.6 (18.3-25.2) |  | 17 | 15.6 (11.2-21.3) |  | 158 | 23.5 (20.0-27.5) | 0.7 | 1326 |
|  | F | 57 | 27.4 (23.4-31.7) |  | 77 | 24.9 (20.8-29.4) |  | 19 | 17.4 (12.8-23.3) |  | 142 | 23.3 (19.5-27.5) | 1.5 | 1237 |
| Rural | M | 1270 | 43.1 (40.6-45.7) |  | 943 | 39.7 (36.2-43.2) |  | 360 | 30.9 (27.4-34.6) |  | 178 | 30.3 (26.2-34.7) | 66.0\*\*\* | 7074 |
|  | F | 1364 | 44.4 (42.4-46.4) |  | 937 | 41.7 (38.6-45.0) |  | 320 | 29 (25.8-32.5) |  | 177 | 31.9 (26.5-37.8) | 78.3\*\*\* | 6977 |
| **Ecological zones** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mountain | M | 103 | 40.3 (36.4-44.4) |  | 106 | 43.9 (38.5-49.5) |  | 39 | 36.7 (30.3-43.6) |  | 24 | 26.1 (17.7-36.7) | 4.9\* | 693 |
|  | F | 103 | 44.4 (39.9-49.0) |  | 84 | 40.7 (32.9-48.9) |  | 32 | 35 (27.8-43.0) |  | 25 | 31.1 (23.0-40.6) | 5.5\* | 612 |
| Hill | M | 492 | 37.7 (33.8-41.8) |  | 356 | 32.5 (29.0-36.1) |  | 151 | 28.3 (23.7-33.3) |  | 83 | 19 (15.2-23.4) | 54.8\*\*\* | 3361 |
|  | F | 556 | 40 (37.5-42.7) |  | 362 | 34 (30.5-37.7) |  | 112 | 24.6 (20.5-29.2) |  | 76 | 17.1 (13.5-21.6) | 93.1\*\*\* | 3352 |
| Terai | M | 736 | 46 (42.2-49.7) |  | 552 | 40.4 (35.3-45.8) |  | 187 | 29.5 (24.6-35.0) |  | 230 | 31.3 (27.7-35.1) | 66.2\*\*\* | 4335 |
|  | F | 762 | 45.9 (42.5-49.3) |  | 568 | 44.2 (39.7-48.9) |  | 195 | 29.4 (25.0-34.2) |  | 218 | 33.9 (29.1-39.1) | 52.2\*\*\* | 4249 |
| **Development regions** | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Eastern | M | 255 | 36 (31.6-40.8) |  | 184 | 30.7 (26.1-35.7) |  | 79 | 27.1 (20.7-34.7) |  | 74 | 25.9 (19.9-32.9) | 12.8\*\*\* | 1882 |
|  | F | 288 | 36.6 (32.0-41.4) |  | 197 | 35.2 (29.9-40.9) |  | 74 | 23.9 (17.8-31.3) |  | 70 | 27.2 (20.6-35.0) | 15.7\*\*\* | 1916 |
| Central | M | 481 | 45.4 (40.0-50.9) |  | 328 | 37.2 (30.1-44.8) |  | 101 | 25.8 (20.6-31.9) |  | 126 | 28.5 (23.9-33.7) | 56.7\*\*\* | 2775 |
|  | F | 504 | 48 (43.6-52.5) |  | 325 | 39.5 (33.3-46.1) |  | 127 | 33.3 (27.8-39.2) |  | 118 | 27.4 (21.2-34.7) | 61.9\*\*\* | 2682 |
| Western | M | 224 | 38.3 (34.3-42.4) |  | 177 | 38 (31.6-44.9) |  | 75 | 29.3 (20.5-39.8) |  | 61 | 23.8 (17.8-31.0) | 19.4\*\*\* | 1565 |
|  | F | 240 | 39 (34.6-43.7) |  | 199 | 39.1 (33.2-45.4) |  | 33 | 15.9 (10.5-23.3) |  | 49 | 23.7 (17.4-31.4) | 33.0\*\*\* | 1541 |
| Mid-Western | M | 216 | 45.2 (38.6-51.8) |  | 143 | 43 (37.7-48.4) |  | 74 | 38.2 (31.6-45.3) |  | 43 | 26.7 (21.1-33.1) | 15.7\*\*\* | 1166 |
|  | F | 228 | 46.1 (43.2-49.1) |  | 144 | 43.7 (39.3-48.2) |  | 64 | 35.5 (28.7-43.1) |  | 55 | 31.4 (24.5-39.2) | 14.1\*\*\* | 1177 |
| Far western | M | 155 | 46.9 (40.8-53.0) |  | 181 | 43 (37.5-48.8) |  | 49 | 33.7 (26.9-41.3) |  | 32 | 28 (20.9-36.3) | 15.7\*\*\* | 1012 |
|  | F | 161 | 48.3 (43.3-53.3) |  | 149 | 44.6 (39.3-50.1) |  | 42 | 31.3 (25.2-38.2) |  | 27 | 28.2 (20.4-37.5) | 18.1\*\*\* | 898 |

Note: \**p* <0.05, \*\**p*<0.01, \*\*\* *p* <0.001. M=Male children, F=Female children