

Supplementary Table 1. Baseline characteristics for study participants compared to children excluded due to lack of information on BMI measured at age 4 years \pm 6 months old

| | | | Included patients (BMI available at age 48 \pm 6 months) | | | | | Excluded patients (no BMI available at age 48 \pm 6 months) | | | |
|--|------------------------------|--------------------|--|---------------------|-------------------------|--------------------|-------------------|---|---------------------|-------------------------|--------------------|
| | | Total | Underweight range BMI | Normal range BMI | Overweight range BMI | Obese range BMI | Total | Underweight range BMI | Normal range BMI | Overweight range BMI | Obese range BMI |
| Participants | N (%) | 466 997 | 540 (0.1) | 430 681 (92.2) | 26526 (5.7) | 9 250 (2.0) | 336 924 | 2 296 (0.7) | 278 030 (82.5) | 37 052 (11.0) | 19 546 (5.8) |
| BMIz | Mean (SD) | 0.46 (1.09) | -3.51 (0.47) | 0.80 (0.88) | 2.40 (0.28) | 3.66 (0.51) | 0.43 (1.17) | -2.71 (0.64) | 0.11 (0.87) | 1.72 (0.50) | 2.91 (0.73) |
| Age in months at BMIz measurement | Mean (SD) | 49.13 (2.00) | 49.06 (2.50) | 49.13 (1.99) | 49.13 (2.01) | 49.15 (2.11) | 54.30 (36.61) | 85.72 (39.24) | 49.00 (34.58) | 76.69 (36.85) | 83.53 (31.80) |
| Sex | Female N (%) | 226 868 (48.58) | 248 (45.9) | 210 274 (48.8) | 12 455 (47.0) | 3 891 (42.1) | 162 842 (48.3) | 1 029 (44.8) | 136 061 (48.9) | 17 981 (39.8) | 7 771 (48.5) |
| Socio- economic status (the MEDEA index, quintiles rural) + | 1 Least deprive d area | 57 439 (12.3) | 51 (0.1) | 53 877 (93.8) | 2 750 (4.8) | 761 (1.3) | 50 398 (15.0) | 349 (0.7) | 42 208 (83.7) | 5 557 (11.0) | 2 284 (4.5) |
| | 2 | 68 720 (14.7) | 80 (0.1) | 63 799 (92.8) | 3 715 (5.4) | 1 126 (1.6) | 47 392 (14.1) | 301 (0.6) | 38 886 (82.1) | 5 471 (11.5) | 2 734 (5.8) |
| | 3 | 71 416 (15.3) | 79 (0.1) | 65 660 (91.9) | 4 170 (5.8) | 1 507 (2.1) | 47 313 (14.0) | 330 (0.7) | 38 274 (80.9) | 5 564 (11.8) | 3 145 (6.6) |
| | 4 | 72 801 (15.6) | 79 (0.1) | 66 407 (91.2) | 4 569 (6.3) | 1 746 (2.4) | 49 127 (14.6) | 325 (0.7) | 39 808 (81.0) | 5 755 (11.7) | 3 239 (6.6) |
| | 5 Most deprive d area | 77 129 (16.5) | 117 (0.2) | 69 581 (90.2) | 5 259 (6.8) | 2 172 (2.8) | 55 468 (16.5) | 444 (0.8) | 44 928 (81.0) | 6 134 (11.1) | 3 962 (7.1) |
| | Rural N (%) | 94 825 (20.3) | 100 (0.1) | 88 571 (93.4) | 4 666 (4.9) | 1 488 (1.6) | 59 418 (17.6) | 404 (0.7) | 49 898 (84.0) | 6 110 (10.3) | 3 006 (5.1) |
| | Missing | 24 667 (5.3) | 34 (0.1) | 22 786 (92.4) | 1 397 (5.7) | 450 (1.8) | 27 808 (8.3) | 143 (0.5) | 24028 (86.4) | 2 461 (8.8) | 1 176 (4.2) |
| Nationality | Spanish N (%) | 415 829 (89.0) | 439 (81.3) | 383 739 (89.1) | 23 568 (88.8) | 8 083 (87.4) | 272 974 (81.0) | 1 557 (67.8) | 225 915 (81.3) | 29 833 (80.5) | 15 669 (80.2) |
| | Other N (%) | 51168 (10.96) | 101 (18.7) | 46 942 (10.9) | 2 958 (11.2) | 1 167 (12.6) | 63 950 (19.0) | 739 (32.2) | 52 115 (18.7) | 7 219 (19.5) | 3 877 (19.8) |

