

# Health Score Calculation: A Comprehensive Explanation

## Introduction

The **Health Score (FHS)** is a **composite metric** that quantifies an individual's overall well-being based on multiple factors. It integrates **biometrics, physical activity, sleep quality, and lifestyle factors** into a **single numerical score ranging from 0 to 100**.

A higher **Health Score (FHS)** represents **better overall health**, while a lower score indicates **areas that may require improvement**.

## Why is the Health Score Important?

- Provides an **objective measure of well-being**.
- Helps **track progress** over time.
- Highlights **specific areas** that need improvement.
- Encourages **healthy lifestyle choices**.

The **Health Score (FHS)** is calculated by **combining multiple health indicators**, each contributing to the final score:

- Biometric Health Index (BHI)** – Based on blood test results.
- Activity-Based Health Score (AHS)** – Based on daily steps, exercise, and calorie expenditure.
- Sleep Quality Score (SQS)** – Based on sleep duration and efficiency.
- Final Health Score (FHS)** – A weighted combination of all the sub-scores.

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## 1. Biometric Health Index (BHI)

### What is BHI?

The **Biometric Health Index (BHI)** evaluates an individual's **blood test results**, including **glucose, cholesterol, hemoglobin, and other biomarkers**. It measures **how close** the test values are to the **normal healthy range**.

### Formula for BHI:

$$BHI = 100 - \sum_{i=1}^n (w_i \times D_i)$$

Where:

- $D_i$  = **Deviation** of test result  $i$  from the normal range.
- $w_i$  = **Weight assigned** to each test based on its health impact.
- $n$  = Total number of tests.

**Deviation Calculation:**

$$D_i = \left| \frac{\text{result}_i - \text{normal}_i}{\text{normal range width}} \right| \times 100$$

**Interpretation:**

- **BHI = 100** → Perfect biometrics (all test results within the normal range).
- **BHI < 100** → Some test values are outside the normal range.
- **BHI = 0** → Extremely poor biometrics.

## 2. Activity-Based Health Score (AHS)

**What is AHS?**

The **Activity-Based Health Score (AHS)** measures **physical activity**, including **daily steps**, **active minutes**, and **calories burned**.

**Formula for AHS:**

$$AHS = \left( \frac{\text{Daily Steps}}{10,000} \times 40 \right) + \left( \frac{\text{Active Minutes}}{60} \times 30 \right) + \left( \frac{\text{Calories Burned}}{\text{Target Calories}} \times 30 \right)$$

Where:

- **10,000 steps** is the daily target.
- **60 minutes** of active movement is considered healthy.
- **Target Calories** is an estimated **daily expenditure goal** (e.g., 2500 kcal).

**Interpretation:**

- **AHS = 100** → High activity level, meeting all targets.
  - **AHS < 100** → Physical activity is below optimal levels.
  - **AHS = 0** → No recorded physical activity.
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### 3. Sleep Quality Score (SQS)

#### What is SQS?

The **Sleep Quality Score (SQS)** evaluates an individual's **sleep habits**, focusing on **duration and consistency**.

#### Formula for SQS:

$$SQS = 100 - (|Ideal\ Sleep\ Duration - Actual\ Sleep\ Duration| \times 10)$$

#### Where:

- **Ideal Sleep Duration = 8 hours.**
- **Actual Sleep Duration = Average sleep recorded.**
- **10 points penalty per hour of deviation.**

#### Interpretation:

- **SQS = 100** → Perfect sleep duration.
  - **SQS < 100** → Sleep duration is too short or too long.
  - **SQS = 0** → Very unhealthy sleep patterns.
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### 4. Final Health Score (FHS)

#### What is FHS?

The **Final Health Score (FHS)** combines all the sub-scores into a single overall health score.

#### Formula for FHS:

$$FHS = (0.4 \times BHI) + (0.3 \times AHS) + (0.3 \times SQS)$$

#### Where:

- **BHI** = Biometrics Health Index (40% weight).
- **AHS** = Activity-Based Score (30% weight).
- **SQS** = Sleep Quality Score (30% weight).

#### Interpretation:

- **FHS = 100** → Excellent health.
- **FHS < 100** → Certain areas need improvement.
- **FHS < 50** → Health risks present.
- **FHS < 30** → High risk of chronic health issues.

## Summary

Score Type	Meaning	Formula
BHI	Biometrics Health Index	$BHI = 100 - \sum(w_i \times D_i)$
AHS	Activity-Based Score	$AHS = \frac{Steps}{10,000} \times 40 + \frac{Minutes}{60} \times 30 + \frac{Calories\ Burned}{Target} \times 30$
SQS	Sleep Quality Score	( SQS = 100 - \left( \left(
FHS	Final Health Score	$FHS = (0.4 \times BHI) + (0.3 \times AHS) + (0.3 \times SQS)$

## Conclusion

The **Health Score (FHS)** is a **comprehensive metric** that combines multiple health indicators to give users an **overall wellness rating**. It allows individuals to:

1. **Identify strengths and weaknesses** in their health.
2. **Take actionable steps** to improve fitness, sleep, and biometrics.
3. **Track progress over time** with a standardized metric.

This model can be further improved by:

- **Incorporating nutrition data.**
- **Adding mental health metrics.**
- **Using AI models** to predict future health risks.