**Health Score Calculation – Explanation**

The health score is calculated based on multiple health metrics, including blood tests, physical activity, sleep duration, BMI, smoking habits, and stability. Each category has a defined scoring system to ensure a fair and accurate health assessment.

**1. Blood Test Scores (Maximum: 50 points)**

Each blood test parameter is assessed based on age and gender, using predefined scoring ranges.

**Glucose Levels (mg/dL)**

| **Age** | **Excellent (10 pts)** | **Normal (10 pts)** | **Slightly Unhealthy (5 pts)** | **Unhealthy (0 pts)** |
| --- | --- | --- | --- | --- |
| 18-40 | 70-90 | 70-99 | ⚠️ 100-125 (Pre-Diabetes) | 🚨 126+ (Diabetes) |
| 41-60 | 70-95 | 70-105 | ⚠️ 105-125 | 🚨 126+ |
| 61+ | 70-100 | 70-110 | ⚠️ 110-130 | 🚨 130+ |

**Hemoglobin Levels (g/dL)**

| **Age** | **Gender** | **Excellent (10 pts)** | **Normal (10 pts)** | **Slightly Unhealthy (5 pts)** | **Unhealthy (0 pts)** |
| --- | --- | --- | --- | --- | --- |
| 18-40 | Male | 14-16.5 | 13.8-17.2 | ⚠️ 10-12 | 🚨 <7 or >20 |
| 18-40 | Female | 13-15 | 12.1-15.1 | ⚠️ 10-12 | 🚨 <7 or >20 |
| 41-60 | Male | 13.5-16 | 13.5-17 | ⚠️ 9-11.5 | 🚨 <7.5 or >19 |
| 41-60 | Female | 12.5-14.5 | 12-15 | ⚠️ 9-11.5 | 🚨 <7.5 or >19 |

**Cholesterol Levels (mg/dL)**

| **Age** | **Excellent (10 pts)** | **Normal (10 pts)** | **Slightly Unhealthy (5 pts)** | **Unhealthy (0 pts)** |
| --- | --- | --- | --- | --- |
| 18-40 | 150-180 | ≤ 200 | ⚠️ 200-239 | 🚨 240+ |
| 41-60 | 150-190 | ≤ 210 | ⚠️ 210-249 | 🚨 250+ |
| 61+ | 150-200 | ≤ 220 | ⚠️ 220-259 | 🚨 260+ |

**Creatinine Levels (mg/dL)**

| **Age** | **Gender** | **Excellent (10 pts)** | **Normal (10 pts)** | **Slightly Unhealthy (5 pts)** | **Unhealthy (0 pts)** |
| --- | --- | --- | --- | --- | --- |
| 18-40 | Male | 0.8-1.2 | 0.7-1.3 | ⚠️ 1.3-1.5 | 🚨 >2.0 |
| 18-40 | Female | 0.6-1.0 | 0.6-1.1 | ⚠️ 1.3-1.5 | 🚨 >2.0 |

**White Blood Cell Count (WBC)**

| **Age** | **Excellent (10 pts)** | **Normal (10 pts)** | **Slightly Unhealthy (5 pts)** | **Unhealthy (0 pts)** |
| --- | --- | --- | --- | --- |
| 18-40 | 5,000-9,000 | 4,000-11,000 | ⚠️ 3,000-4,000 | 🚨 <2,000 or >30,000 |

Each test result contributes between **0 to 10 points**, based on the predefined health ranges.

**2. Physical Activity Score (Maximum: 15 points)**

The score is determined by step count and adjusted based on the user's age:

* **10,000+ steps** → **15 points**
* **7,500 - 9,999 steps** → **10 points**
* **5,000 - 7,499 steps** → **5 points**
* **Less than 5,000 steps** → **0 points**

**3. Sleep Duration Score (Maximum: 10 points)**

The score is determined based on sleep duration and adjusted by age:

* **7 - 9 hours** → **10 points**
* **5 - 6.9 hours** → **5 points**
* **Less than 5 hours** → **0 points**

**4. BMI Score (Maximum: 20 points)**

Calculated using **BMI = weight (kg) / height² (m²)**:

* **BMI < 16 (Severely Underweight)** → **0 points**
* **BMI 16 - 16.9 (Moderately Underweight)** → **5 points**
* **BMI 17 - 18.4 (Mildly Underweight)** → **10 points**
* **BMI 18.5 - 24.9 (Healthy range)** → **20 points**
* **BMI 25 - 29.9 (Overweight)** → **15 points**
* **BMI 30 - 34.9 (Obese Class I)** → **10 points**
* **BMI 35 - 39.9 (Obese Class II)** → **5 points**
* **BMI ≥ 40 (Severely Obese)** → **0 points**

**5. Smoking Penalty (Penalty: -10 to 0 points)**

Smoking only reduces the score, not adds to it:

* **Non-Smoker** → **0 points (No penalty)**
* **Occasional Smoker** → **-5 points**
* **Regular Smoker** → **-10 points**

**6. Stability Bonus (Maximum: 5 points)**

A stability bonus is awarded if no health metric received a **0 score**:

* **No failed metrics** → **5 points**
* **One or more failed metrics** → **0 points**

**7. Comparison to System Average (Maximum: 10 points)**

A user is compared to the system-wide average health score:

* **Above 90% of system average** → **10 points**
* **Below 90% of system average** → **0 points**

**🏆 Final Health Score Calculation**

| **Category** | **Maximum Score** |
| --- | --- |
| Blood Test Results | 50 |
| Physical Activity | 15 |
| Sleep Duration | 10 |
| BMI Score | 20 |
| Smoking Penalty | (-10) to 0 |
| Stability Bonus | 5 |
| Comparison to Average | 10 |
| **Total Possible Score** | **100** |

💡 **Final Notes**

* **85+ points** → Excellent health
* **50 - 84 points** → Moderate health
* **Below 50 points** → Health intervention recommended
* The system dynamically updates the **comparison to average** based on real-time user data.