

Science with a Little Altitude | QS18

Fah Sathirapongsasuti, PhD





पुमोरी
Pumori

▲ EBC

▲ Everest

● Kala Patthar

● Gorak Shep

ल्होत्से
Lhotse

China

Nepal

● Lobuche

खुम्जुंग
Khumjung

महालंगुर
Himal

नाम्चे
Namche

Chukhung

● Dingboche

अमा दब्लम
Ama Dablam

● Tyangboche

● Namche Bazar

बेन्कार
Benkar

● Phakding

चौरीखर्क
Chaurikharka

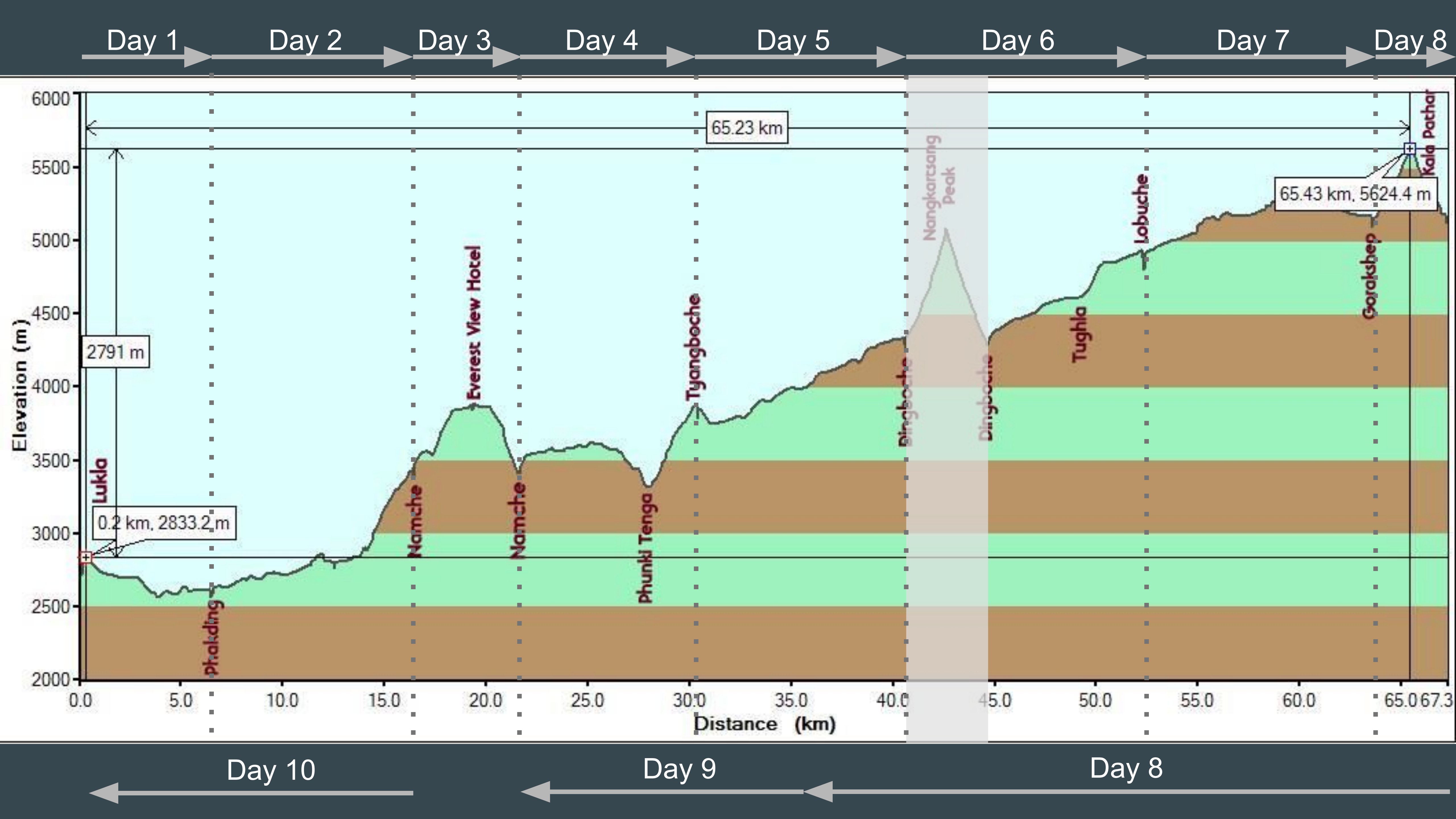
चैम्लिंग
Chamlang

मीरा पीक
Mera Peak

● Lukla

Takasindu

मकाल



Everest







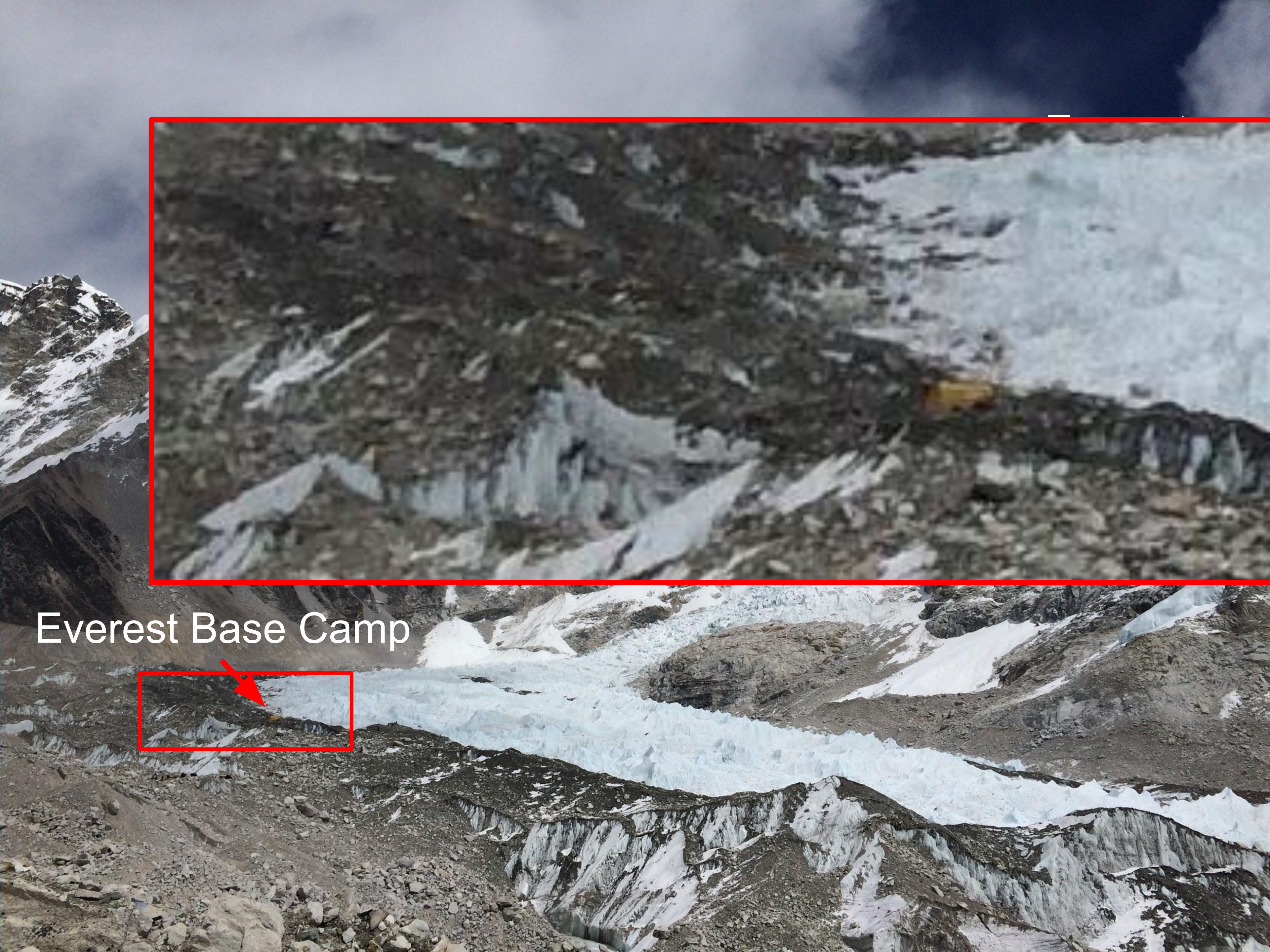
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SCOTT FISCHER
MAY 10 1996

