

ALTITUDE AND BLOOD PRESSURE IN CHILDREN

Abstract- People living at high altitude are generally observed to have lower blood pressure than those residing at sea level. To investigate whether low pO₂ or low body weight accounts for this, blood pressure, weight, height and pulse rate were measured in 847 Peruvian children residing at 3500 m and compared to previously collected data in 3924 Dutch children living at sea level. In the two study populations the same protocol for measurement of blood pressure was used by observers who showed no systematic differences in average blood pressure readings during training sessions.

Systolic as well as diastolic blood pressure was found to increase with age in both Peruvian and Dutch children. Systolic blood pressure by age was 5-10 mmHg lower in Peruvian boys and girls than in their Dutch counterparts. However, virtually no differences in systolic blood pressure, and to a lesser extent diastolic blood pressure, by body weight or height between Peruvian and Dutch subjects were found.

These findings are in agreement with the hypothesis that differences in body weight, rather than in pO₂, explain most of the observed differences in blood pressure between children of the same age living at different altitudes.

Table I Systolic and Diastolic Blood Pressure [mean (standard deviation)] in Peruvian and Dutch children aged 5-19

Age	<u>n</u>		<u>Systolic BP</u>		<u>Diastolic BP.</u>	
	H	P	Holland \bar{x} (SD)	Peru \bar{x} (SD)	Holland \bar{x} (SD)	Peru \bar{x} (SD)
Boys						
5- 9	727	125	101 (11)	95 (10)	63 (9)	58 (10)
10-14	713	199	112 (13)	101 (11)	66 (10)	61 (12)
15-19	520	178	126 (14)	116 (11)	69 (11)	68 (11)
total	1960	502				
Girls						
5- 9	734	113	102 (12)	97 (13)	64 (11)	61 (11)
10-14	691	159	111 (13)	105 (11)	67 (10)	68 (11)
15-19	539	73	119 (13)	115 (12)	70 (11)	75 (11)
total	1964	345				

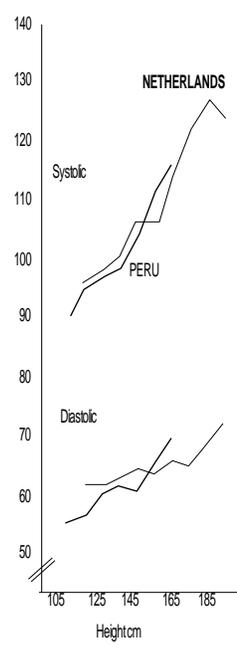
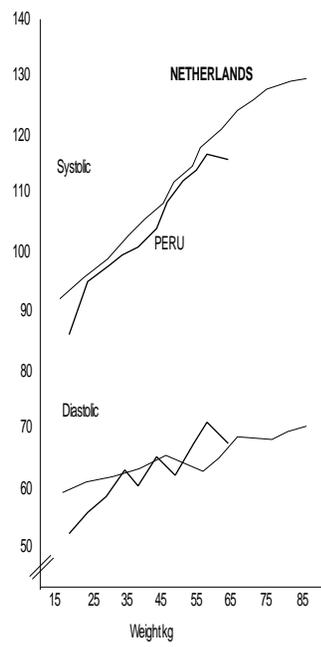
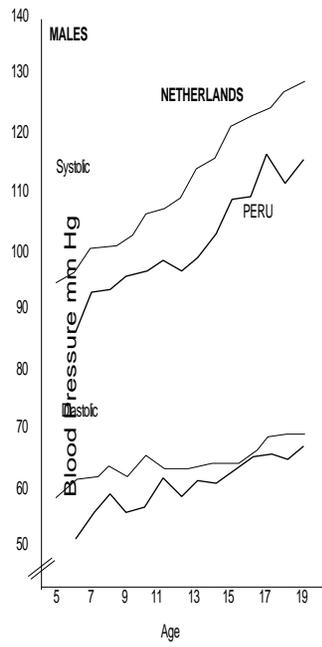


Table II Coefficients of Simple Linear Regression (**b**) of Blood Pressure on Body Weight and Height in Peruvian and Dutch children aged 5-19

	<u>Systolic BP (mmHg)</u>				<u>Diastolic BP (mmHg).</u>			
	Holland		Peru		Holland		Peru	
	b	SE[b]	b	SE[b]	b	SE[b]	b	SE[b]
Boys								
Weight (kg)	0.63	0.01	0.64	0.03	0.16	0.01	0.34	0.03
Height (cm)	0.49	0.02	0.45	0.02	0.12	0.01	0.24	0.02
Girls								
Weight (kg)	0.57	0.02	0.63	0.05	0.21	0.02	0.48	0.05
Height (cm)	0.43	0.02	0.46	0.04	0.15	0.01	0.34	0.04

Table III Relation between Altitude and BP in Peruvian and Dutch children aged 5-19. Differences in Systolic and Diastolic BP adjusted for various combinations of confounding variables using multiple linear regression.

	<u>Boys (n=2451; P=495 H=1956)</u>				<u>Girls (n=2299; P=341 H=1958)</u>			
	<u>Sys BP</u>		<u>Dia BP</u>		<u>Sys BP</u>		<u>Dia BP</u>	
	H - P		H - P		H - P		H - P	
	Diff	SE	Diff	SE	Diff	SE	Diff	SE
Alt, Age	9.6	0.6	2.7	0.5	5.6	0.7	-0.4	0.6
Alt, Age, Pulse	8.6	0.6	2.4	0.5	4.7	0.7	-0.8	0.6
Alt, Age, Pulse, Wt	2.4	0.7	1.2	0.6	-0.8	0.7	-3.1	0.6
Alt, Age, Pulse, Ht	1.5	0.8	1.0	0.7	-1.1	0.8	-3.5	0.7
Alt, Age, Pulse, BMI	2.7	0.8	1.4	0.7	0.1	0.8	-3.0	0.7

H - P : Holland minus Peru;

Diff: difference

SE: SE(difference)