

Supplementary material

Table Supl. 1: Prevalence of child growth indicators according to mother's race/skin color. Brazil, 2008-2017.

BAZ										
	Children of White mothers	%	Children of Asian descent mothers	%	Children of Black mothers	%	Children of Pardo mothers	%	Children of Indigenous mothers	%
Severe thinness	92491	1.40	1507	2.06	12748	1.96	249299	2.11	2643	1.77
Thinness	165194	2.51	2485	3.40	21198	3.27	402055	3.41	3629	2.43
Adequate	4090329	62.13	45955	62.95	412674	63.60	7393831	62.65	90292	60.41
Overweight risk	1362149	20.69	13729	18.81	121070	18.66	2215449	18.77	34646	23.18
Overweight	593726	9.02	6122	8.39	53967	8.32	1018786	8.63	12993	8.69
Obesity	279274	4.24	3205	4.39	27152	4.18	523229	4.43	5271	3.53
Total	6583163	100.00	73003	100.00	648809	100.00	11802649	100.00	149474	100.00
L/HAZ										
	Children of White mothers	%	Children of Asian descent mothers	%	Children of Black mothers	%	Children of Pardo mothers	%	Children of Indigenous mothers	%
Severe stunting	181822	2.76	2730	3.74	23127	3.56	478034	4.05	13465	9.01
Moderate stunting	385439	5.85	5292	7.25	44423	6.85	917229	7.77	26509	17.73
Adequate	6015902	91.38	64981	89.01	581259	89.59	10407386	88.18	109500	73.26
Total	6583163	100.00	73003	100.00	648809	100.00	11802649	100.00	149474	100.00
WAZ										
	Children of White mothers	%	Children of Asian descent mothers	%	Children of Black mothers	%	Children of Pardo mothers	%	Children of Indigenous mothers	%
Severe underweight	27331	0.42	457	0.63	4087	0.63	77204	0.65	1666	1.11
Moderate underweight	135609	2.06	2196	3.01	18518	2.85	368674	3.12	7157	4.79
Adequate	6003845	91.20	66190	90.67	590412	91.00	10732755	90.94	136901	91.59
Overweight	416378	6.32	4160	5.70	35792	5.52	624016	5.29	3750	2.51
Total	6583163	100.00	73003	100.00	648809	100.00	11802649	100.00	149474	100.00

	WHZ									
	Children of White mothers		Children of Asian descent mothers		Children of Black mothers		Children of Pardo mothers		Children of Indigenous mothers	
		%		%		%		%		%
Severe wasting	74878	1.14	1242	1.70	10599	1.63	208047	1.76	2243	1.50
Wasting	168382	2.56	2612	3.58	22366	3.45	424949	3.60	4027	2.69
Adequate	4214860	64.02	47505	65.07	426077	65.67	7662950	64.93	97330	65.12
Overweight risk	1333447	20.26	13303	18.22	117723	18.14	2151204	18.23	31480	21.06
Overweight	548941	8.34	5613	7.69	49195	7.58	919203	7.79	10439	6.98
Obesity	242655	3.69	2728	3.74	22849	3.52	436296	3.70	3955	2.65
Total	6583163	100	73003	100	648809	100.00	11802649	100.00	149474	100.00

Notes: BAZ: body mass index-for-age z-score, L/HAZ: length/height-for-age z-score, WAZ: weight-for-age z-score, WHZ: weight-for-length/height z-score.

Table Supl. 2: Descriptive statistics for anthropometric variables. Brazil, 2008-2017.

	Children of White mothers		Children of Asian descent mothers		Children of Black Mothers		Children of Pardo mothers		Children of Indigenous mothers	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min - Max	Mean (SD)	Min - Max	Mean (SD)	Min - Max
Age (months)	28.96 (18.83)	0 - 60.03	29.40 (19.07)	0 - 60.03	30.11 (19.43)	0 - 60.03	29.79 (19.23)	0 - 60.03	30.30 (19.24)	0 - 59.80
Length/height (cm)	92.32 (13.05)	45 - 120	92.94 (12.53)	45 - 120	93.85 (12.40)	45 - 120	93.29 (12.10)	45 - 120	91.47 (10.73)	46 - 119
Weight (kg)	12.44 (5.34)	0.50 – 36.30	12.25 (5.30)	0.71 – 34.00	12.37 (5.43)	0.52 – 35.80	12.25 (5.29)	0.50 – 36.00	11.75 (5.00)	0.51 – 34.50
L/HAZ	-0.21 (1.42)	-6.00 - +6.00	-0.30 (1.51)	-6.00 - +6.00	-0.29 (1.48)	-6.00 - +6.00	-0.37 (1.52)	-6.00 - +6.00	-1.12 (1.55)	-6.00 - +6.00
WAZ	0.22 (1.15)	-5.99 - +5.00	0.07 (1.19)	-5.98 - +5.00	0.08 (1.18)	-5.93 - +5.00	0.03 (1.18)	-6.00 - +5.00	-0.34 (1.12)	-5.96 - +4.99
Number of measurements	6.22 (5.24)	2 - 109	5.69 (4.28)	2 - 61	5.47 (3.99)	2 - 77	5.49 (3.93)	2 - 119	5.14 (3.16)	2 - 66

Notes: SD: standard deviation, L/HAZ: length/height-for-age z-score, WAZ: weight-for-age z-score.

