#### **Uniform density values**

##### Table S-2: The uniform density values for each segment that we used for our study [[1], [2]](https://paperpile.com/c/cvOHoT/wZye7+AbtsG)

|  |  |
| --- | --- |
| **Body Segment** | **Density (kg/m3 )** |
| Head | 1070 |
| Torso | 820 |
| Ab | 1010 |
| Pelvis | 1020 |
| Thigh | 1040 |
| Shank | 1080 |
| Foot | 1080 |
| Arm | 1060 |
| Forearm | 1100 |
| Hand | 1105 |
|  |  |

#### **Regression equations**

The regression equation we used in our study are based off of the study by Zatsiorsky and Seluyanov 1983.

The equations are in the form :

where is a mass inertia characteristic, is the body weight in kg of the participant and is the height of the participant in cm. The parameters from this equation () can be determined using Table A-2 for males and Table A-3 for females.

##### Table S-3: Coefficients of multiple regression equations for estimating the inertial properties for male body segments from known body mass and height.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ilong(kg cm2)** | | | **Iml (kg cm2)** | | | **Iap (kg cm2)** | | |  | | | **Segment Mass (kg)** | | |
| **Male** | **B0** | **B1** | **B2** | **B0** | **B1** | **B2** | **B0** | **B1** | **B2** |  |  |  | **B0** | **B1** | **B2** |
| Head | 61.6 | 1.72 | 0.0814 | -112 | 1.43 | 1.73 | -78 | 1.171 | 1.519 |  |  |  | 1.296 | 0.0171 | 0.0143 |
| Up-Trunk | 561 | 36.03 | -9.98 | 367 | 18.3 | -5.73 | 81.2 | 36.73 | -5.97 |  |  |  | 8.2144 | 0.1862 | -0.0584 |
| Abdomen | 1501 | 43.14 | -19.8 | 263 | 26.7 | -8 | 618.5 | 39.8 | -12.87 |  |  |  | 7.181 | 0.2234 | -0.0663 |
| Pelvis | -775 | 14.7 | 1.685 | -934 | 11.8 | 3.44 | -1568 | 12 | 7.741 |  |  |  | -7.498 | 0.0976 | 0.04896 |
| Thigh | -13.5 | 11.3 | -2.28 | -3690 | 32.02 | 19.24 | -3557 | 31.7 | 18.61 |  |  |  | -2.649 | 0.1463 | 0.0137 |
| Shank | -70.5 | 1.134 | 0.3 | -1152 | 4.594 | 6.815 | -1105 | 4.59 | 6.63 |  |  |  | -1.592 | 0.0362 | 0.0121 |
| Foot | -15.48 | 0.0144 | 0.088 | -97.09 | 0.414 | 0.614 | -100 | 0.48 | 0.626 |  |  |  | -0.829 | 0.0077 | 0.0073 |
| Arm | -16.9 | 0.662 | 0.0435 | -232 | 1.525 | 1.343 | -250.7 | 1.56 | 1.512 |  |  |  | 0.25 | 0.03012 | -0.0027 |
| Forearm | 5.66 | 0.306 | -0.088 | -67.9 | 0.855 | 0.376 | -64 | 0.95 | 0.34 |  |  |  | 0.3185 | 0.01445 | -0.00114 |
| Hand | -6.26 | 0.0762 | 0.0347 | -13.68 | 0.088 | 0.092 | -19.5 | 0.17 | 0.116 |  |  |  | -0.1165 | 0.0036 | 0.00175 |

##### Table A-4 : Coefficients of multiple regression equations for estimating the inertial properties for female body segments from known body mass and height

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ilong (kg cm2)** | | | **Iml (kg cm2)** | | | **Iap (kg cm2)** | | |  | | | **Segment Mass (kg)** | | |
| **Female** | **B0** | **B1** | **B2** | **B0** | **B1** | **B2** | **B0** | **B1** | **B2** |  |  |  | **B0** | **B1** | **B2** |
| Head | -35.48 | 2.43 | 0.237 | 66.4 | -0.447 | 1.29 | 217.8 | -0.032 | 0.059 |  |  |  | 2.388 | -0.001 | 0.015 |
| Up-Trunk | -2823.2 | 25.8 | 12.8 | -2075 | 15.6 | 9.4 | -4038.5 | 28.6 | 20 |  |  |  | -16.593 | 0.14 | 0.0995 |
| Abdomen | -672.9 | 1.47 | 7.53 | -546 | 2.87 | 5.1 | -368.7 | -6.22 | 8.86 |  |  |  | -2.741 | 0.031 | 0.056 |
| Pelvis | -715.9 | 23.5 | -1.106 | -633 | 10.8 | 2.26 | -987.6 | 14.9 | 3.76 |  |  |  | -4.908 | 0.124 | 0.0272 |
| Thigh | 1339.8 | 6.3 | -8.28 | -2659.4 | 50.35 | 6.96 | -4033.4 | 44.99 | 17.08 |  |  |  | 5.185 | 0.183 | -0.042 |
| Shank | -53.2 | 0.284 | 0.489 | -943.3 | -2.51 | 8.47 | -963.1 | -3.57 | 9.04 |  |  |  | -0.436 | -0.011 | 0.0238 |
| Foot | 23.9 | 0.337 | -0.059 | -61.4 | 0.348 | 0.406 | -92.24 | 0.486 | 0.558 |  |  |  | -1.207 | -0.0175 | 0.0057 |
| Arm | -118.6 | 1.19 | 0.44 | -330.4 | -0.461 | 2.67 | -151.4 | 0.107 | 1.554 |  |  |  | 0.206 | 0.0053 | 0.0066 |
| Forearm | 7.4 | 0.21 | -0.08 | -138.5 | 0.533 | 0.887 | -132.1 | 0.62 | 0.825 |  |  |  | 0.295 | 0.009 | 0.0003 |
| Hand | -2.138 | 0.053 | 0.0073 | -5.79 | 0.087 | 0.034 | -5.71 | 0.122 | 0.035 |  |  |  | -0.116 | 0.0017 | 0.002 |

#### **References**

[1] [R. F. Chandler, C. E. Clauser, J. T. McConville, H. M. Reynolds, and J. W. Young, “Investigation of inertial properties of the human body,” Air Force Aerospace Medical Research Lab Wright-Patterson AFB OH, 1975. [Online]. Available:](http://paperpile.com/b/cvOHoT/wZye7) <https://apps.dtic.mil/sti/citations/ADA016485>[.](http://paperpile.com/b/cvOHoT/wZye7)

[2] [D. J. Pearsall, J. G. Reid, and L. A. Livingston, “Segmental inertial parameters of the human trunk as determined from computed tomography,” *Ann. Biomed. Eng.*, vol. 24, no. 2, pp. 198–210, Mar. 1996.](http://paperpile.com/b/cvOHoT/AbtsG)