Everest



Everest Base Camp

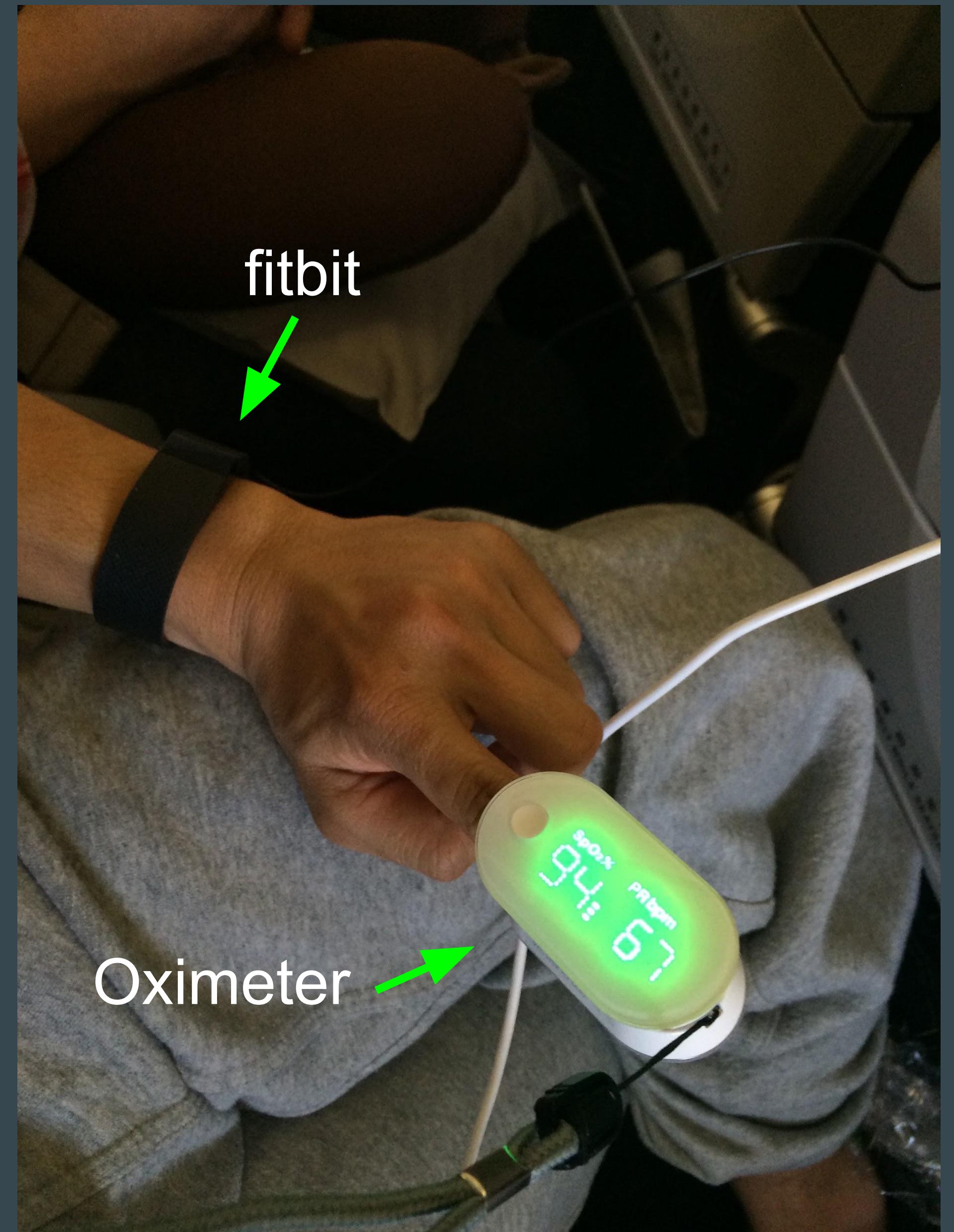




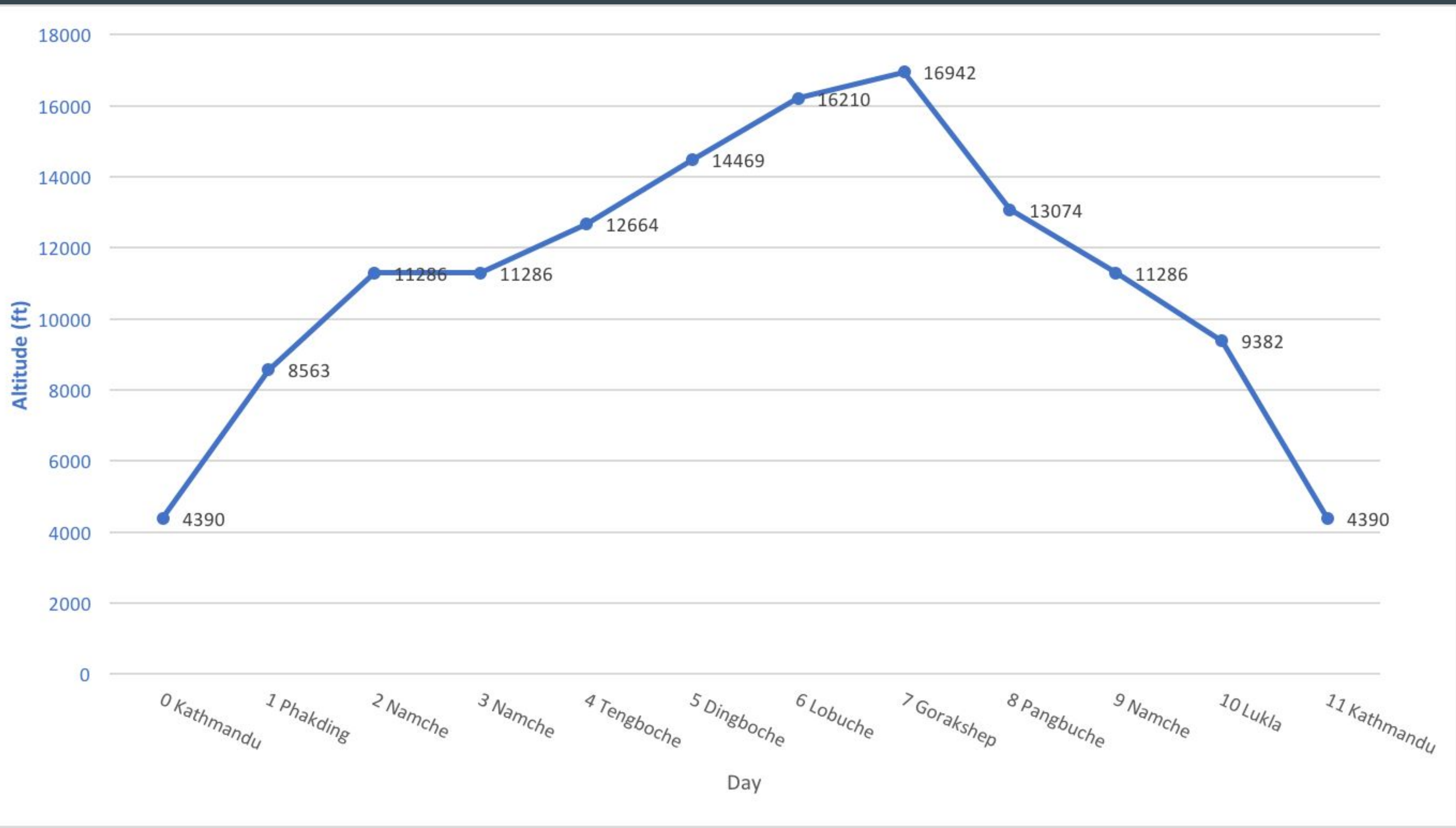
Everest Base Camp

Data Collection

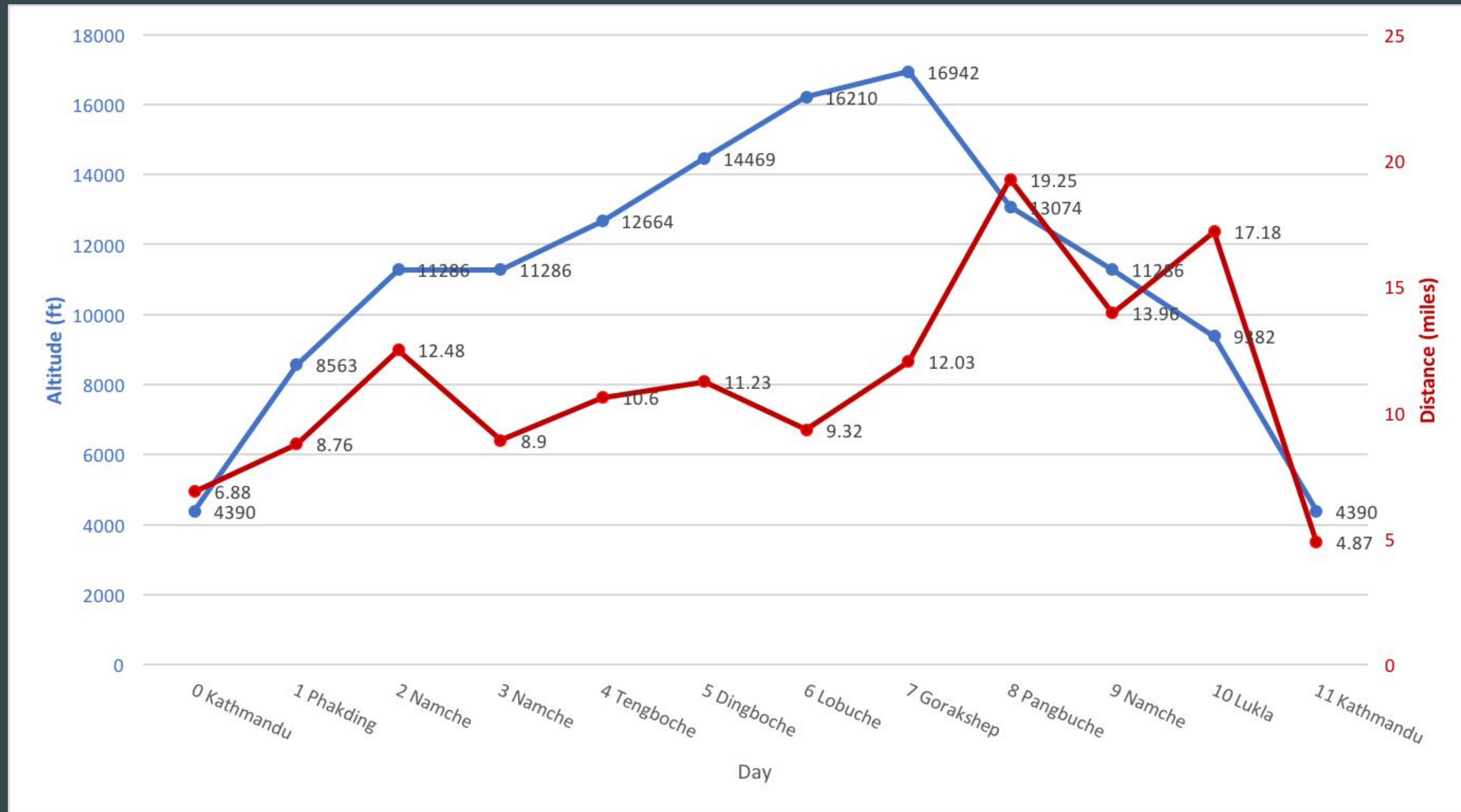
- Activities (elevation gain, step, calories) using [Fitbit Charge HR](#)
- Peripheral capillary oxygen saturation (spO2) using [iHealth Oximeter](#)
 - Frequency: >5 times / day
 - Morning (wakeup)
 - At tea houses
 - On arrival at lodges
 - Before bed
 - Replicates: 3-5 replicates per measurement



