

# HEALTH INDEX DOCUMENTATION

## What is the Health Index?

The Health Index (HI) is an algorithm designed to score a user's health status and lifestyle based on three main categories: Vitals, Activity, and Well-being. This is done in order to help give users insights to the quality of their health and lifestyle. The score is calculated on a scale of 100 points, so if your Health Index Score (HIS) is high, you can reasonably assume that your overall health and lifestyle is good and healthy. This index is recalculated every Monday based on data collected over the previous week from Helo Devices.

## Categories and Subcategories

There are 3 main categories: Vitals, Activity, and Well-being. Each of these main categories has subcategories that help determine the overall score. The subcategories for each main one is shown below.

## Scoring Logic

Each subcategory is weighted to help determine the overall score for the respective main category. For example, Sleep Duration Analysis accounts for 20% of the overall Well-being category score. The Well-being score can equal a max of 35, so if you had perfect sleep duration, the contribution to the Well-being score would be 7.

*Sleep Duration Analysis Score Contribution:  $35 \times 20\% = 7$*

The same logic applies to all the other subcategories and their respective main category. The score for the main categories and weight of the subcategories is shown below.

<b>Vitals</b>	<b>Max Score: 35</b>
Cardiovascular Analysis	40%
Respiratory Analysis	40%
Overall Analysis	20%
<b>Activity</b>	<b>Max Score: 30</b>
Weekly Sports	30%
Daily Steps	50%
Average Calories Burned	20%

<b>Well-being</b>	<b>Max Score: 35</b>
Sleep Duration Analysis	20%
Sleep Quality Analysis	20%
Stress Analysis	20%
Energy Analysis	10%
Stand Hours	20%
Bioelectrical Impedance Analysis (BIA)	10%

## General Rules/Things To Note

- Missing readings for a specific measurement during the given time span will result in negative or no points.
- Some of the measurements are binary, meaning that if you do not meet a certain amount given the time period allotted, you will not receive points for it. For example, if you do not meet the daily steps requirement for the day, you will not receive credit for it since the goal was not reached

\* Please note that the algorithm is still in Beta phase and will be improved gradually. Weights and Calculation factors might change over time.

# VITALS

**Max Score:** 35

**Description:** Vitals are the result of analysis based on measurements that can directly affect the user's health condition.

## Cardiovascular Analysis

**Weight:** 40%

**Description:** This is the analysis based on measurements related to the user's heart and vascular system related readings.

### Calculation Factors

**Heart Rate: (Weight 17%)** Graded based on the user's average heart rate within the time period. Average is expected to be within 60 to 100 bpm but it varies based on the user's age.

**Blood Pressure: (Weight 13%)** Graded based on the user's average Blood Pressure within the time period. Expected average is  $\leq 120$  Systolic and  $\leq 80$  Diastolic.

**ElectroCardiogram(ECG): (Weight 25%)** Only ECG readings that are analyzed by AI are considered. Expected result is "Normal". Any abnormal reading will result in negative points for this factor.

**Accelerated Photoplethysmograph(APG): (Weight 20%)** Readings over 3 are considered risky and end up in negative points, there is a 10% tolerance. Let's say you did 10 APG measurements between the given time period and 1 is over

3, it will be ignored as it can be a result of high light exposure, movement or loose band/watch.

**Atrial Fibrillation (AFib): (Weight 25%)** It is calculated based on AFib measurement in device and has 20% tolerance as it is constantly ON. Expected results are “normal” and abnormal results will cause negative points.

## Respiratory Analysis

**Weight:** 40%

**Description:** This analysis is based on the respiratory system and oxygen saturation of the body.

### Calculation Factors

**Breath Rate: (Weight 30%)** Graded based on the user's average breath rate within the time period. Average changes based on the user's age but for adults, it is expected to be between 12 to 20 breath per minute.

**Blood Oxygen saturation(SpO2): (Weight 70%)** Each result collected during the time period is evaluated individually as the readings are precise. Each reading should be over 94 or it will be considered as abnormal reading. Tolerance rate is 10%.

## Overall Analysis

**Weight:** 20%

**Description:** This analysis is based on the user's overall health indicators like body temperature fluctuation and Body Mass Index.

