**Additional File 1: Approach, calculation and validation of weight cut-off ranges for the “with obesity” and “without obesity” groups.**

1. **Flowchart representing a summary of how we calculated weight cut-off ranges using average female height and weight, followed by reverse BMI calculation.**

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1. **Mathematics and details involved in the calculation of weight cut-off ranges**

**Average female height = 63.6 inches rounded to 64 inches plus or minus 4 inches**

**Average weight = 169.8 pounds (77.0kg)**

**According to CDC report**[[1]](#footnote-1) **= 2013-2014 data (crude value in women 20 years and over)**

|  |  |  |
| --- | --- | --- |
| **BMI (kg/m2)** | **Classification[[2]](#footnote-2)** |  |
| **< 18.5** | **Underweight** |  |
| **18.5 – 24.9**  | **Normal** |  |
| **25.0 – 29.9** | **Overweight** | **BMI Formula: weight (kg) / [height (m)]2** |
| **30.0 – 34.9** | **Obese, Class I** |  |
| **35.0 – 39.9**  | **Obese, Class II** |  |
| **>40.0 kg/m2** | **Obese, Class III** |  |

**Average BMI based on height (64±4 inches) with average weight of 77.0kg:**

**4 ft 6 ins = 56 ins = 1.4224 m = 2.02 m2 77.0 kg (169.8 lbs) /2.02 = BMI = 38.1**

**5 ft 0 ins = 60 ins = 1.5240 m = 2.32 m2 77.0 kg (169.8 lbs) /2.32 = BMI = 33.1**

**5 ft 4 ins = 64 ins = 1.6256 m = 2.64 m2 77.0 kg (169.8 lbs) /2.64 = BMI = 29.2**

**5 ft 8 ins = 68 ins = 1.7272 m = 2.98 m2 77.0 kg (169.8 lbs) /2.98 = BMI = 25.8**

**6 ft 0 ins = 72 ins = 1.8288 m = 3.34 m2 77.0 kg (169.8 lbs) /3.34 = BMI = 23.0**

**1. Determining a “normal” BMI through reverse BMI calculation using the average female height of 64 inches (1.6256m) and an average BMI of 22 (normal classification):**

**4 ft 6 ins = 56 ins = 1.4224 m = 2.02 m2 BMI = 22 = 22 x 2.02 = 44.44 kg**

**5 ft 0 ins = 60 ins = 1.5240 m = 2.32 m2 BMI = 22 = 22 x 2.32 = 51.04 kg**

**5 ft 4 ins = 64 ins = 1.6256 m = 2.64 m2 BMI = 22 = 22 x 2.64 = 58.08 kg**

**5 ft 8 ins = 68 ins = 1.7272 m = 2.98 m2 BMI = 22 = 22 x 2.98 = 65.56 kg**

**6 ft 0 ins = 72 ins = 1.8288 m = 3.34 m2 BMI = 22 = 22 x 3.34 = 73.48 kg**

**Therefore, for a height of 64±4 inches and a BMI = 22, estimated “without obesity” weight range = 51.0-65.6 kg**

**2. Determining an “obese” BMI through reverse BMI calculation using the average female height of 64 inches and an average BMI of 30, 35 and 40 (with obesity):**

