

# Characterization of Asymptomatic B-lines in High Altitude Trekkers

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## Background

- Pulmonary B-lines are a prevalent finding in lung ultrasound (LUS) and indicate the presence of pulmonary edema, as is seen in high altitude pulmonary edema (HAPE)<sup>1</sup>.
- Research indicates a significant proportion of asymptomatic individuals with normal oxygen levels, who do not develop HAPE symptoms, exhibit B-lines in lung ultrasounds<sup>2,3</sup>.
- Some studies suggest that this finding may be prevalent in as many as 80% of asymptomatic hikers at >13,000ft, however these numbers vary greatly between studies<sup>2-5</sup>.

## Objectives

Characterize the relationship between B-line development and altitude. Investigate B-lines and associated changes in vital signs and symptoms of acute mountain sickness (AMS).

## Methods

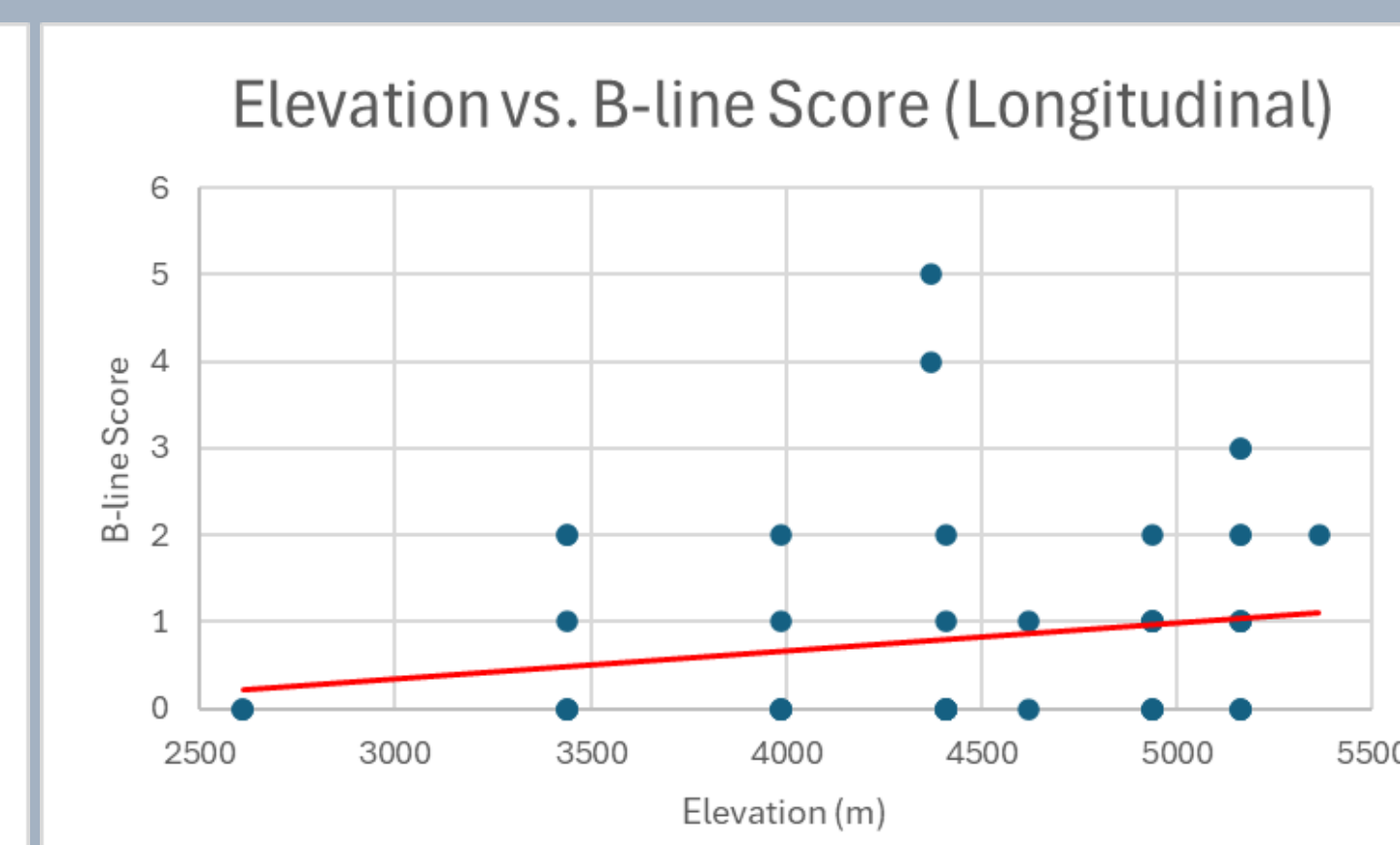
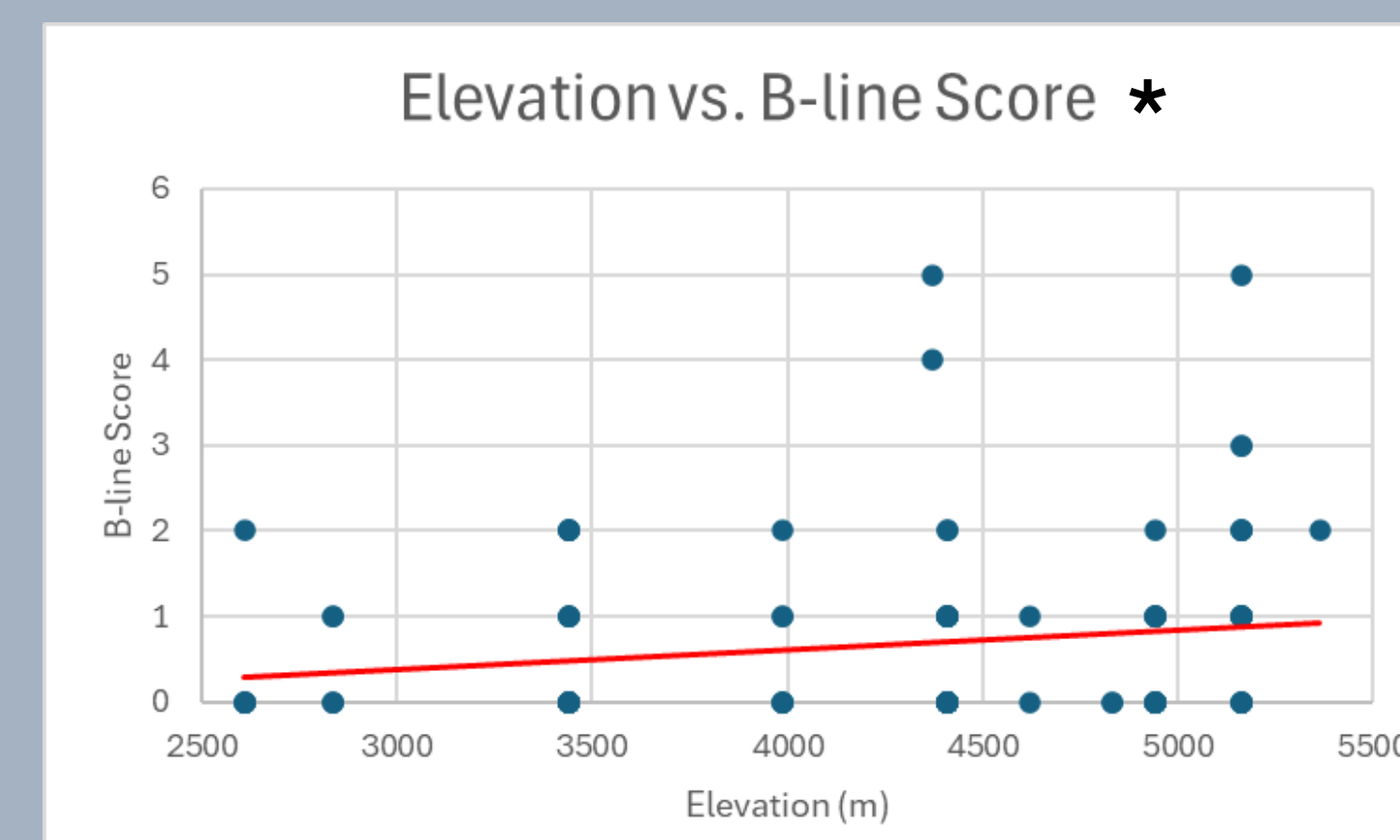
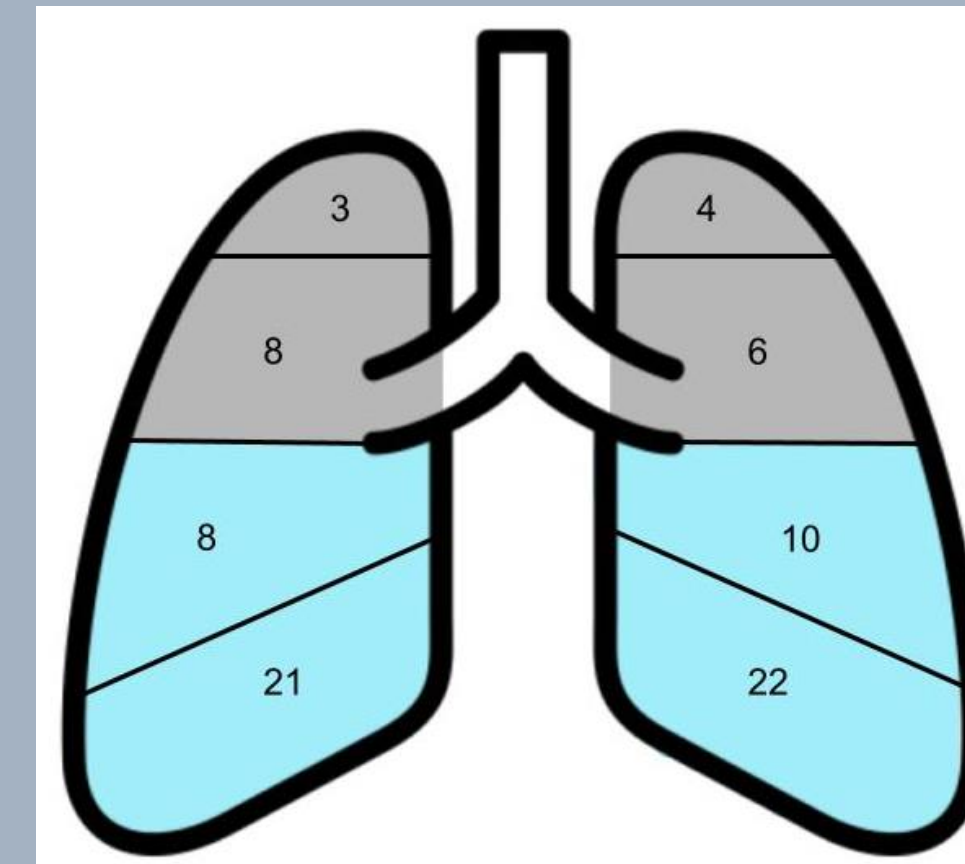
- Observational study investigating adult trekkers in the Khumbu Valley region in Nepal.
- 8-point LUS was performed to obtain a B-line quantification score.
- Additional data collected included current and recent altitudes (2,610-5,364m), vital signs, and Lake Louise Score (LLS) for AMS.
- A subset of participants were followed longitudinally for matched data collection as they continued their ascent.

