# How to Consider Health Factor of Users?

## ***User Inputs***

1. Age

2. Weight

3. Height

4. Gender

5. Activeness Level {Sedentary / Light Activity / Moderate Activity / Active / Very Active}

6. Health Issues {Diabetes / Hypertension / Hypotension / None}

7. Any Bad Habits {Smoking / Alcohol / Both / None}

8. Your Goal {Lose Weight / Maintain Weight / Gain Weight}

9. Allergic to any specified Food (If any) {Blank Space to type}

## ***BMR (Source - Wikipedia)***

By using Age, Weight, Height, Gender & Activeness Level we will be calculating the total calories the person requires to run his/her Vital Organs at rest. This will be done by calculating BMR (Basal Metabolic Rate) using **Mifflin-St Jeor Equation**. Calories will be used mainly for the recommender system based on which recipe recommendation will work.

Earlier we were using BMR formula of **Harris-Benedict equation,** it was published in 1919.

1. **For Men = 66.47 + (13.75 \* weight [kg]) + (5.003 \* height [cm]) − (6.755 \* age [years])**
2. **For Women = 655.1 + (9.563 \* weight [kg]) + (1.85 \* height [cm]) − (4.676 \* age [years])**

Later in 1984, the original **Harris-Benedict equations** were revised using new data. In comparisons with actual expenditure, the revised equations were found to be more accurate. Equations were:

1. **For Men: 88.362 + (13.397 \* weight [kg]) + (4.799 \* height [cm]) − (5.677 \* age [years])**
2. **For Women: 447.593 + (9.247 \* weight [kg]) + (3.098 \* height [cm]) − (4.33 \* age** **[years])**

It was the best BMR equation until 1990, when **Mifflin-St Jeor** introduced the equation.

**Mifflin-St Jeor equation:**

1. **For Men: 5 + (10 \* weight [kg]) + (6.25 \* height [cm]) − (5 \* age [years])**
2. **For Women: (9.247 \* weight [kg]) + (3.098 \* height [cm]) − (4.33 \* age** **[years]) - 161**

During the last 100 years, lifestyles have changed and Frankenfield showed it to be about 5% more accurate.

***Activeness Levels / Activity Multiplier:***

**1. Sedentary:** BMR x 1.2 (little or no exercise, desk job)

**2. Lightly active:** BMR x 1.375 (light exercise/ sports 1-3 days/week)

**3. Moderately active:** BMR x 1.55 (moderate exercise/ sports 6-7 days/week)

**4. Very active:** BMR x 1.725 (hard exercise every day, or exercising 2 hours/day)

**5. Extra active:** BMR x 1.9 (hard exercise 2 or more times per day, or training for marathon, or triathlon, etc.)

Multiplying BMR with Activity Multiplier values gives us **Total Daily Energy Expenditure (TDEE).**

## ***Health Factor***

For considering Health Issues, we need another dataset which would help us in deciding that which User should be given which recipe. We will use Carbs {Starch, Sugar, Fibre}, Lipids, Proteins, Cholesterol & Sodium. We need ranges of data which can show that for diabetes what should be the range of carbs, lipids, etc. Same for others as well.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Carbs (Starch, Sugar & Fibre)* | *Fats* | *Proteins* | Cholesterol | Sodium |
| **Diabetic** | 40-50% of TDEE | 25-30% of TDEE or not more than 15 g | 15-20% of TDEE | 125 - 200mg | Less than 2300mg |
| **Hypertension** | 40-55% of TDEE & Minimum 30 g Fibre | 25-27% of TDEE & Saturated Fat Less than 6% | 12-18% of TDEE | 125 - 150mg | Less than 1500mg |
| **Hypotension** | 40-55% of TDEE | 25-27% of TDEE & Saturated Fat Less than 6% | 18-20% of TDEE | 125 - 200mg | Less than 2300mg |
| **None** | 40-65% of TDEE | 20-35% of TDEE | 12-20% of TDEE | 125 - 300mg | Less than 2300mg |

**Fat Intake by Age Groups:**

|  |  |
| --- | --- |
| **2 - 3 Years** | 30 - 40 % of TDEE |
| **4 - 18 Years** | 25 - 35 % of TDEE |
| **19+ Years** | 20 - 35 % of TDEE |

**Protein Needed by Age Groups:**

|  |  |
| --- | --- |
| **Age** | **Protein Needed (Grams/Day)** |
| **1 - 3** | 13 |
| **4 - 8** | 19 |
| **9 - 13** | 34 |
| **14 - 18 (Girls)** | 46 |
| **14 - 18 (Boys)** | 52 |
| **19+ (Women)** | 46 |
| **19+ (Men)** | 56 |

***Example:***

Taking random values for User Inputs.