Table Supl. 3: Point and interval estimates for the parameters of both the height and weight model. Brazil, 2008-2017.

Height			
Parameter	Estimate	Standard Error	CI 95%
Intercept	46.0288	0.0120	[46.0052, 46.0523]
Race / skin color (Asian descent)	-0.3934	0.0356	[-0.4631, -0.3237]
Race / skin color (Black)	-0.2148	0.0123	[-0.2389, -0.1907]
Race / skin color (Pardo)	-0.6032	0.0048	[-0.6126, -0.5938]
Race / skin color (Indigenous)	-3.3115	0.0238	[-3.3581, -3.2648]
$\sigma_{\text{Intercept}}$	3.8214		[3.8191, 3.8237]
σ_{ϵ}	3.8419		[3.8406, 3.8432]
Weight			
Intercept	3.4134	0.0041	[3.4054, 3.4214]
Race / skin color (Asian descent)	-0.2183	0.0123	[-0.2442, -0.1925]
Race / skin color (Black)	-0.1517	0.0046	[-0.1606, -0.1428]
Race / skin color (Pardo)	-0.2523	0.0018	[-0.2557, -0.2488]
Race / skin color (Indigenous)	-0.7384	0.0088	[-0.7559, -0.7211]
$\sigma_{\text{Intercept}}$	1.4673		[1.4678, 1.4683]
σ_{ϵ}	1.4139		[1.4134, 1.4143]

Reference category: Sex: Boys; Race/skin color: White; Educational level: 8 years or more; Marital status: Married or in a stable union. Adjusted for sex, $\sqrt{\text{Age}}$, Mother's educational level mother, Mother's civil status, Mother's age.

Table Supl. 4: Point and interval estimates for the parameters of the length / height model in the training dataset. SISVAN. 2008–2017.

Parameter	Estimate	Standard Error	CI 95%
Intercept	46.0302	0.0144	[46.0021, 46.0583]
$\sqrt{\text{Age}}$	8.1701	0.0010	[8.1681, 8.1721]
Sex (girls)	-0.9290	0.0052	[-0.9392, -0.9188]
Race / skin color (Asian descent)	-0.3757	0.0425	[-0.4591, -0.2924]
Race / skin color (Black)	-0.2156	0.0147	[-0.2444, -0.1868]
Race / skin color (Pardo)	-0.6039	0.0057	[-0.6151, -0.5927]
Race / skin color (Indigenous)	-3.3262	0.0284	[-3.3819, -3.2705]
Educational level (3 years or less)	-1.3929	0.0085	[-1.4096, -1.3761]
Educational level (4 to 7 years)	-0.6975	0.0056	[-0.7085, -0.6864]
Civil status (single)	-0.1725	0.0054	[-0.1830, -0.1620]
Civil status (divorced / widow)	0.2356	0.0275	[0.1817, 0.2894]
Mother's age	0.0260	0.0004	[0.0252, 0.0269]
$\sigma_{\text{Intercept}}$	3.8208		[3.8170, 3.8246]
σ_{ε}	3.8425		[3.8409, 3.8442]

Reference category: Sex: Boys; Race/skin color: White; Educational level: 8 years or more; Marital status: Married or in a stable union. Adjusted for sex, $\sqrt{\text{Age}}$, Mother's educational level mother, Mother's civil status, Mother's age.

Table Supl. 5: Point and interval estimates for the parameters of the weight model in the training dataset. SISVAN. 2008–2017.

Parameter	Estimate	Standard Error	CI 95%
Intercept	3.4110	0.0049	[3.4015, 3.4205]
$\sqrt{\text{Age}}$	1.9110	0.0001	[1.9107, 1.9113]
Sex (girls)	-0.3906	0.0019	[-0.3944, -0.3868]
Race / skin color (Asian descent)	-0.2493	0.0158	[-0.2802, -0.2184]
Race / skin color (Black)	-0.1508	0.0054	[-0.1615, -0.1402]
Race / skin color (Pardo)	-0.2540	0.0021	[-0.2581, -0.2498]
Race / skin color (Indigenous)	-0.7336	0.0105	[-0.7542, -0.7130]
Educational level (3 years or less)	-0.4361	0.0032	[-0.4423, -0.4299]
Educational level (4 to 7 years)	-0.2171	0.0021	[-0.2212, -0.2130]
Civil status (single)	-0.0215	0.0020	[-0.0254, -0.0176]
Civil status (divorced / widow)	0.1375	0.0102	[0.1176, 0.1575]
Mother's age	0.0098	0.0002	[0.0095, 0.0101]
$\sigma_{\text{Intercept}}$	1.4678		[1.4671, 1.4684]
σ_{ε}	1.4142		[1.4138, 1.4146]