**4 ft 6 ins = 56 ins = 1.4224 m = 2.02 m2 BMI = 30 = 30 x 2.02 = 60.60 kg**

**5 ft 0 ins = 60 ins = 1.5240 m = 2.32 m2 BMI = 30 = 30 x 2.32 = 69.60 kg**

**5 ft 4 ins = 64 ins = 1.6256 m = 2.64 m2 BMI = 30 = 30 x 2.64 = 79.20 kg**

**5 ft 8 ins = 68 ins = 1.7272 m = 2.98 m2 BMI = 30 = 30 x 2.98 = 89.40 kg**

**6 ft 0 ins = 72 ins = 1.8288 m = 3.34 m2 BMI = 30 = 30 x 3.34 = 100.20 kg**

**4 ft 6 ins = 56 ins = 1.4224 m = 2.02 m2 BMI = 35 = 35 x 2.02 = 70.70 kg**

**5 ft 0 ins = 60 ins = 1.5240 m = 2.32 m2 BMI = 35 = 35 x 2.32 = 81.20 kg**

**5 ft 4 ins = 64 ins = 1.6256 m = 2.64 m2 BMI = 35 = 35 x 2.64 = 92.40 kg**

**5 ft 8 ins = 68 ins = 1.7272 m = 2.98 m2 BMI = 35 = 35 x 2.98 = 104.30 kg**

**6 ft 0 ins = 72 ins = 1.8288 m = 3.34 m2 BMI = 35 = 35 x 3.34 = 116.90 kg**

**4 ft 6 ins = 56 ins = 1.4224 m = 2.02 m2 BMI = 40 = 40 x 2.02 = 80.8 kg**

**5 ft 0 ins = 60 ins = 1.5240 m = 2.32 m2 BMI = 40 = 40 x 2.32 = 92.8 kg**

**5 ft 4 ins = 64 ins = 1.6256 m = 2.64 m2 BMI = 40 = 40 x 2.64 = 105.6 kg**

**5 ft 8 ins = 68 ins = 1.7272 m = 2.98 m2 BMI = 40 = 40 x 2.98 = 119.2 kg**

**6 ft 0 ins = 72 ins = 1.8288 m = 3.34 m2 BMI = 40 = 40 x 3.34 = 133.6 kg**

**Therefore, for height of 64±4 ins and a BMI of 30 up to 40, estimated average weight range = 69.6 – 119.2 kg**

**Maximum thresholds were determined by “extreme” scenarios:**

* **A BMI of 18.5 for 4.6ft high, weight is 37.4kg**
* **A BMI of 18.5 for 6.4ft high, weight is 68.9kg**
* **A BMI of 50.0 for 4.6ft high, weight is 101.0kg**
* **A BMI of 50.0 for 6.4ft high, weight is 186.5kg**

**Taken together, final weight group cut-offs:**

**Lean (without obesity) =** >38-65.6kg **Obesity (with obesity) =** ≤85.0-186kg, with ≤85.0 being determined during validation.

Women with unlikely weights (≤37kg or ≥187kg) or who do not fall into one of the weight groups were therefore excluded.

1. **V****alidation of weight ranges to a previous study:**

**Analysis of available pilot data from our previous study (*Jin et al., 2018. Am J Physiol Endocrinol Metab 315: E435–E445* and *Vakili et al. 2013. J Biol Chem; 288(31): 22849–22861*), also supports identifying no obesity and with obesity cohorts of pregnant women based on pre-pregnancy weights of < 65.6 kg versus > 85.0 kg, respectively. We attempted to validate these “cutoffs” by using the recorded height, weight and BMI values available from the women in the study which compared lean (non-obese) versus obese women.**

**Pre-pregnancy weight cutoff <65.6 kg**

* **39 = women with a pre-pregnancy BMI of <25 kg/m2 in *Jin et al. 2018 & Vakili et al. 2013***
* **35 of these women had a pre-pregnancy weight of < 65.6 kg**
* **35 / 39 = 0.897\*100 = 90% capture rate**

**Pre-pregnancy weight cutoff >85.0 kg**

* **23 = women with a pre-pregnancy BMI of >30 kg/m2 in *Jin et al. 2018 & Vakili et al. 2013***
* **23 of these women had a pre-pregnancy weight > 85.0 kg**
* **23/23 = 0.1\*100 = 100% capture rate**

**Thus, this sample analysis above supports designation of no obesity and with obesity cohorts of pregnant women based on weights of < 65.6 kg versus > 85 kg, respectively.**

1. Table 1 and Table 3 in: <https://www.cdc.gov/nchs/data/nhsr/nhsr122-508.pdf> [↑](#footnote-ref-1)
2. Source: Health Canada. Canadian Guidelines for Body Weight Classification in Adults. Ottawa: Minister of Public Works and Government Services Canada; 2003. [↑](#footnote-ref-2)