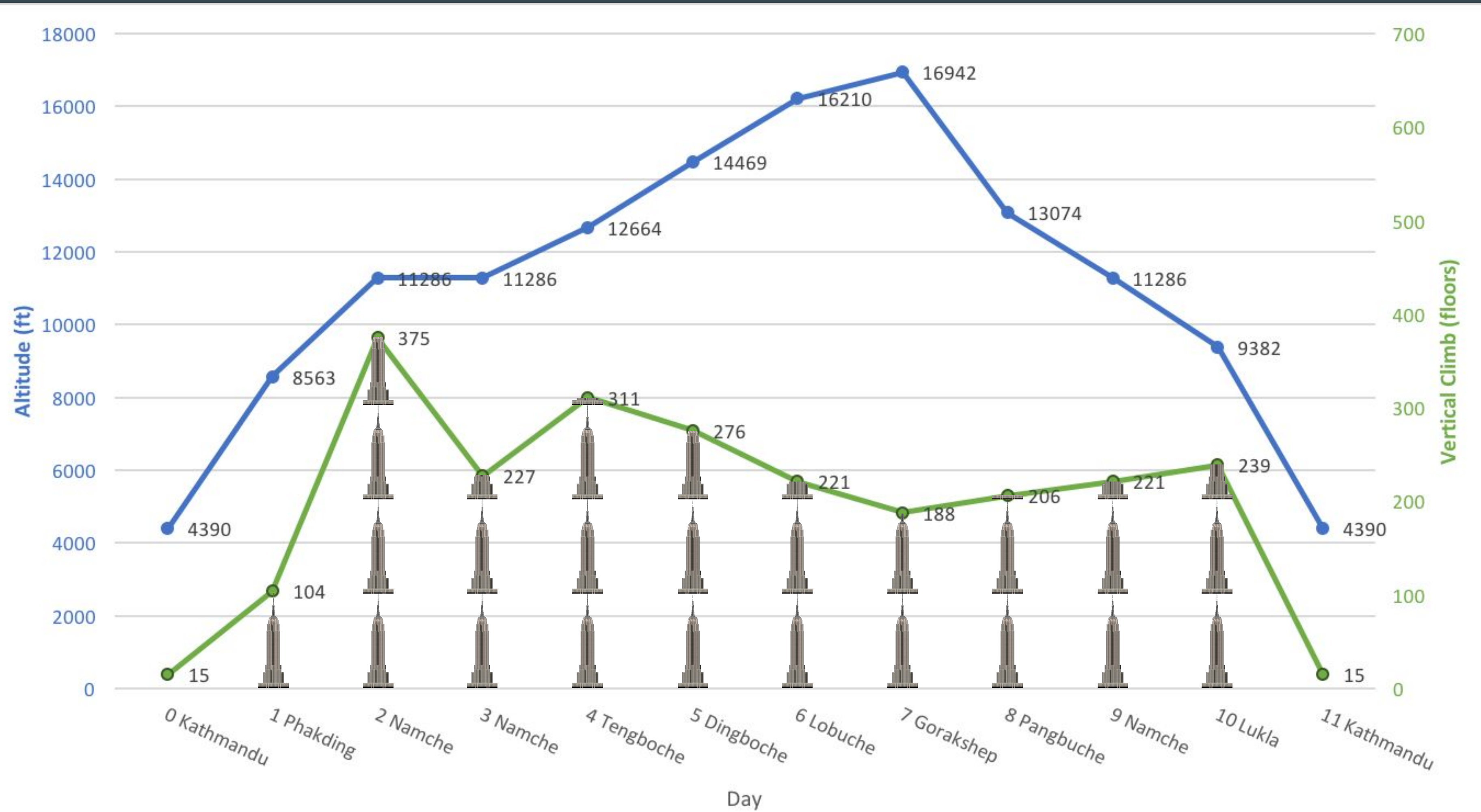
Data



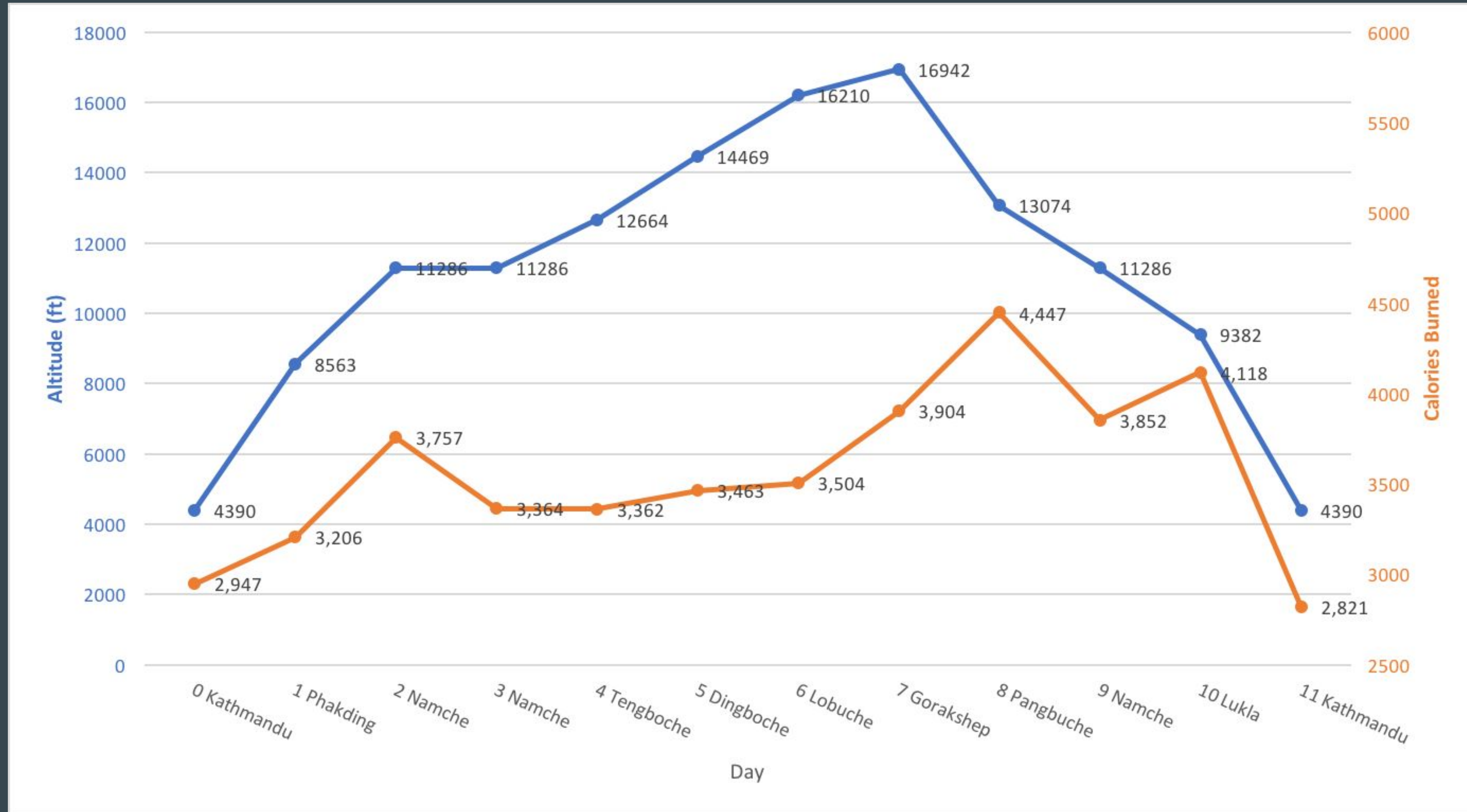
Distance



Vertical climb

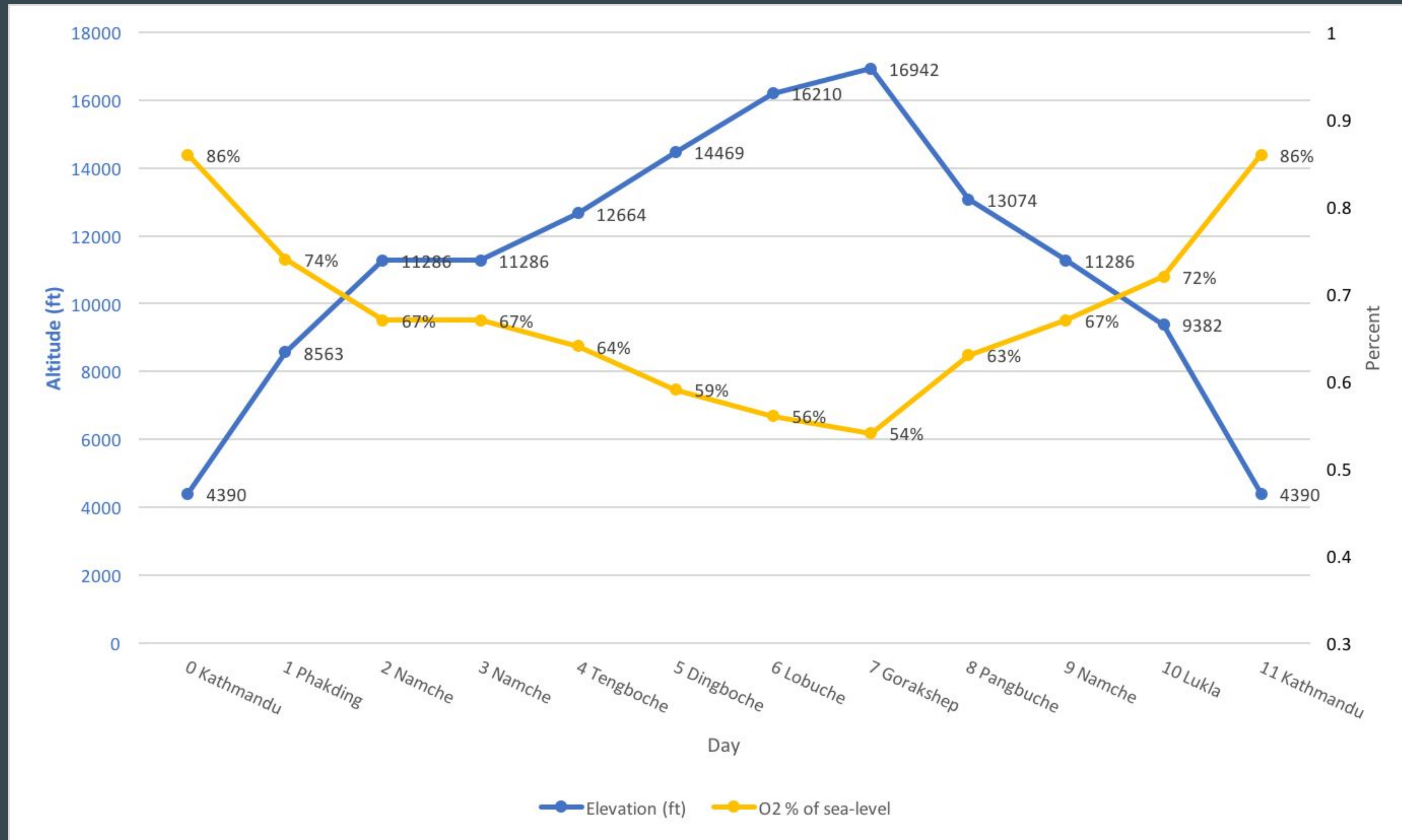


