Supplement table 1 Basic information of survey sites in six provinces

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Provinces | location | City/  Rural | Iodine level\* | Median Urinary Iodine | | | | | | | | | | | | | | | | | | | |
| Children | | | | | adults | | | | | Pregnant women | | | | | Lactating women | | | | |
| n | 1st | 2nd | 3rd | ave | n | 1st | 2nd | 3rd | ave | n | 1st | 2nd | 3rd | ave | n | 1st | 2nd | 3rd | ave |
| Fujian | South | City | Excessive | 111 | 267.3  (181.4-357.0) | 324.6  (203.3-406.4) | 338.2  (269.6-461.4) | 319.5  (255.5-394.3) | 119 | 174.4  (109.6-240.7) | 196.7  (100.9-255.6) | 202.1  (109.7-280.8) | 196.6  (139.3-264.6) | 61 | 109.1  (72.0-174.4) | 185.1  (86.1-243.2) | 166.0  (91.0-232.0) | 158.7  (114.0-213.6) | 50 | 110.9  (74.1-166.5) | 141.3  (91.8-212.2) | 135.3  (91.2-200.2) | 136.4  (99.4-187.9) |
| Chongqing | South | Rural | Adequate | 100 | 223.0  (155.7-322.5) | 152.4  (112.1-231.1) | 178.2  (140.2-255.4) | 197.3  (143.6-254.1) | 100 | 275.2  (153.1-366.9) | 202.3  (101.5-322.6) | 210.2  (153.9-271.0) | 233.8  (184.0-281.7) | 50 | 207.1  (129.1-302.8) | 139.4  (106.8-181.4) | 187.2  (103.9-417.0) | 151.5  (112.4-190.7) | 50 | 176.1  (115.1-217.4) | 118.8  (69.4-210.8) | 121.6  (84.9-205.0) | 151.3  (111.4-213.1) |
| Shandong | Central | City | Above requirement | 108 | 261.6  (177.3-390.8) | 257.2  (185.5-377.6) | 314.5  (209.8-434.2) | 291.6  (237.4-348.7) | 188 | 307.2  (219.4-437.2) | 270.9  (174.2-361.3) | 343.7  (225.1-459.2) | 332.0  (255.6-387.3) | 76 | 201.6  (136.4-297.4) | 205.8  (120.4-321.5) | 259.1  (169.1-388.1) | 220.7  (169.4-334.7) | 65 | 235.4  (147.5-334.0) | 190.2  (130.5-286.3) | 269.4  (167.2-368.1) | 244.0  (171.1-308.8) |
| Auhui | Central | Rural | Above requirement | 127 | 291.6  (77.8-415.4) | 329.5  (165.6-456.2) | 295.5  (109.1-443.3) | 284.3  (194.1-401.8) | 132 | 325.6  (107.5-454.1) | 381.1  (193.9-488.6) | 368.7  (250.7-518.4) | 338.6  (276.2-442.8) | 50 | 223.1  (74.1-354.2) | 171.9  (59.2-339.6) | 233.1  (126.6-392.4) | 203.7  (144.5-284.0) | 68 | 194.9  (112.1-329.1) | 251.4  (117.9-395.7) | 163.8  (81.3-267.4) | 212.0  (148.2-308.4) |
| Gansu | North | City | Excessive | 100 | 358.6  (266.6-464.1) | 300.7  (231.3-357.1) | 349.5  (281.0-431.0) | 332.1  (284.1-388.2) | 104 | 189.0  (105.3-266.0) | 250.0  (134.1-332.7) | 216.5  (145.0-306.1) | 218.8  (182.3-272.3) | 52 | 266.6  (134.9-346.0) | 318.5  (183.4-382.8) | 250.6  (164.9-317.2) | 274.7  (203.8-315.8) | 59 | 239.5  (162.4-307.6) | 190.8  (125.9-328.7) | 167.5  (101.4-242.9) | 217.9  (165.9-270.8) |
| Jilin | North | Rural | Adequate | 111 | 186.9  (113.5-245.0) | 218.7  (161.1-293.3) | 196.4  (142.4-262.9) | 192.2  (164.9-238.7) | 112 | 262.2  (205.3-335.4) | 269.2  (203.4-336.0) | 279.5  (211.2-359.8) | 266.0  (222.9-323.4) | 58 | 193.4  (123.4-267.3) | 170.8  (120.1-245.7) | 197.3  (135.8-231.3) | 199.6  (145.2-244.4) | 56 | 193.0  (118.2-261.2) | 225.9  (148.2-295.5) | 262.9  (146.6-339.8) | 223.8  (161.0-271.0) |
| Total |  |  |  | 657 | 253.7  (160.6-373.2) | 257.6  (161.9-358.8) | 277.8  (178.5-402.8) | 271.0  (194.1-354.1) | 755 | 251.0  (152.9-358.8) | 250.6  (153.5-349.7) | 259.5  (174.3-376.3) | 260.6  (197.2-337.7) | 347 | 194.8  (113.9-300.7) | 202.0  (120.9-301.4) | 209.9  (133.7-309.1) | 206.9  (153.3-276.4) | 348 | 185.1  (117.2-279.0) | 191.0  (112.3-282.6) | 180.8  (106.4-273.3) | 193.9  (138.4-262.0) |

Ave, average of three times, 1st the first sample, 2nd the second sample, 3rd the third sample in 10 days, \* based on children’s median urinary iodine for three times.