### Calculation Factors

**Body Mass Index: (Weight 50%)** This is a simple calculation based on user's height and weight and user is expected to be in healthy zone which is below 18.5.

**Temperature: (Weight 50%)** Graded based on average of the user within the time period. Expected to be between 36°C (96.8°F) and 37.5°C (99.5°F).

# ACTIVITY

**Max Score:** 30

**Description:** This analysis is based on the user's weekly activity level. All calculations under this category are set with goals.

## Calculation Factors

**Weekly Sports: (Weight 30%)** Users are expected to do any type of sport activities for at least 30 minutes, 2 times a week. If the goal is missed, points will be deducted from total.

**Daily Steps: (Weight 50%)** Users are expected to do at least 6000 steps 5 times a week. If the goal is missed, points will be deducted from total.

**Average Calories Burned: (Weight 20%)** This is another indicator of the user's activity level inside the day. Users are expected to burn at least 300 calories per day either from steps or sports activities to match the goal.

# WELL-BEING

**Max Score:** 35

**Description:** This analysis is based on the user's stress level, readiness and BIA readings that contributes the user to have a well-balanced life.

## Calculation Factors

**Sleep Duration Analysis: (Weight 20%)** Sleep duration required changes from age to age, but it is generally expected to be over 7 hours for adults based on WHO reports.

**Sleep Quality Analysis: (Weight 20%)** User's sleep quality is calculated based on many factors like sleep duration, REM sleep ratio, deep sleep ratio, sleep start time and wake up times. Users are expected to have over 70% score for at least 4 days of the week.

**Stress Analysis: (Weight 20%)** The User is expected to maintain a stress level lower than 70 through the week, with a tolerance rate of 10%.

**Energy Analysis: (Weight 10%)** Energy levels are generally restored with good sleep and higher during mornings. Users are expected to maintain a 50 energy level at least 2/3 of the day.

**Stand Hours: (Weight 20%)** To maintain healthy circulation, users should not be sitting for extended periods of time without standing. In this analysis, users are expected to stand up at least once, at 10 different hours of the day. For example, standing up once at 10:00am, 12:00pm, etc. We expect users to do this for at least 5 days of the week.

**Bioelectrical impedance analysis (BIA): (Weight 10%)** This is one of the most complicated analysis of all as it changes for each gender, age group and reading type. Each value is considered to be within range. Considered readings are:

- **Total Body Water (TBW):** Total Body Water is the total water present in the body. Water typically accounts for about 60% of the weight of an adult. A normal value for adult men is 65% up to 30 years old, 60% for 30 to 40, and 58% for 41 to 71. For women, it is 62% up to 30 years, 58% for 30 to 40, and 55% for 41 to 70.
- **Intracellular Water (ICW):** Intracellular Water is water inside of cells. It makes up —generally 2/3— of Total Body Water (along with Extracellular

Water). ICW allows molecules to be transported to the different organelles inside the cell.

- **Extracellular Water (ECW):** Extracellular Water represents body water outside of cells. It makes up — generally 1/3 — of Total Body Water (along with Intracellular Water). ECW helps control the movement of electrolytes, allows oxygen delivery to the cells, and clears waste from metabolic processes. This value can indicate dehydration or water retention.
- **Sodium/Potassium Ratio (NA/K):** The Sodium/Potassium ratio (Na/K refers to the chemical symbols of these elements) provides insight into the body's ability to maintain the balance between sodium and potassium inside and outside of cells. An abnormal ratio can be an indication of poor cellular function, including impaired ability to absorb nutrients, eliminate metabolic waste, and maintain muscle tension and contraction. The ideal value is a ratio of around 0.85 for men and 1.00 for women. A value of 1.60 indicates that there is 60% more sodium in the cell. A value of 0.60 indicates strong dehydration and/or energy malnutrition.
- **Extracellular Mass (ECM):** Extracellular Mass (ECM) includes bone, cartilage, ligaments, and non-metabolically active tissues, along with extracellular water.
- **Body Cell Mass(BCMI):** Body Cell Mass is the metabolically active component of fat-free mass and the single best predictor of nutritional status. The Body Cell Mass Index is calculated as  $BCM/Height^2$  (using  $kg/m^2$ ). A result below 8 for women and under 10 for men can be an indication of malnutrition.