Calories

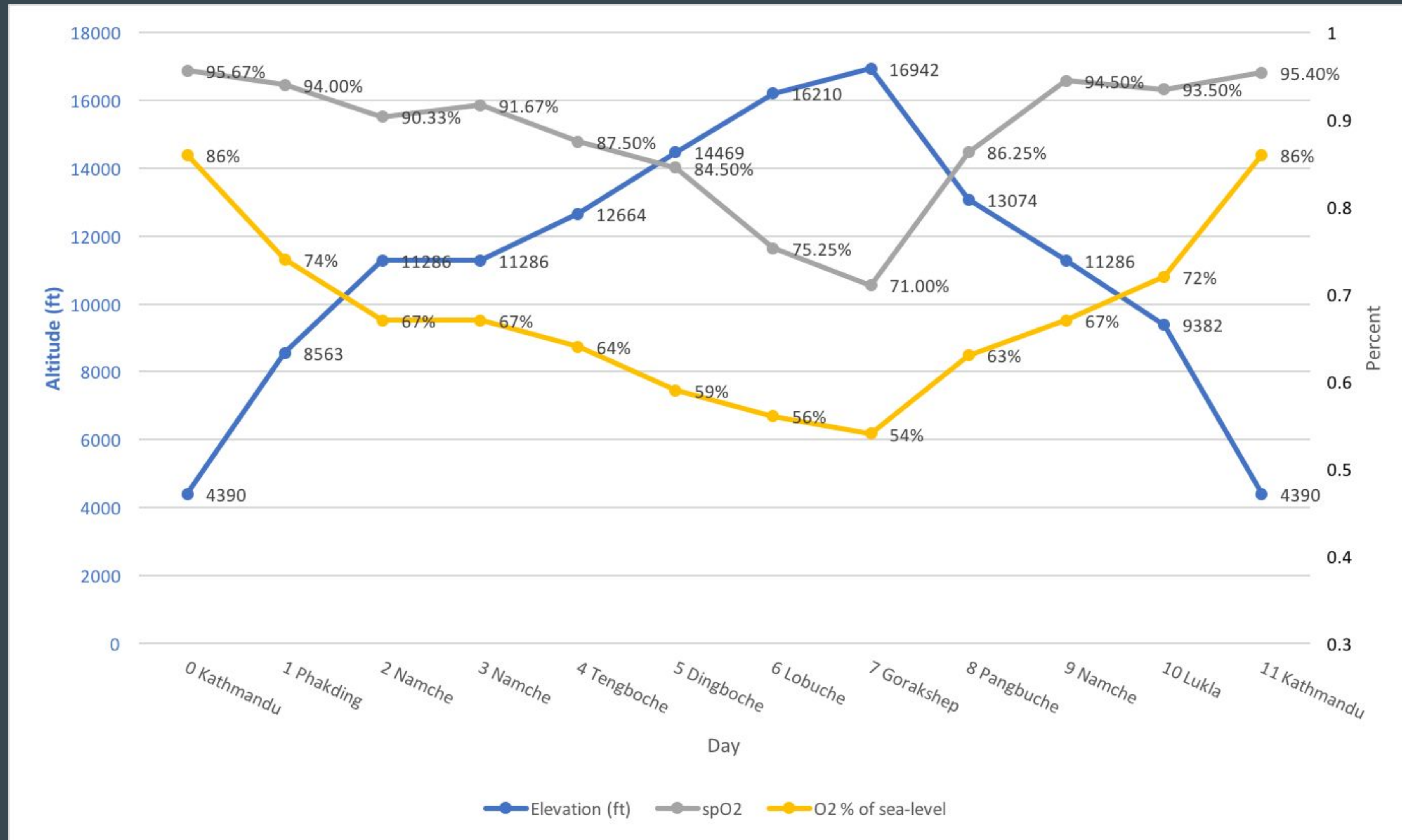




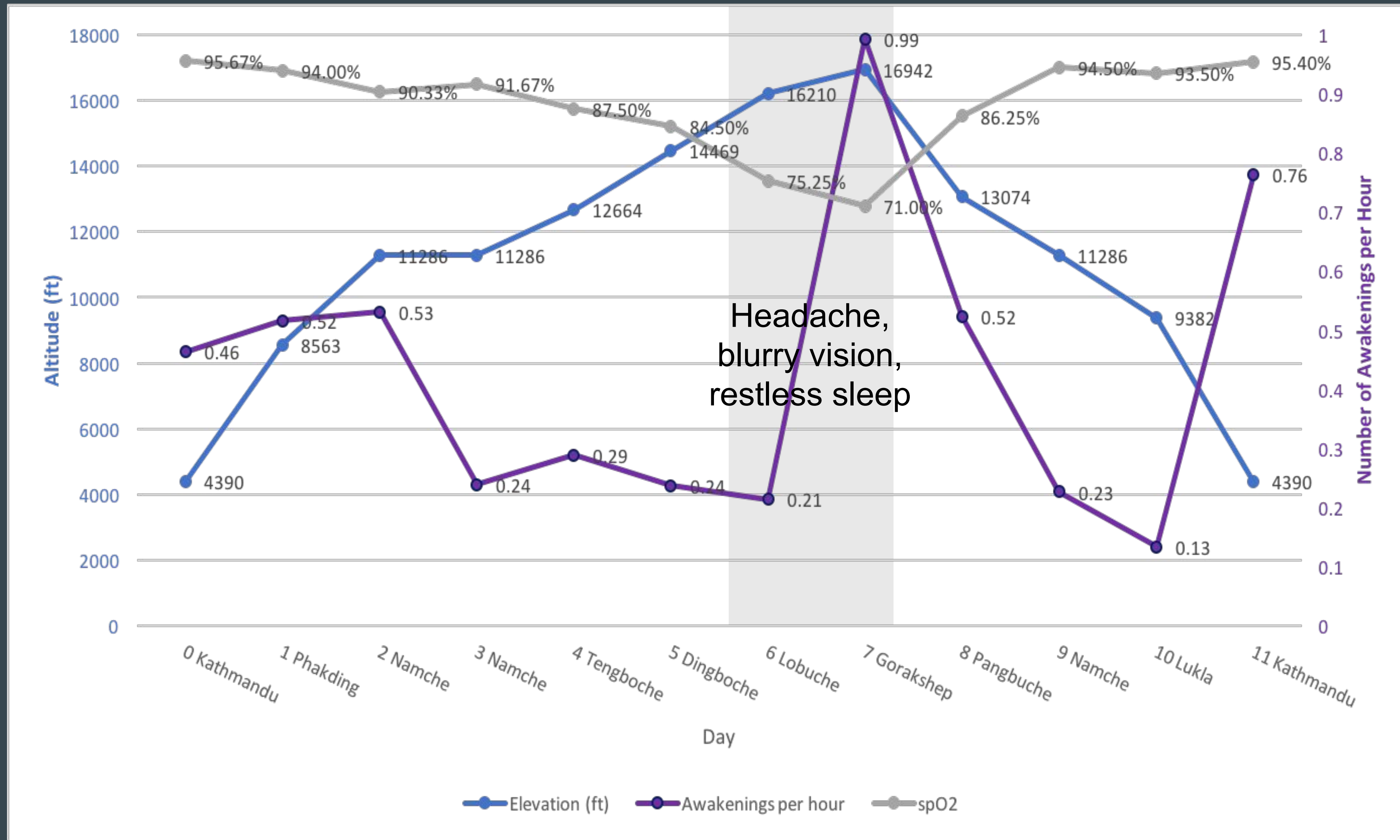
Effect of altitude on inhaled O2 (% of sea-level)