Supplement table 2 Thyroid dysfunction and thyroid function parameters of **children and adults** by different iodine status areas

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Children | | |  | Adults | | |  |
| Jilin  Chongqing  (MUI 100-199µg/L) | Anhui  Shandong  (MUI 200-299µg/L) | Fujian  Gansu  (MUI300-µg/L) | P value | Jilin  Chongqing | Anhui  Shandong | Fujian  Gansu | P value |
| N | 211 | 217 | 211 | 212 | 274 | 223 |
| Sub-Hypothyroidism %(n/N) | 1.91(4/209) | 1.84(4/217) | 3.41(7/205) | 0.003\*\* | 2.84(6/211) | 4.04(11/272) | 7.62(17/217) | 0.047\*\* |
| overt-Hypothyroidism %(n/N) | 0(0/209) | 0(0/217) | 0(0/205) | 0.775 | 0(0/211) | 1.47(4/272) | 0(0/217) | 0.340 |
| Sub-Hyperthyroidism %(n/N) | 2.87(6/209) | 1.38(3/217) | 1.95(4/205) | 0.589 | 1.90(4/211) | 0.74(2/272) | 0.92(2/217) | 0.912 |
| overt-Hyperthyroidism %(n/N) | 0(0/209) | 0.92(2/217) | 0(0/205) | 1.000 | 0(0/211) | 0(0/272) | 0(0/217) | 0.399 |
| Elevated Tg >25 %(n/N) | 0.95(2/211) | 0.00(0/215) | 0.48(1/207) | 0.437 | 3.30(7/212) | 3.66(10/273) | 2.36(5/212) | 0.710 |
| Elevated TgAb >30 %(n/N) | 3.79(8/211) | 3.72(8/215) | 0.97(2/207) | 0.140 | 12.74(27/212) | 14.65(40/273) | 9.30(20/215) | 0.203 |
| Elevated TMAb >20 %(n/N) | 3.32(7/211) | 3.72(8/215) | 1.82(2/110) | 0.670 | 12.74(27/212) | 13.55(37/273) | 7.20（8/111） | 0.210 |
| TSH(mIU/L) Median(QL-QU) | 2.91(2.14-4.02) | 2.79(2.12-3.86) | 2.99(2.10-4.39) | 0.471 | 1.65(1.17-2.34) | 1.86(1.28-2.76) | 2.03(1.34-2.95) | 0.003\*\* |
| Tg(ng/mL) Median(QL-QU) | 6.17(5.09-7.79) | 5.34(3.28-7.33) | 5.11(4.33-6.06) | 0.000\*\* | 8.12(6.56-10.14) | 5.56(4.17-8.02) | 5.87(3.50-6.88) | 0.000\*\* |
| TgAb(%) Median(QL-QU) | 2.86(2.10-3.47) | 1.74(1.17-2.79) | 1.88(1.22-2.78) | 0.000\*\* | 2.21(1.43-3.29) | 2.06(1.41-4.08) | 3.24(2.24-4.61) | 0.000\*\* |
| TMAb(%) Median(QL-QU) | 1.61(1.06-2.44) | 1.85(1.49-2.30) | 2.14(1.56-2.91) | 0.000\*\* | 2.12(1.26-3.46) | 2.08(1.42-3.90) | 1.98(1.21-3.34) | 0.356 |
| FT3(pmol/L) Mean(SD) | 5.76(0.62) | 5.88(0.62) | 5.80(0.66) | 0.146 | 4.87(0.66) | 4.94(0.79) | 4.83(0.61) | 0.256 |
| FT4(pmol/L) Mean(SD) | 16.47(1.70) | 16.65(1.88) | 17.00(1.83)\* | 0.010\*\* | 15.94(2.59) | 16.62(2.66)\* | 16.44(2.69) | 0.019\*\* |
| TT3(nmol/L)Mean(SD) | 2.52(0.40) | 2.72(0.43)\* | 2.48(0.46) | 0.000\*\* | 1.94(0.34) | 2.08(0.43)\* | 1.96(0.32) | 0.000\*\* |
| TT4(nmol/L) Mean(SD) | 112.83(17.56) | 113.55(18.89) | 109.93(18.13) | 0.098 | 96.31(16.57) | 103.66(20.32)\* | 102.72(15.68)\* | 0.000\*\* |

Note:\* comparison between current group and adequate group(Jilin and Chongqing),\*\* comparison between three groups. One-way ANOVA was used for FT3, FT4, TT3 and TT4; Mann-Whitney U test was adopted for TSH, Tg, TgAb and TMAb;χ2 test was used for subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, overt hyperthyroidism, elevated Tg, Elevated TgAb and elevated TMAb, p<0.05 was considered significant.