## Results

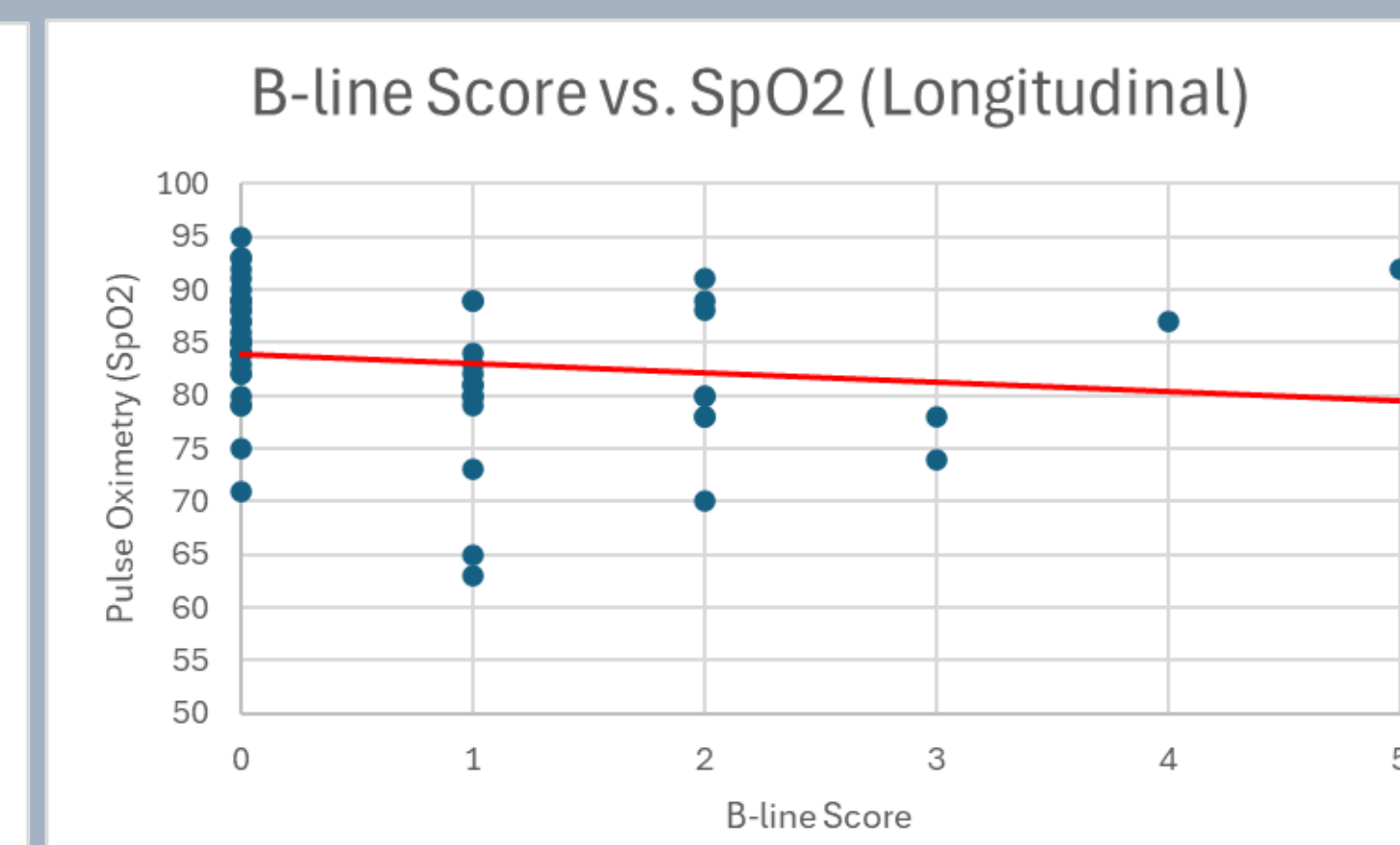
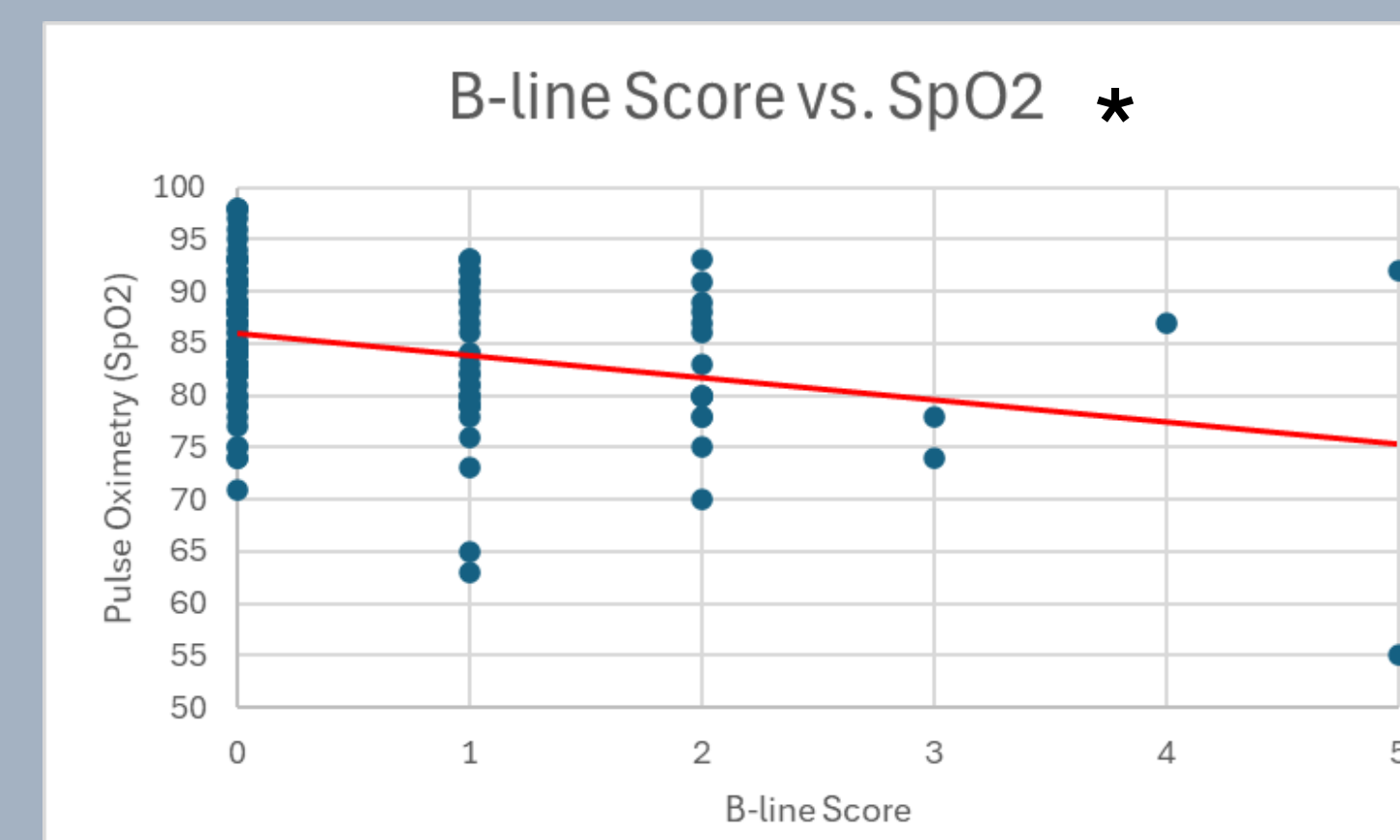
Demographics		
	All subjects (n=88)	Longitudinal group (n=21)
Mean age (years, range)	38 (20-71)	36 (21-69)
Female	46	12
Male	42	9
Home altitude (ft, range)	1,191 (7-6237)	1,339 (16-5279)