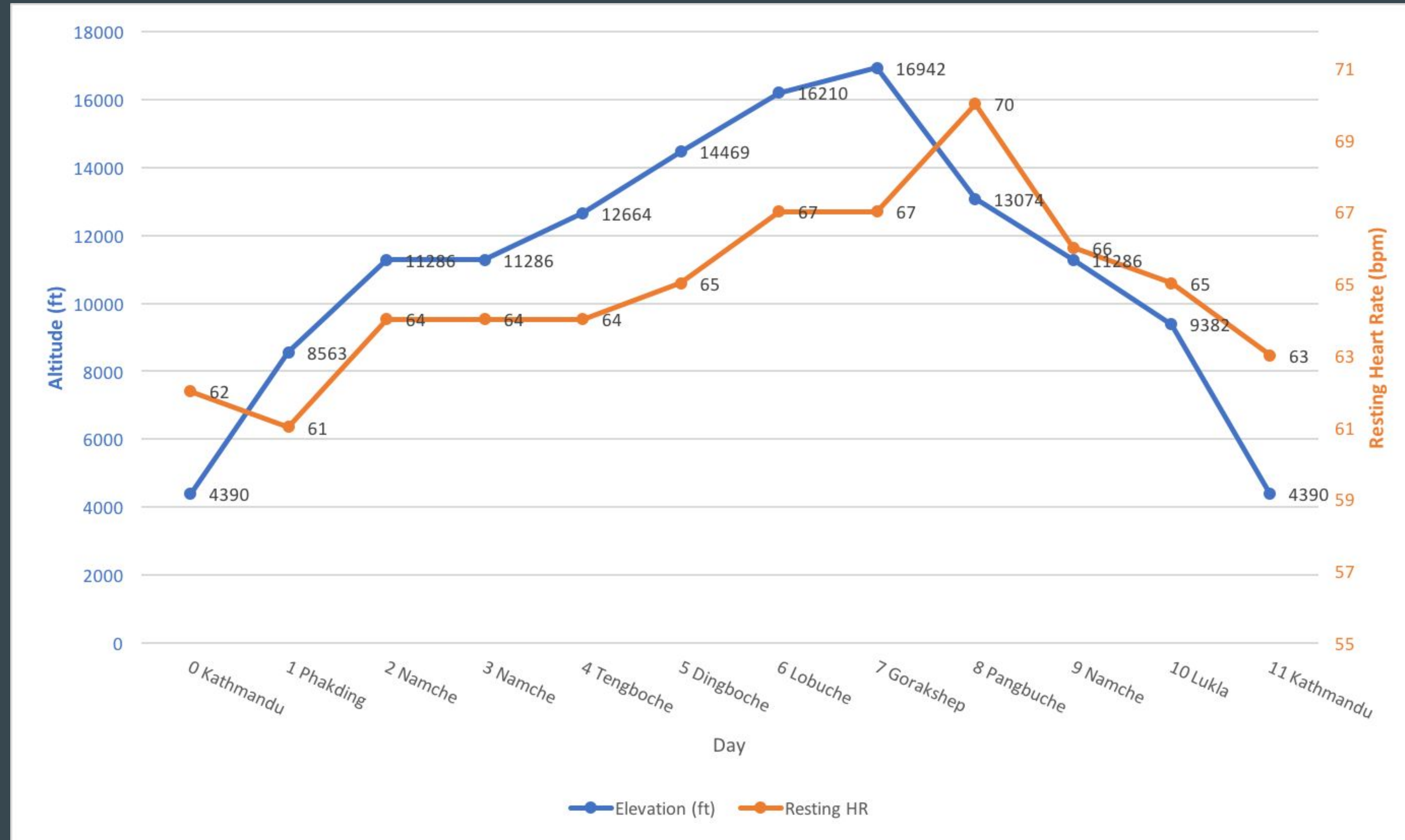
Effect of altitude on spO2



Altitude sickness was experienced when spO2 < 80%

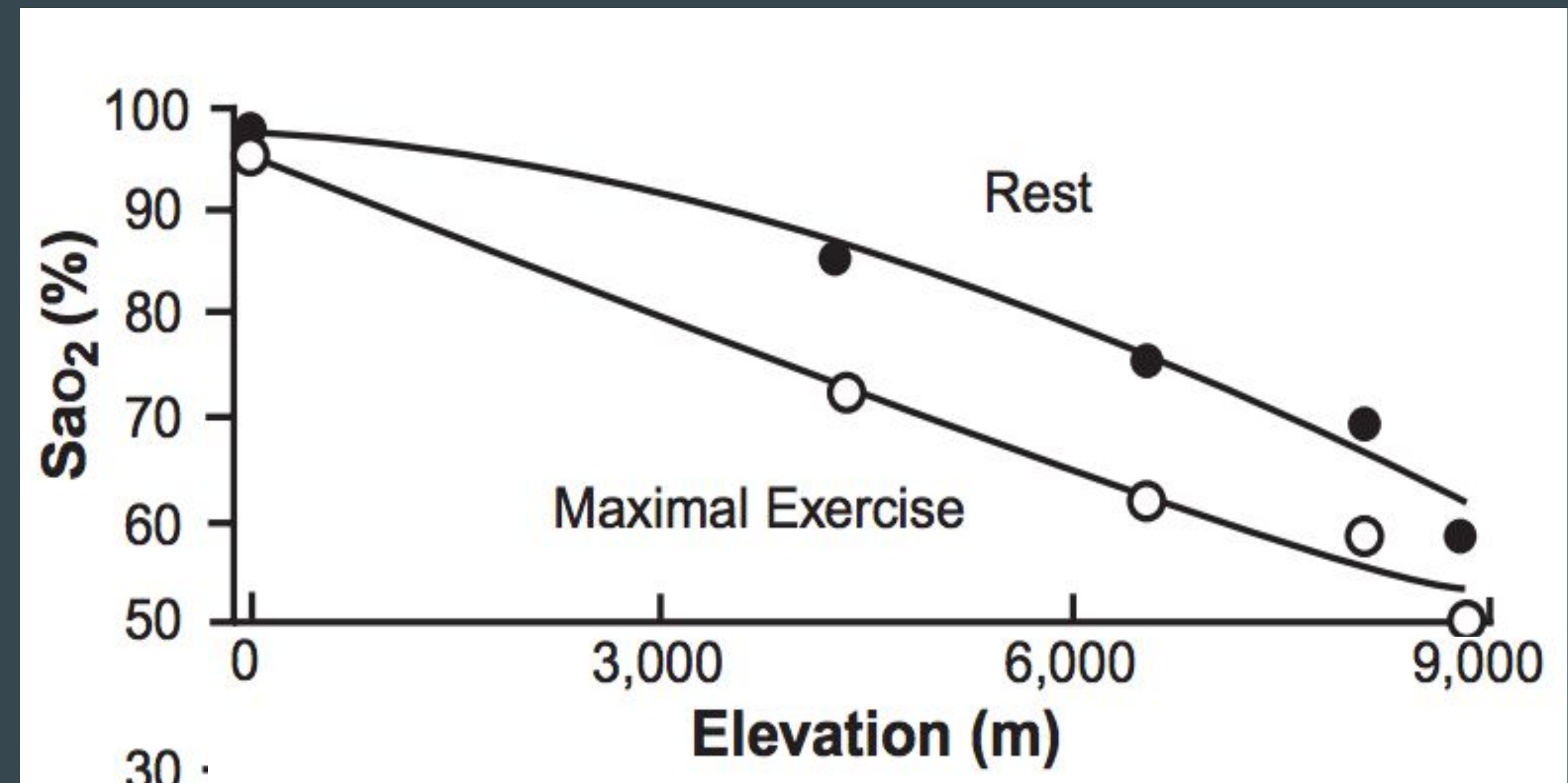
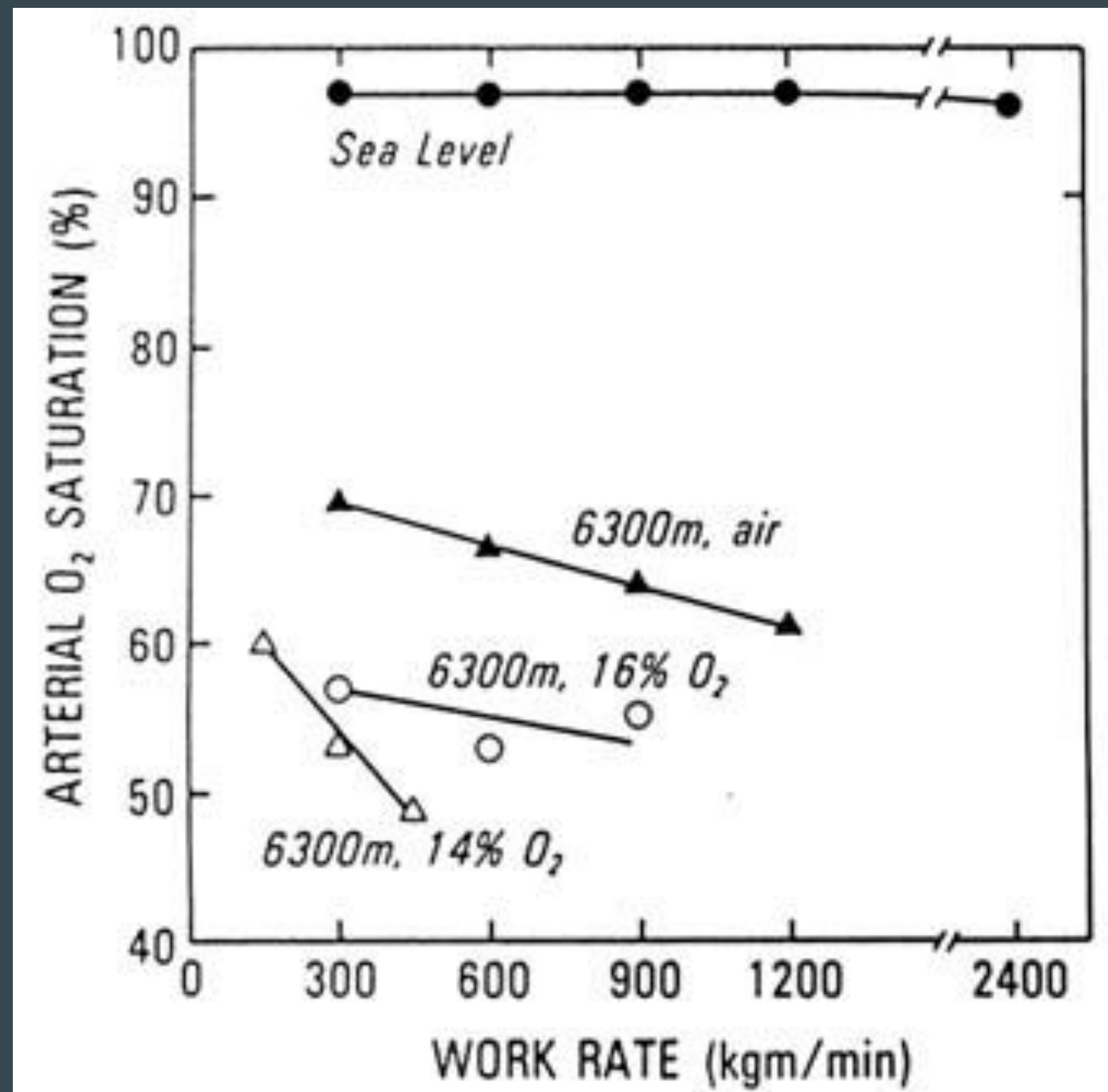