Reference category: Sex: Boys; Race/skin color: White; Educational level: 8 years or more; Marital status: Married or in a stable union. Adjusted for sex, $\sqrt{\text{Age}}$, Mother's educational level mother, Mother's civil status, Mother's age.

Table Supl. 6: Point and interval estimates for the parameters of the L/HAZ model in the training dataset. SISVAN. 2008–2017.

Parameter	Estimate	Standard Error	CI 95%
Intercept	-0.6503	0.0172	[-0.6840, -0.6166]
Splines 1	-0.4998	0.0311	[-0.5607, -0.4389]
Splines 2	-0.1326	0.0165	[-0.1650, -0.1002]
Splines 3	0.2128	0.0187	[0.1762, 0.2493]
Splines 4	0.3204	0.0171	[0.2869, 0.3539]
Splines 5	0.2543	0.0173	[0.2205, 0.2882]
Splines 6	0.0333	0.0169	[0.0002, 0.0665]
Splines 7	0.4031	0.0170	[0.3699, 0.4364]
Splines 8	0.3778	0.0170	[0.3445, 0.4111]
Splines 9	0.4993	0.0170	[0.4659, 0.5326]
Splines 10	0.3983	0.0170	[0.3651, 0.4316]
Splines 11	0.4984	0.0232	[0.4529, 0.5440]
Sex (girls)	0.0409	0.0014	[0.0382, 0.0436]
Race / skin color (Asian descent)	-0.1003	0.0114	[-0.1226, -0.0779]
Race / skin color (Black)	-0.0658	0.0039	[-0.0735, -0.0581]
Race / skin color (Pardo)	-0.1591	0.0015	[-0.1621, -0.1561]
Race / skin color (Indigenous)	-0.8711	0.0076	[-0.8860, -0.8561]
Educational level (3 years or less)	-0.3583	0.0023	[-0.3628, -0.3538]
Educational level (4 to 7 years)	-0.1832	0.0015	[-0.1862, -0.1803]
Civil status (single)	-0.0418	0.0014	[-0.0446, -0.0390]
Civil status (divorced / widow)	0.0655	0.0074	[0.0511, 0.0799]
Mother's age	0.0066	0.0001	[0.0064, 0.0068]
$\sigma_{\text{Intercept}}$			
σ_{ε}			

Reference category: Sex: Boys; Race/skin color: White; Educational level: 8 years or more; Marital status: Married or in a stable union. Adjusted for sex, Age (splines), Mother's educational level mother, Mother's civil status, Mother's age. Notes: The dimension of the splines accounts for the number of knots (K=8) and the polynomial degree (p = 3).

Table Supl. 7: Point and interval estimates for the parameters of the WAZ model in the training dataset. SISVAN. 2008–2017

Parameter	Estimate	Standard Error	CI 95%
Intercept	-0.1618	0.0109	[-0.1832, -0.1404]
Splines 1	-0.3392	0.0193	[-0.3770, -0.3015]
Splines 2	-0.2102	0.0103	[-0.2303, -0.1901]
Splines 3	0.0477	0.0116	[0.0250, 0.0704]
Splines 4	0.4630	0.0106	[0.4422, 0.4838]
Splines 5	0.5015	0.0107	[0.4805, 0.5226]
Splines 6	0.4771	0.0105	[0.4565, 0.4977]
Splines 7	0.3704	0.0105	[0.3498, 0.3911]
Splines 8	0.3040	0.0106	[0.2833, 0.3247]
Splines 9	0.2741	0.0106	[0.2533, 0.2948]
Splines 10	0.2471	0.0105	[0.2264, 0.2678]
Splines 11	0.3034	0.0145	[0.2750, 0.3319]
Sex (girls)	-0.0321	0.0012	[-0.0345, -0.0297]
Race / skin color (Asian descent)	-0.1493	0.0100	[-0.1689, -0.1296]
Race / skin color (Black)	-0.1086	0.0035	[-0.1154, -0.1018]
Race / skin color (Pardo)	-0.1729	0.0013	[-0.1755, -0.1702]
Race / skin color (Indigenous)	-0.5000	0.0067	[-0.5131, -0.4869]
Educational level (3 years or less)	-0.3214	0.0020	[-0.3253, -0.3174]
Educational level (4 to 7 years)	-0.1597	0.0013	[-0.1623, -0.1571]
Civil status (single)	-0.0248	0.0013	[-0.0273, -0.0224]
Civil status (divorced / widow)	0.0853	0.0065	[0.0726, 0.0980]
Mother's age	0.0060	0.0001	[0.0058, 0.0062]
$\sigma_{\text{Intercept}}$	0.9577		[0.9575, 0.9578]
σ_{ε}	0.6674		[0.6672, 0.6677]