88 subjects were enrolled with 122 total scans. 21 of these subjects were followed longitudinally for a total of 55 entries.

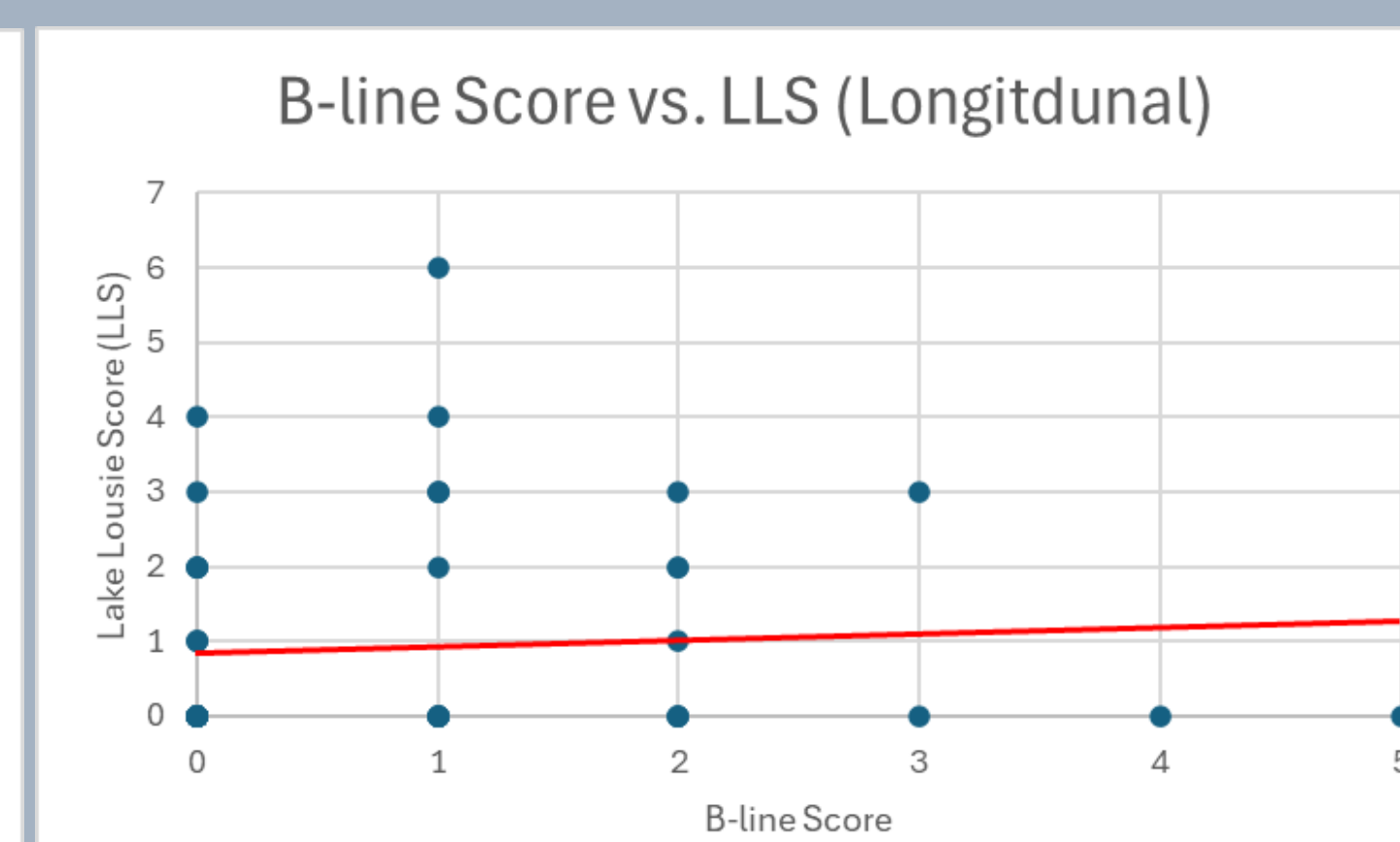