Effect of altitude on resting heart rate

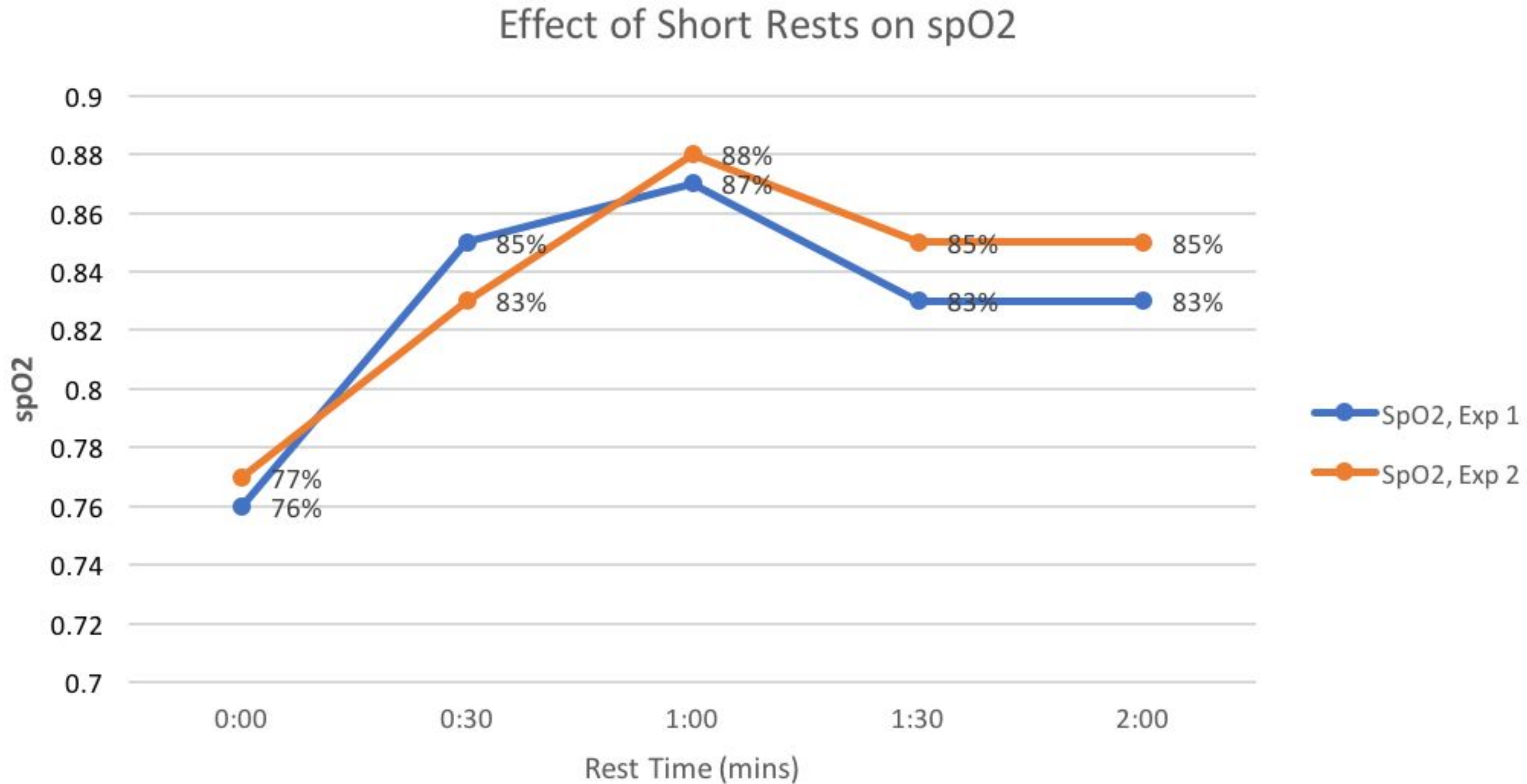


Exercise decreases spO2

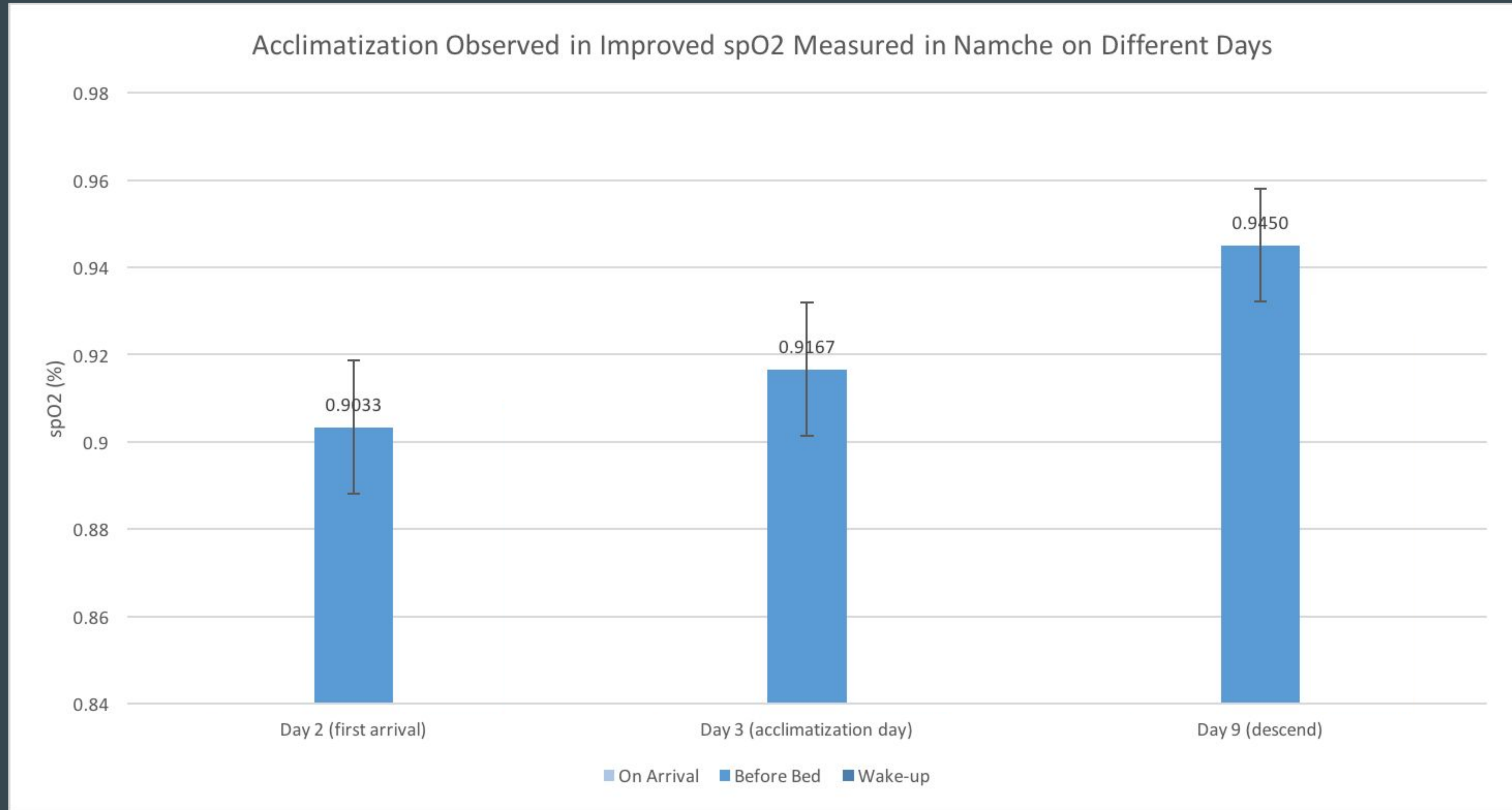
- High altitude exercise has long been observed to dramatically decrease spO2
[[West et al 1962](#), [West et al 1983](#), [Pandolf and Burr 2002](#)]



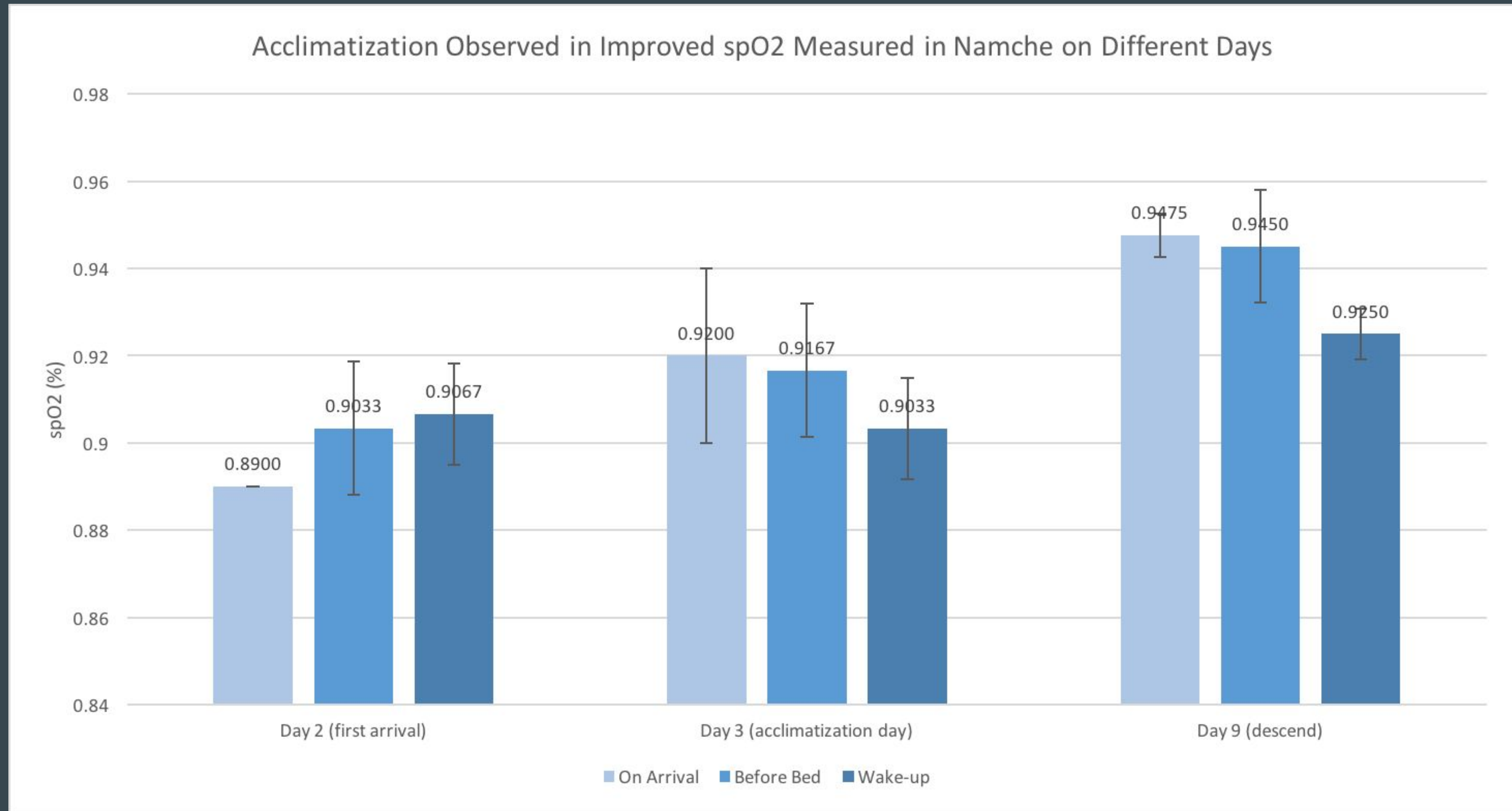
Rest, even a short one, can improve SpO2



Acclimatization markedly improves SpO2



Acclimatization markedly improves SpO2



Sherpas have higher spO2



Sherpa 89 vs Fah 85



Sherpa 88 vs Fah 85

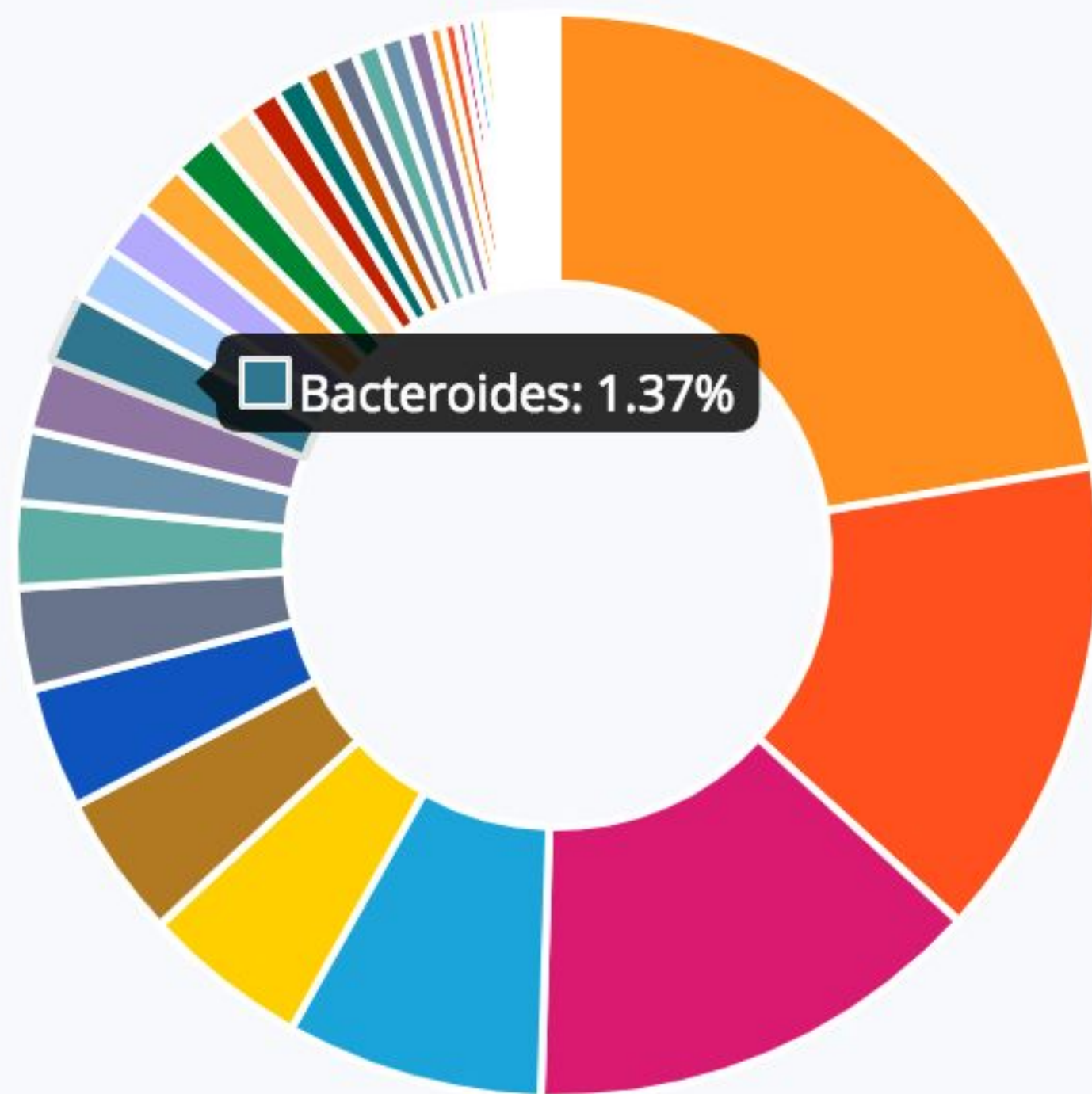


Sherpa 96 vs Fah 93

Gut Microbiome at Genus Level

uBiome

1 Week Before



Wellness Match Score

95.2%



The overlap between your sample and the average microbiome among Selected Samples.

