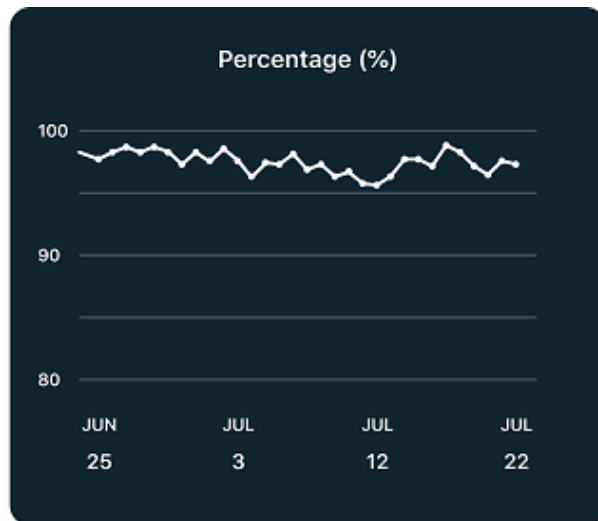# The Fitbit Blood Oxygen Saturation (SpO2) Tracking Feature

This graph shows your nightly average SpO2. Note that Fitbit devices don't measure SpO2 levels <80%. In the graph, any measurement <80% is shown as "<80" on the 80% line.

The Product

Every cell in the human body needs oxygen to function. Blood oxygen saturation (also known as SpO2) is the percentage of a person's blood that contains oxygen and indicates how well their body distributes oxygen from the lungs to the cells. The Fitbit SpO2 feature makes it easier to track this metric. Users can choose to wear their Fitbit device to bed; after waking up and syncing their device, their SpO2 level from the night before is visible in the Fitbit app and on their Fitbit device. Additionally, users can see their blood oxygen saturation trends in the Fitbit app and learn more about this metric in the app and on the Fitbit help site.

Tracking SpO2 can help users be more aware of their blood oxygen saturation trends during sleep. Users can also see if their reading falls above or below their personal baseline. Knowing how well oxygen is being distributed throughout the body can help users understand their overall wellness.

Fitbit devices determine SpO2 levels by using red and infrared light sensors on the back of the device. The sensors shine red and infrared light onto skin and blood vessels and use the

reflected light that bounces back to estimate how much oxygen is in the blood. Machine learning (ML) is used to estimate the SpO2 value and to ensure a high confidence level in the blood oxygen reading. If ML detects an issue with the previous night's reading, an SpO2 value won't appear in the morning. In general, blood oxygen levels tend to remain relatively constant, even during exercise and sleep. Nighttime SpO2 can be lower than daytime SpO2 because breathing rate is usually slower during sleep. Daytime blood oxygen saturation is generally between 95% and 100%, while nighttime SpO2 values are typically above 90%; these values, however, can be influenced by altitude, caffeine intake, or other changes in a user's wellbeing.

The Approach

The Fitbit SpO2 feature aligns with Google's AI Principles[1] in several ways.

- For principle #1, be socially beneficial, the convenience of tracking SpO2 levels at home can help users better understand their overall wellbeing. Traditionally, blood oxygen levels are measured either by using an invasive procedure, where a medical professional draws a person's blood and uses laboratory equipment to measure oxygen saturation, or through a pulse oximeter which uses optical techniques to non-invasively measure SpO2.
- For principle #2, avoid creating or reinforcing unfair bias, and principle #6, uphold standards of scientific excellence, this feature was tested with a diversity of people. Studies show that some pulse oximeters might be less accurate for people with darker skin tones.[2] This potential inaccuracy could lead patients with darker skin tones who experience occult hypoxemia[3] (blood oxygen saturation below 88% despite an oxygen saturation reading of 92% to 96% on a pulse oximeter) to receive inaccurate SpO2 measurements and not receive necessary medical treatment. To foster a more equitable experience for users, Fitbit researchers trained the SpO2 algorithm with data from users with a variety of skin tones.[4]
- For principle #3, be built and tested for safety, this feature uses optical sensors to estimate a user's blood oxygen saturation. The LEDs in the sensors have very low power

---

[1] About Google's AI Principles In 2018, Google published our AI Principles to help guide ethical development and use of the technology. Our objectives: 1. Be socially beneficial. 2. Avoid creating or reinforcing unfair bias. 3. Be built and tested for safety. 4. Be accountable to people. 5. Incorporate privacy design principles. 6. Uphold high standards of scientific excellence. 7.Be made available for use in accord with these principles. In addition to the above objectives, we will not design or deploy AI in the following application areas: 1. Technologies that cause or are likely to cause overall harm. Where there is a material risk of harm, we will proceed only where we believe that the benefits substantially outweigh the risks, and will incorporate appropriate safety constraints. 2. Weapons or other technologies whose principal purpose or implementation is to cause or directly facilitate injury to people. 3. Technologies that gather or use information for surveillance violating internationally accepted norms. 4. Technologies whose purpose contravenes widely accepted principles of international law and human rights. As our experience in this space deepens, this list may evolve.

[2] https://pubmed.ncbi.nlm.nih.gov/15791098/

[3] https://www.nejm.org/doi/full/10.1056/nejmc2029240

[4] Fitbit researchers analyzed data from users with darker skin tones, such as those that have a score of 4 or higher on the Fitzpatrick scale, which estimates how different types of skin respond to ultraviolet light. Fitbit used the Fitzpatrick scale because it is an accepted approximate measure of skin tone, but is exploring the more systematic use of objective colorimetry and scales with gradations that match better to observed human skin tones such as the Monk scale.

so they won't burn skin and are programmed to shut down if the Fitbit device freezes or can't find a signal.[5]

- For principle #5, incorporate privacy design principles, this feature allows users to track blood oxygen trends in a discreet way. Users must provide consent in the Fitbit app to turn on this feature and can remove SpO2 tracking from their Fitbit device at any time. Additionally, users can access and manage their SpO2 data through the Fitbit data export and deletion tools.

The Outcome

Along with other Health Metrics[6] that Fitbit devices can track, including breathing rate, skin temperature, and heart-rate variability, Fitbit SpO2 tracking has given users around the world a convenient way to see trends in their overall wellness[7]. Looking ahead, blood oxygen saturation can play a helpful role in the development of expanded at-home wellness tracking.

---

[5] https://help.fitbit.com/articles/en_US/Help_article/1565.htm

[6] https://www.fitbit.com/global/us/technology/health-metrics

[7] https://help.fitbit.com/articles/en_US/Help_article/2459.htm