Age - 22,

Height – 174cm,

Weight - 75Kg,

Gender - Male,

Activeness - No Exercise / Sedentary,

Health Issues - Diabetes

Goal - Maintain Weight

***Calculating BMR -***

**Harris-Benedict equation**

**For Men**= 66.47 + (13.75 \* weight [kg]) + (5.003 \* height [cm]) − (6.755 \* age [years])

**TDEE =** BMR\*Activeness Level

**Calculations -** (66.47 + (13.75 \* 75) + (5.003 \* 174) - (6.755 \* 22)) \* 1.2 = **2183.5584** KCAL/Day

**Harris-Benedict Revised equation**

**For Men**= 88.362 + (13.397 \* weight [kg]) + (4.799 \* height [cm]) − (5.677 \* age [years])

**TDEE =** BMR\*Activeness Level

**Calculations - (**88.362 + (13.397 \* 75) + (4.799 \* 174) – (5.677 \* 22)) \* 1.2 = **2,163.9228** KCAL/Day

**Mifflin-St Jeor equation**

**For Men**= 5 + (10 \* weight [kg]) + (6.25 \* height [cm]) − (5 \* age [years])

**TDEE =** BMR\*Activeness Level

**Calculations - (**5 + (10 \* 75) + (6.25 \* 174) - (5 \* 22)) \* 1.2 = **2079** KCAL/Day

**Mifflin-St Jeor Equation** is considered most accurate as of now & therefore is being used in many online Calorie / BMR Calculators as well.

Now, as we have got **TDEE** using **BMR**. It’s time to calculate the content of Carbs, Protein, Fat, Cholesterol & Sodium.

Calories (KCAL) - Grams (g): 1 KCAL = 0.129598 g

Grams (g) - Calories (KCAL): 1 g = 7.716179 kcal

Milligrams (mg) - Grams (g): 1mg / 1000

* A **gram** of carbohydrate contains 4 **calories**.
* A **gram** of protein also contains 4 **calories**.
* A **gram** of fat contains 9 **calories**.

As user wants to maintain weight & is a Diabetic Patient, the contents for all above listed Nutrients are:

***Carbohydrates:*** 40-50% of Total Calories

**Calculations** -> [(2079 \* 0.4) / 4] to [(2079 \* 0.5) / 4] = ***208g to 260g***

***Fats:*** 25-30% of Total Calories

**Calculations** -> [(2079 \* 0.25) / 9] to [(2079 \* 0.3) / 9] = ***57.75g to 69.3g***

***Proteins:*** 15-20% of Total Calories

**Calculations** -> [(2079 \* 0.15) / 4] to [(2079 \* 0.2) / 4] = ***78g to 104.85g***

***Cholesterol:*** Less Than ***200mg or 0.2g***

***Sodium:*** Less Than ***2300mg or 2.3g***

--------------------------------------------------------------------------------------------------------------------------------------

Source: https://diabetesstrong.com/how-to-find-your-daily-calorie-need/

If a person wants to lose weight, then he/she needs to reduce their 400-500 calories out of total calories a day to reduce 1 Pound or 0.5 kg weight in a week. Which is a very healthy & sustainable rate.

If a person wants to gain weight, then he/she needs to add 500 calories in their total calories a day.

--------------------------------------------------------------------------------------------------------------------------------------

Source: https://inbodyusa.com/blogs/inbodyblog/49311425-how-to-use-bmr-to-hack-your-diet/

Theoretically, any amount that is less than your normal TDEE can cause you to lose weight; it just depends on how quickly you want to see results.

If a person wants to lose weight & is having TDEE above 1800 Calories a day, then only he/she needs to reduce their 400-500 calories out of TDEE to reduce 1 Pound or 0.5 kg weight in a week. Which is a very healthy & sustainable rate.

But if person is having below 1800 Calories TDEE, in that case person should only reduce 200-300 calories.

If a person wants to gain weight it is recommended that, you need to consume approximately 15% more calories per day than what is required to maintain your body weight (that’s the TDEE).

## Reference:

**Carbohydrates Calculator -** <https://www.calculator.net/carbohydrate-calculator.html>

**Fat Calculator** - <https://www.calculator.net/fat-intake-calculator.html>

**Protein Calculator** - https://www.calculator.net/protein-calculator.html

**Macro Calculator -** https://www.calculator.net/macro-calculator.html

**Amount of calories a Diabetic should eat daily -**

https://www.livestrong.com/article/464032-how-many-calories-should-a-diabetic-eat-daily/

**How to calculate nutritional value in grams out of Total Calories** https://www.cnet.com/health/nutrition/ultimate-guide-to-counting-and-tracking-macros/

**Cholesterol Levels -** <https://medlineplus.gov/cholesterollevelswhatyouneedtoknow.html>