Selected Samples are samples from individuals who report no ailments and high levels of wellness.

SUMMARY

HEALTHY WEIGHT SCORE

10 out of 10

DIVERSITY OF YOUR SAMPLE

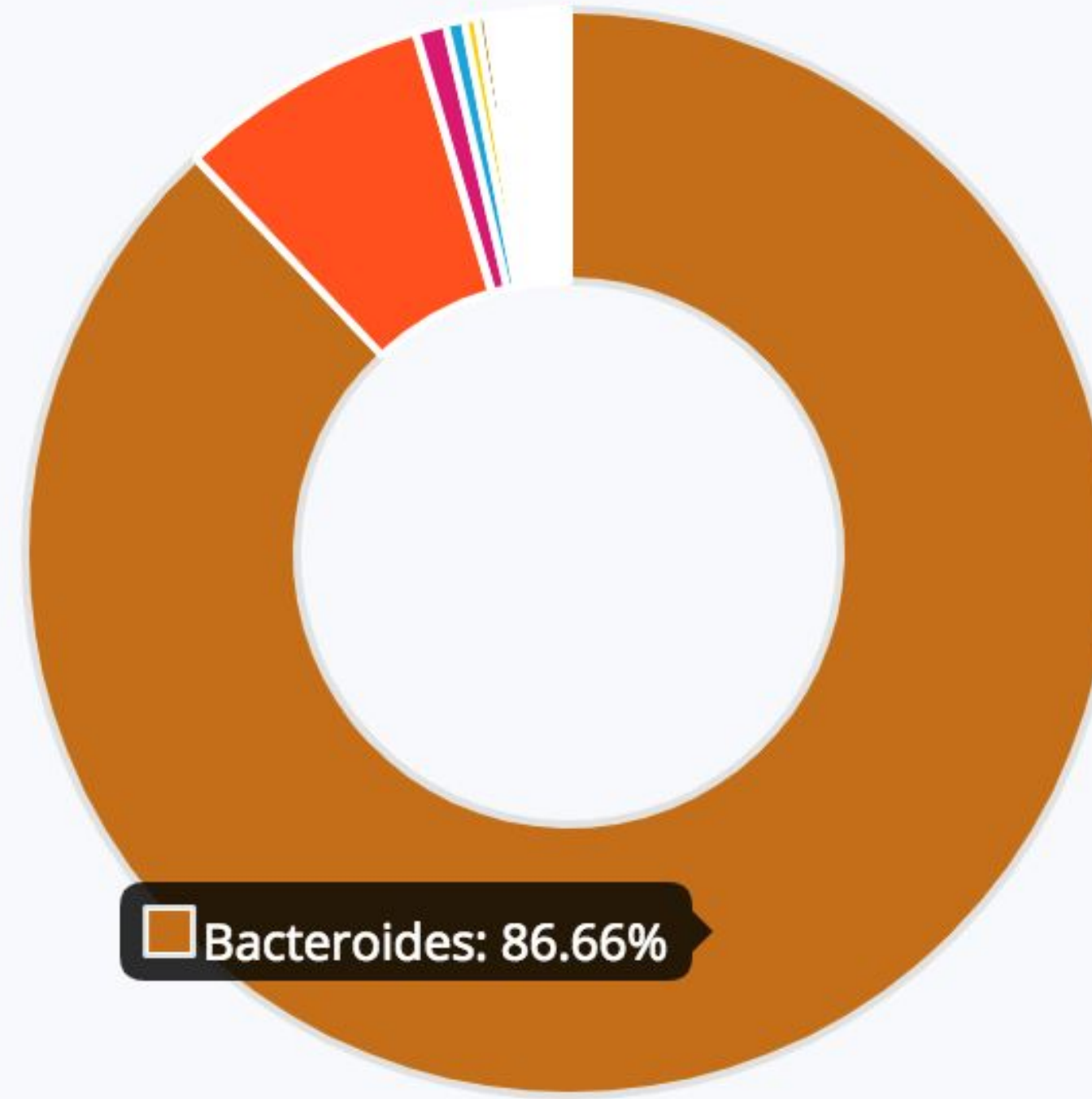
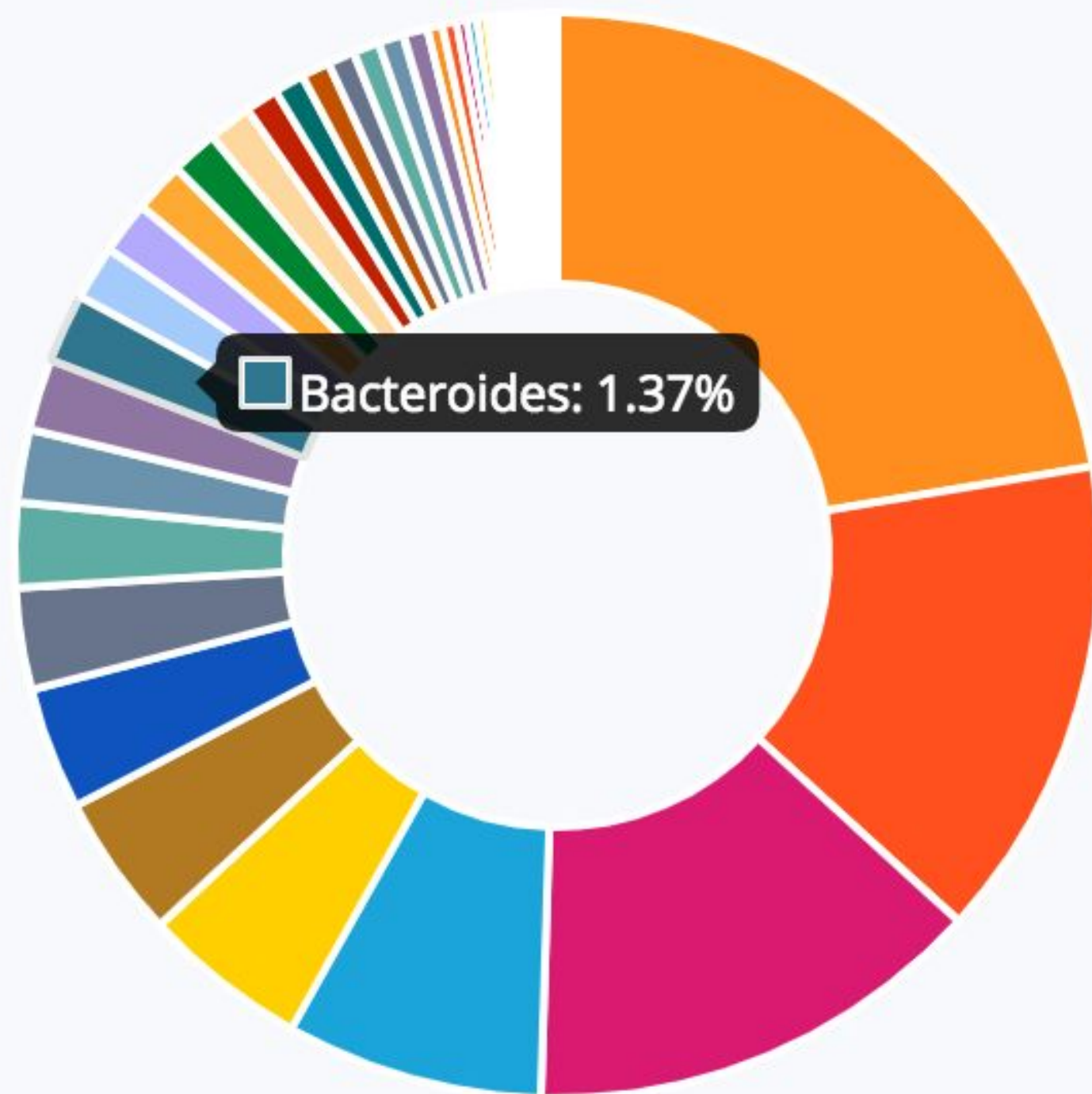
53rd percentile