Supplementary Table 2. Cumulative Incidence according to BMIz category and sex

| Gender | Category | N of fractures ^a | Cumulative Incidence (%) | 95% CI | |
|--------------------------|-----------------------|-----------------------------|--------------------------|--------|-------|
| Any fracture | | | | | |
| Female | Underweight range BMI | <5 | | | |
| | Normal range BMI | 7932 | 8.13 | 7.87 | 8.40 |
| | Overweight range BMI | 589 | 9.18 | 8.34 | 10.02 |
| | Obese range BMI | 212 | 11.01 | 8.81 | 13.21 |
| Male | Underweight range BMI | 14 | 13.84 | 4.66 | 23.02 |
| | Normal range BMI | 10267 | 11.90 | 11.50 | 12.29 |
| | Overweight range BMI | 743 | 13.25 | 11.32 | 15.19 |
| | Obese range BMI | 302 | 14.64 | 10.80 | 18.48 |
| Upper extremity fracture | | | | | |
| Female | Underweight range BMI | <5 | | | |
| | Normal range BMI | 5939 | 5.89 | 5.68 | 6.10 |
| | Overweight range BMI | 442 | 6.69 | 5.96 | 7.43 |
| | Obese range BMI | 156 | 7.14 | 5.89 | 8.40 |
| Male | Underweight range BMI | 10 | 10.98 | 2.25 | 19.71 |

| | | | | | |
|--------------------------|-----------------------|------|------|------|-------|
| | Normal range BMI | 7814 | 9.02 | 8.66 | 9.37 |
| | Overweight range BMI | 539 | 9.84 | 8.01 | 11.67 |
| | Obese range BMI | 212 | 9.49 | 7.58 | 11.40 |
| Lower extremity fracture | | | | | |
| Female | Underweight range BMI | <5 | | | |
| | Normal range BMI | 1564 | 1.98 | 1.82 | 2.14 |
| | Overweight range BMI | 142 | 2.59 | 2.12 | 3.05 |
| | Obese range BMI | 52 | 3.93 | 2.08 | 5.79 |
| Male | Underweight range BMI | <5 | 3.51 | 0.00 | 8.62 |
| | Normal range BMI | 1806 | 2.54 | 2.37 | 2.71 |
| | Overweight range BMI | 171 | 3.32 | 2.56 | 4.08 |
| | Obese range BMI | 82 | 5.92 | 2.45 | 9.39 |
| Axial fracture | | | | | |
| Female | Underweight range BMI | <5 | | | |
| | Normal range BMI | 592 | 0.51 | 0.45 | 0.57 |
| | Overweight range BMI | 26 | 0.36 | 0.20 | 0.52 |
| | Obese range BMI | 14 | 0.48 | 0.21 | 0.75 |
| Male | Underweight range BMI | <5 | 1.67 | 0.00 | 3.56 |

| | | | | | |
|--|----------------------|-----|------|------|------|
| | Normal range BMI | 917 | 0.85 | 0.76 | 0.93 |
| | Overweight range BMI | 56 | 0.57 | 0.40 | 0.74 |
| | Obese range BMI | 21 | 0.64 | 0.32 | 0.96 |

a) Where numbers less than 5, aggregated to prevent secondary disclosure of data

Supplementary Table 3. Association between BMI categories and specific fracture site risks

| | | Unadjusted HR | 95.0% CI | Adjusted HR ^a | 95.0% CI |
|----------------------|----------------------|---------------|--------------|--------------------------|--------------|
| Humerus/Proximal arm | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 0.95 | 0.77 to 1.17 | 0.94 | 0.77 to 1.16 |
| | Obese range BMI | 0.73 | 0.49 to 1.08 | 0.71 | 0.48 to 1.05 |
| Collarbone | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 0.96 | 0.77 to 1.19 | 0.95 | 0.76 to 1.19 |
| | Obese range BMI | 1.14 | 0.81 to 1.60 | 1.12 | 0.79 to 1.57 |
| Wrist/forearm | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 1.15 | 1.07 to 1.25 | 1.14 | 1.06 to 1.24 |
| | Obese range BMI | 1.15 | 1.02 to 1.31 | 1.14 | 1.00 to 1.29 |
| Hand | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 1.04 | 0.91 to 1.19 | 1.02 | 0.90 to 1.17 |
| | Obese range BMI | 1.43 | 1.18 to 1.73 | 1.37 | 1.14 to 1.66 |
| Femur | Normal range BMI | REF | | REF | |

| | | | | | |
|----------------|----------------------|------|--------------|------|--------------|
| | Overweight range BMI | 0.71 | 0.33 to 1.52 | 0.70 | 0.33 to 1.48 |
| | Obese range BMI | 1.75 | 0.77 to 3.95 | 1.63 | 0.72 to 3.69 |
| Tibia / fibula | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 1.57 | 1.31 to 1.87 | 1.57 | 1.31 to 1.87 |
| | Obese range BMI | 1.81 | 1.38 to 2.37 | 1.81 | 1.38 to 2.37 |
| Foot | Normal range BMI | REF | | REF | |
| | Overweight range BMI | 1.35 | 1.16 to 1.58 | 1.34 | 1.15 to 1.57 |
| | Obese range BMI | 1.68 | 1.34 to 2.13 | 1.66 | 1.32 to 2.10 |

a) Adjusted for sex, age (in months), socioeconomic status (the MEDEA index) and nationality

Supplementary Figure 1. Cumulative incidence of fracture according to BMI category.