Supplement table 3 Thyroid dysfunction and thyroid function parameters of **pregnant women and lactating women** by different iodine status areas

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Pregnant women | | |  | Lactating women | | |  |
| Jilin  Chongqing | Anhui  Shandong | Fujian  Gansu | P-value | Jilin  Chongqing | Anhui  Shandong | Fujian  Gansu  109 | P-value |
| N | 107 | 121 | 101 | 106 | 128 |  |
| Sub-Hypothyroidism %(n/N) | 1.89(2/106) | 2.48(3/121) | 6.00(6/100) | 0.205 | 3.88(4/103) | 3.94(5/127) | 5.05(5/99) | 0.895 |
| Overt Hypothyroidism %(n/N) | 0(0/106) | 0(0/121) | 0.00(0/100) | - | 0.97(1/103) | 0.79(1/127) | 0.00(0/99) | 0.185 |
| Sub-Hyperthyroidism %(n/N) | 0(0/106) | 0(0/121) | 0.00(0/100) | 0.621 | 1.94(2/103) | 3.15(4/127) | 1.01(1/99) | 0.442 |
| Overt Hyperthyroidism %(n/N) | 0(0/106) | 0(0/121) | 0.00(0/100) | 1.000 | 0(0/103) | 1.57(2/127) | 0.00(0/99) | 0.782 |
| Elevated Tg >25 %(n/N) | 0.93(1/107) | 0.83(1/121) | 3.03(3/99) | 0.444 | 2.83(3/106) | 0(0/128) | 1.05(1/95) | 0.147 |
| Elevated TgAb >30 %(n/N) | 11.21(12/107) | 4.96(6/121) | 10.00(10/100) | 0.198 | 10.38(11/106) | 8.59(11/128) | 4.04(4/99) | 0.219 |
| Elevated TMAb >20 %(n/N) | 12.15(13/107) | 4.96(6/121) | 12.50(6/48) | 0.107 | 11.32(12/106) | 9.38(12/128) | 2.5(1/40) | 0.238 |
| TSH (mIU/L) Median(QL-QU) | 1.82(1.12-2.45) | 1.73(1.19-2.56) | 2.10(1.46-2.94) | 0.024\*\* | 1.82(1.29-2.65) | 1.98(1.39-2.85) | 2.40(1.40-3.08) | 0.215 |
| Tg (ng/mL) Median(QL-QU) | 3.11(2.20-4.76) | 6.18(4.80-7.75) | 4.96(3.60-6.28) | 0.000\*\* | 4.04(2.30-6.93) | 5.46(4.10-6.89) | 3.38(1.45-5.17) | 0.000\*\* |
| TgAb(%) Median(QL-QU) | 2.32(1.46-4.33) | 1.91(1.32-3.12) | 2.59(2.05-4.24) | 0.000\*\* | 2.02(1.15-5.20) | 1.82(0.91-3.89) | 2.32(1.62-5.34) | 0.017\*\* |
| TMAb(%) Median(QL-QU) | 2.34(1.96-3.04) | 1.94(1.49-4.34) | 0.90(0.40-1.94) | 0.000\*\* | 2.68(2.21-5.34) | 1.95(1.48-4.56) | 2.36(1.73-3.04) | 0.000\*\* |
| FT3(pmol/L) Mean(SD) | 3.84(0.50) | 4.27(0.69)\* | 4.09(0.53)\* | 0.000\*\* | 4.61(0.72) | 5.00(1.18)\* | 3.98(0.85)\* | 0.000\*\* |
| FT4(pmol/L) Mean(SD) | 12.54(1.70) | 14.30(5.68)\* | 13.60(2.23)\* | 0.002\*\* | 14.93(2.90) | 15.86(4.27)\* | 13.23(2.68)\* | 0.000\*\* |
| TT3(nmol/L) Mean(SD) | 2.70(0.48) | 2.71(0.67) | 2.56(0.56) | 0.103 | 1.90(0.46) | 2.00(0.56) | 2.24(0.51)\* | 0.000\*\* |
| TT4(nmol/L) Mean(SD) | 128.26(22.63) | 140.24(33.88)\* | 132.89(29.75) | 0.008\*\* | 87.72(18.91) | 99.14(23.53)\* | 112.70(26.30)\* | 0.000\*\* |

Note: \* comparison between current group and adequate group(Jilin and Chongqing),\*\* comparison between three groups. .One-way ANOVA test was used for FT3, FT4, TT3 and TT4; Mann-Whitney U test was adoped for TSH, Tg, TgAb and TM-Ab;χ2 test was used for subclinical hypothyroidism, overt hypothyroidism, subclinical hyperthyroidism, overt hyperthyroidism, elevated Tg, Elevated Tg-Ab and elevated Tm-Ab, p<0.05 was considered significant.