Gut Microbiome at Genus Level

uBiome

1 Week Before

At Everest BC



SUMMARY

HEALTHY WEIGHT SCORE

0.9 out of 10

DIVERSITY OF YOUR SAMPLE

0th percentile

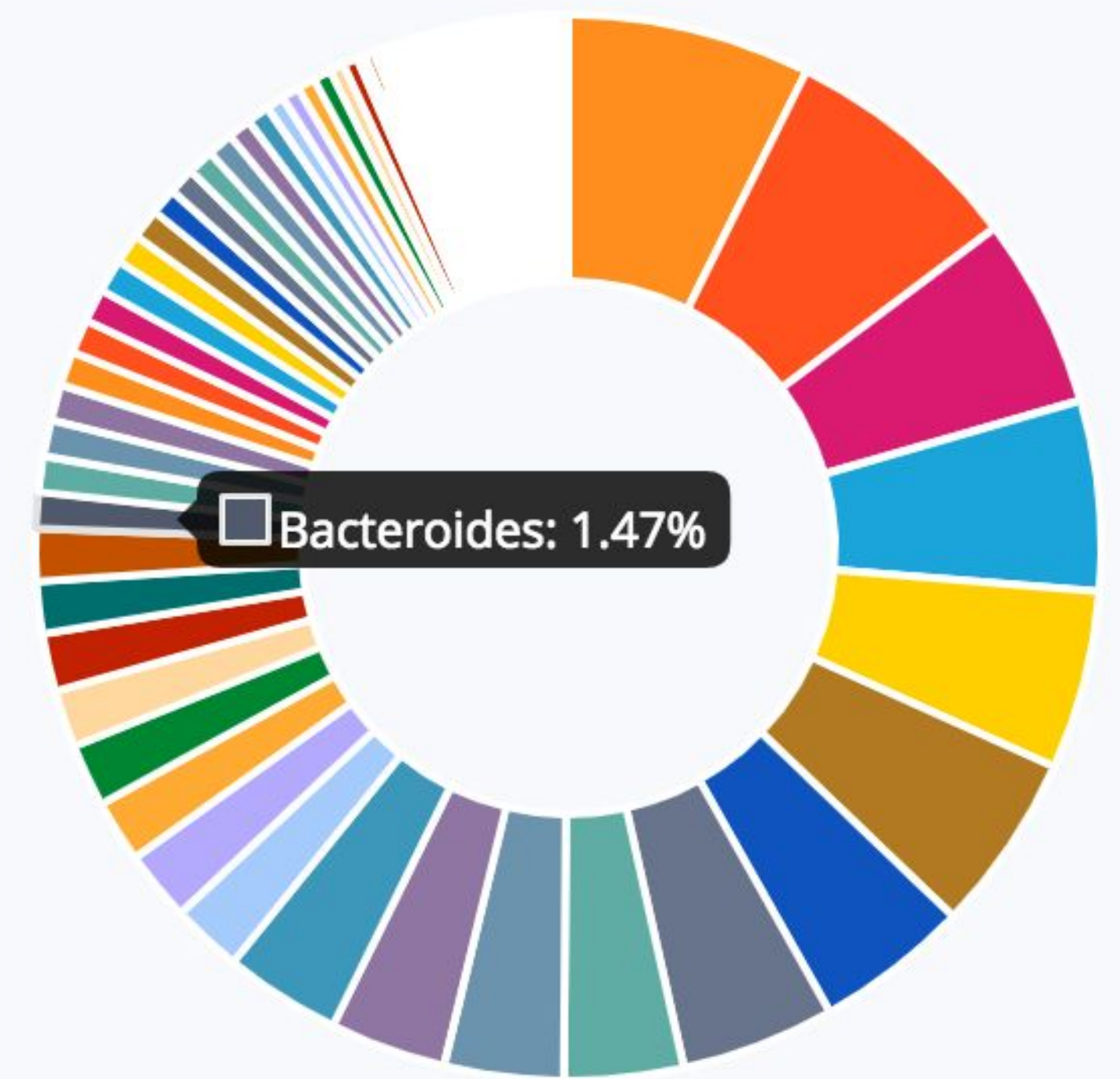
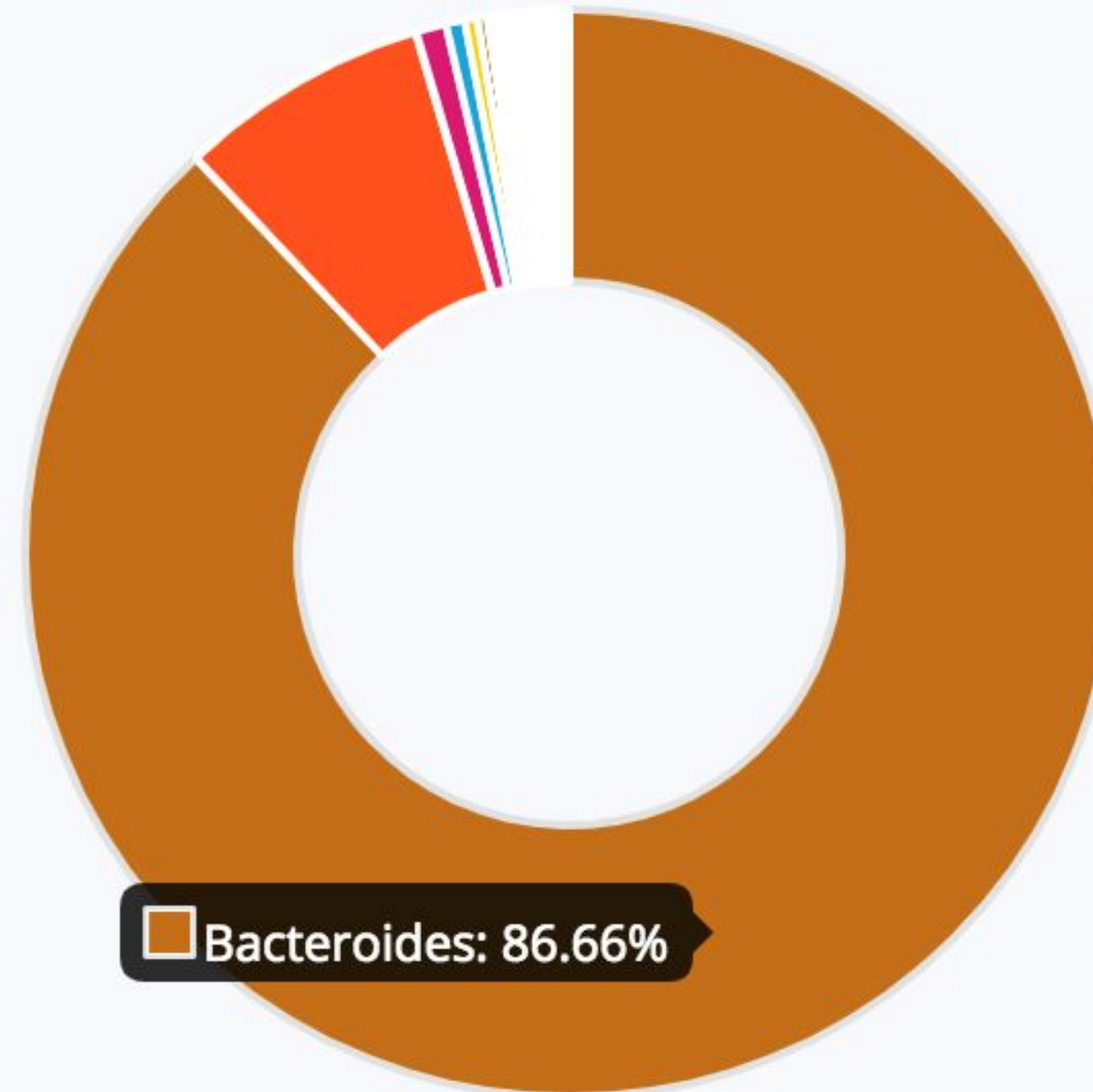
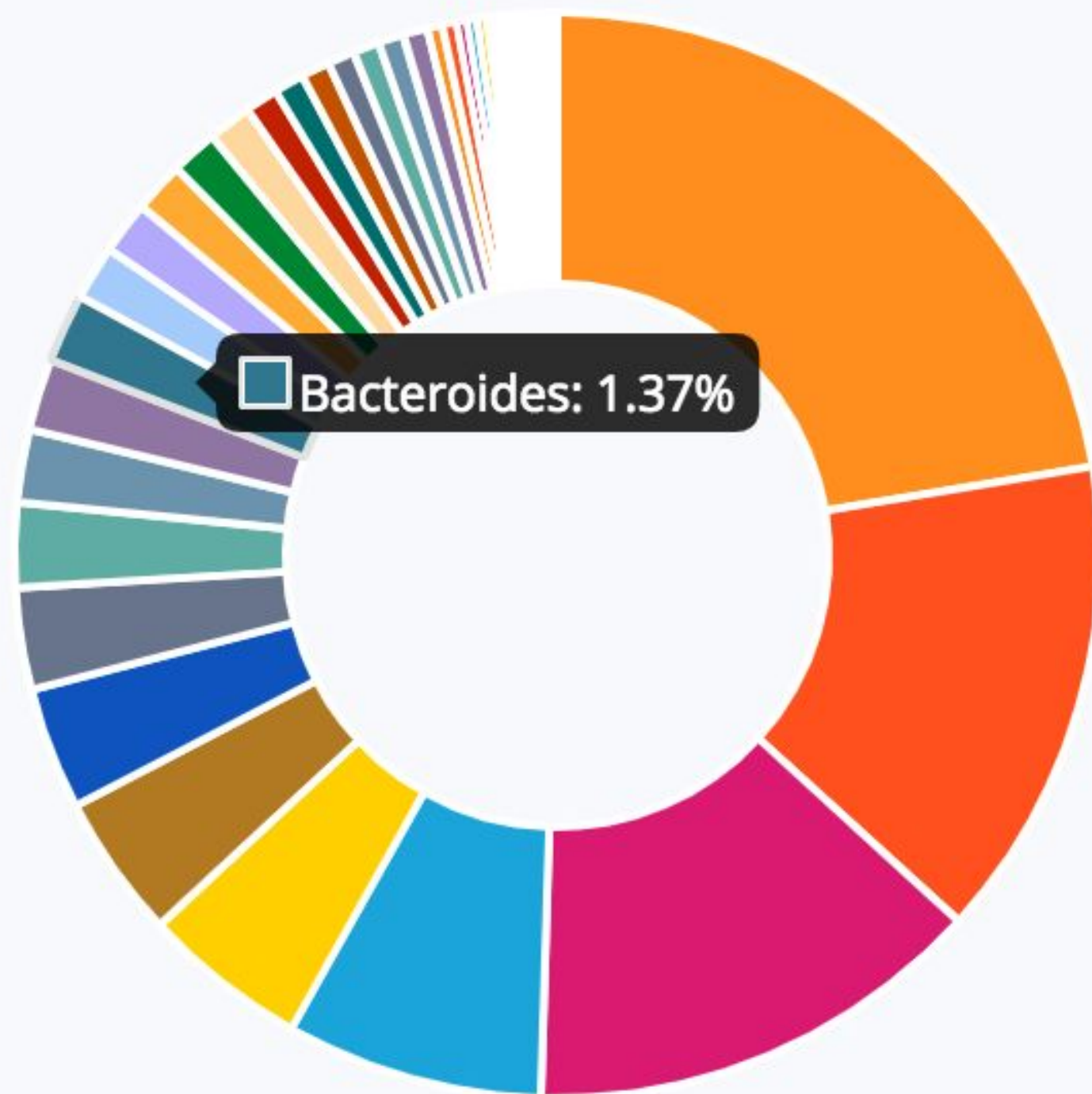
Gut Microbiome at Genus Level

uBiome

1 Week Before

At Everest BC

3 Months After



Practical Advice

- Oximeter is unreliable on **cold fingers** or in **bright light**.
 - Difficult to measure during the daytime
- Best time to measure is **before bed and right after waking up**.
- Would be interesting to systematically measure SpO₂ of **Sherpa** and other travellers for comparison.

read more at

<https://blog.23andme.com/health-traits/science-little-altitude/>



Acknowledgement

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