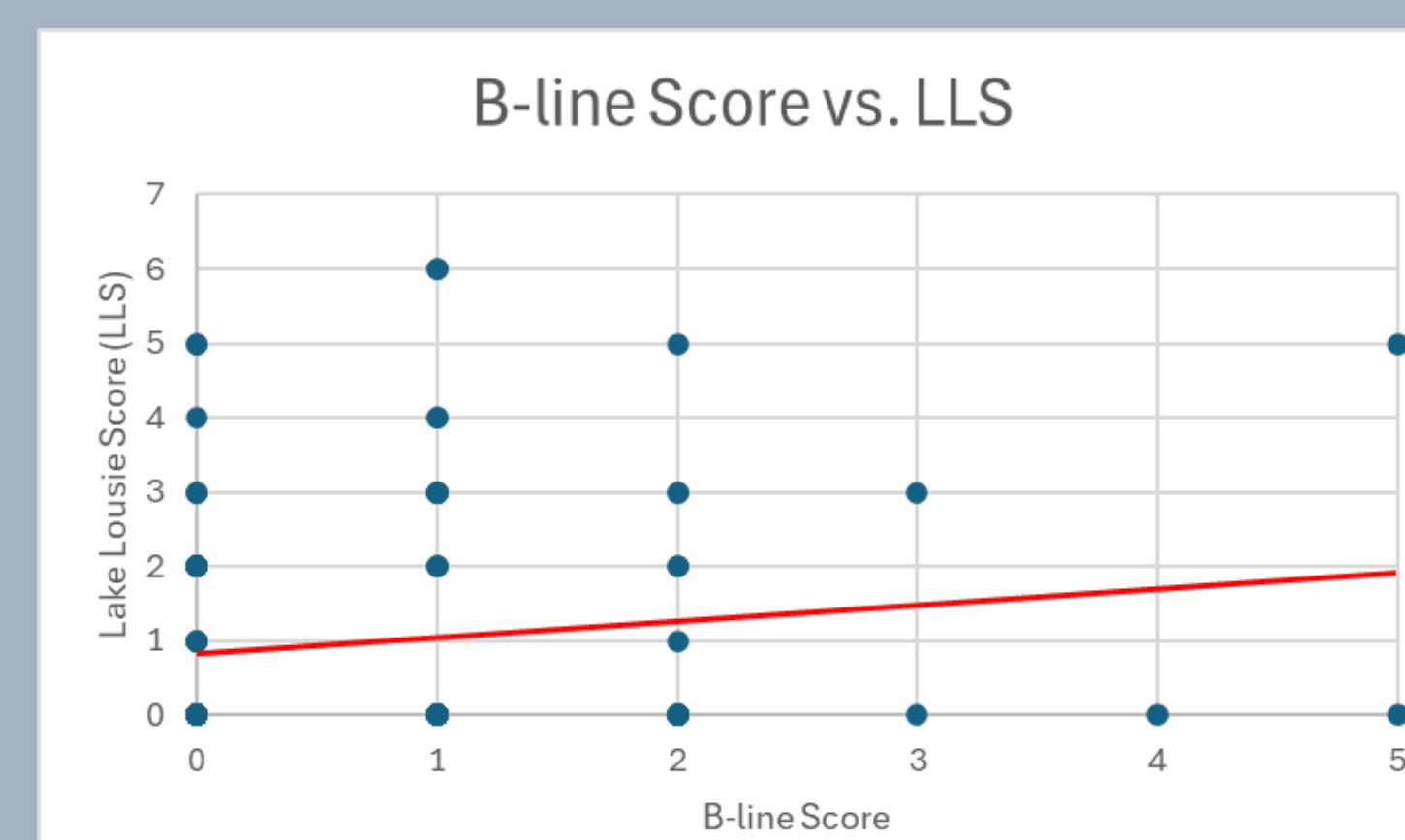
Of the 52 scans with B-lines present, 17 scans (32.7%) had B-lines in the anterior/superior zones and 42 scans (80.8%) had B-lines in the lateral/inferior zones.



There was a significant positive correlation between altitude and B-line score ( $r=0.18$ ,  $p=.049$ ) in the general population, however this finding was not significant in the longitudinal group ( $r=0.21$ ,  $p=0.13$ ).



B-line score was inversely correlated with resting SpO2 ( $r=-0.3$ ,  $p=0.0008$ ), although this finding was not significant in the longitudinal group ( $r=-0.15$ ,  $p=0.28$ ).



There was no significant relationship between B-line score and LLS in either the general population ( $r=0.14$ ,  $p=0.12$ ) or the longitudinal group ( $r=0.069$ ,  $p=0.61$ ).

Scanning Locations					
Location	Elevation (m)	Elevation (ft)	# of New Participants	# of Repeat Scans	Total # Scans
Phakding	2610	8,563	7	0	7
Monjo	2835	9,301	5	0	5
Namche	3440	11,386	22	1	23
Pangboche	3985	13,074	8	0	8
Pheriche	4371	14,341	0	2	2
Dingboche	4410	14,469	26	7	33
Thukla	4620	15,157	0	2	2
Dzongla	4830	15,846	2	0	2
Lobuche	4940	16,207	9	9	18
Gorakshap	5164	16,942	9	12	21
EBC	5364	17,598	0	1	1

## Conclusions

- B-lines were present in ~50% of scans >13,000ft
- LUS B-line scores were higher with increases in altitude.
- Resting SpO2 was found to decrease with higher B-line scores.
- B-lines were most commonly found in the inferior and lateral lung zones.
- B-line scores were not correlated with development of symptoms of AMS.
- More research is needed to elucidate the clinical significance of these asymptomatic findings.

## Acknowledgements

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- Himalayan Rescue Association

## References

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