Reference category: Sex: Boys; Race/skin color: White; Educational level: 8 years or more; Marital status: Married or in a stable union. Adjusted for sex, Age (splines), Mother's educational level mother, Mother's civil status, Mother's age. Notes: The dimension of the splines accounts for the number of knots (K=8) and the polynomial degree (p = 3).

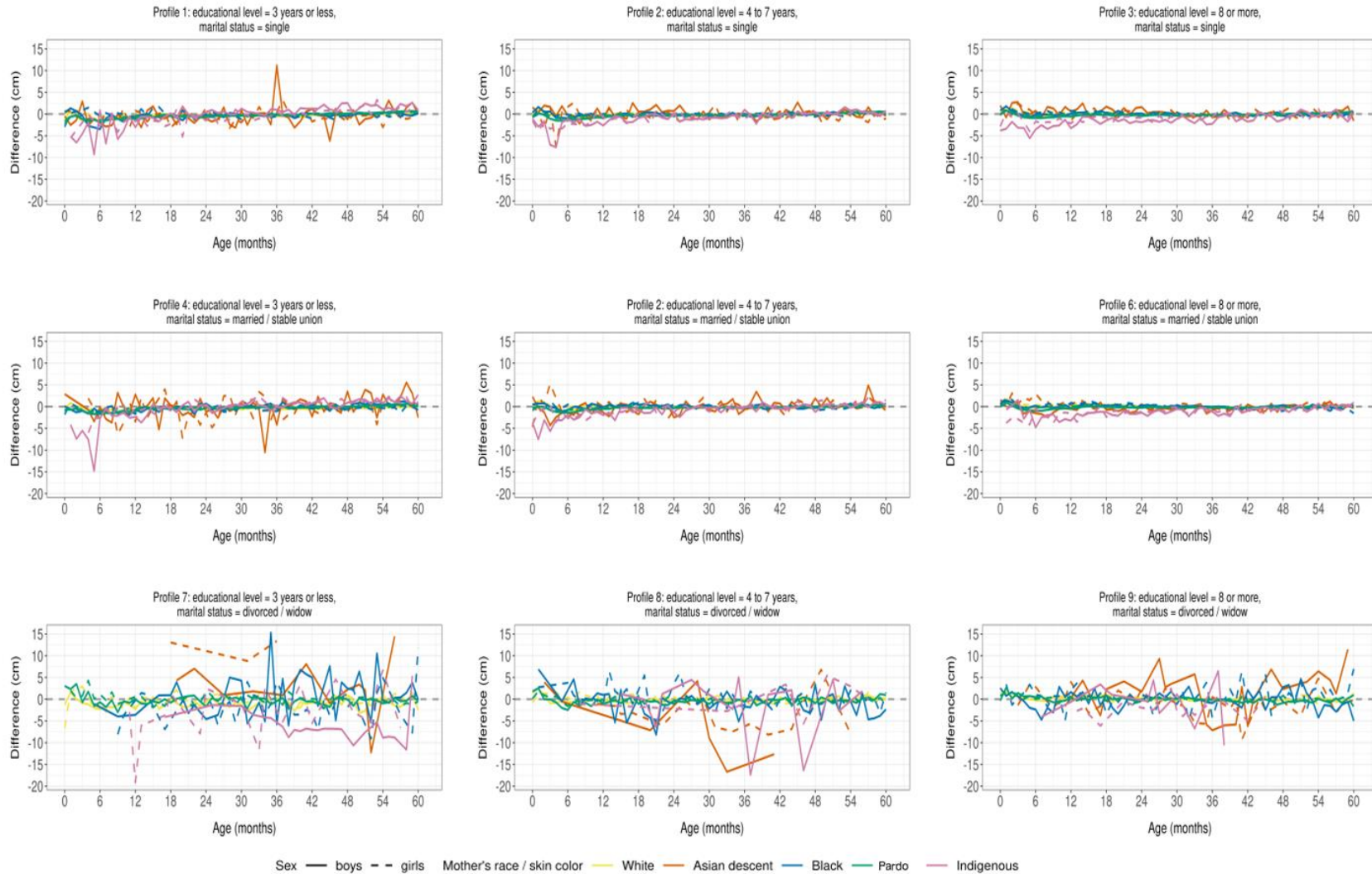


Figure S1: Difference between estimated and observed mean height curves for the testing dataset, based on parameter estimates of the training dataset.

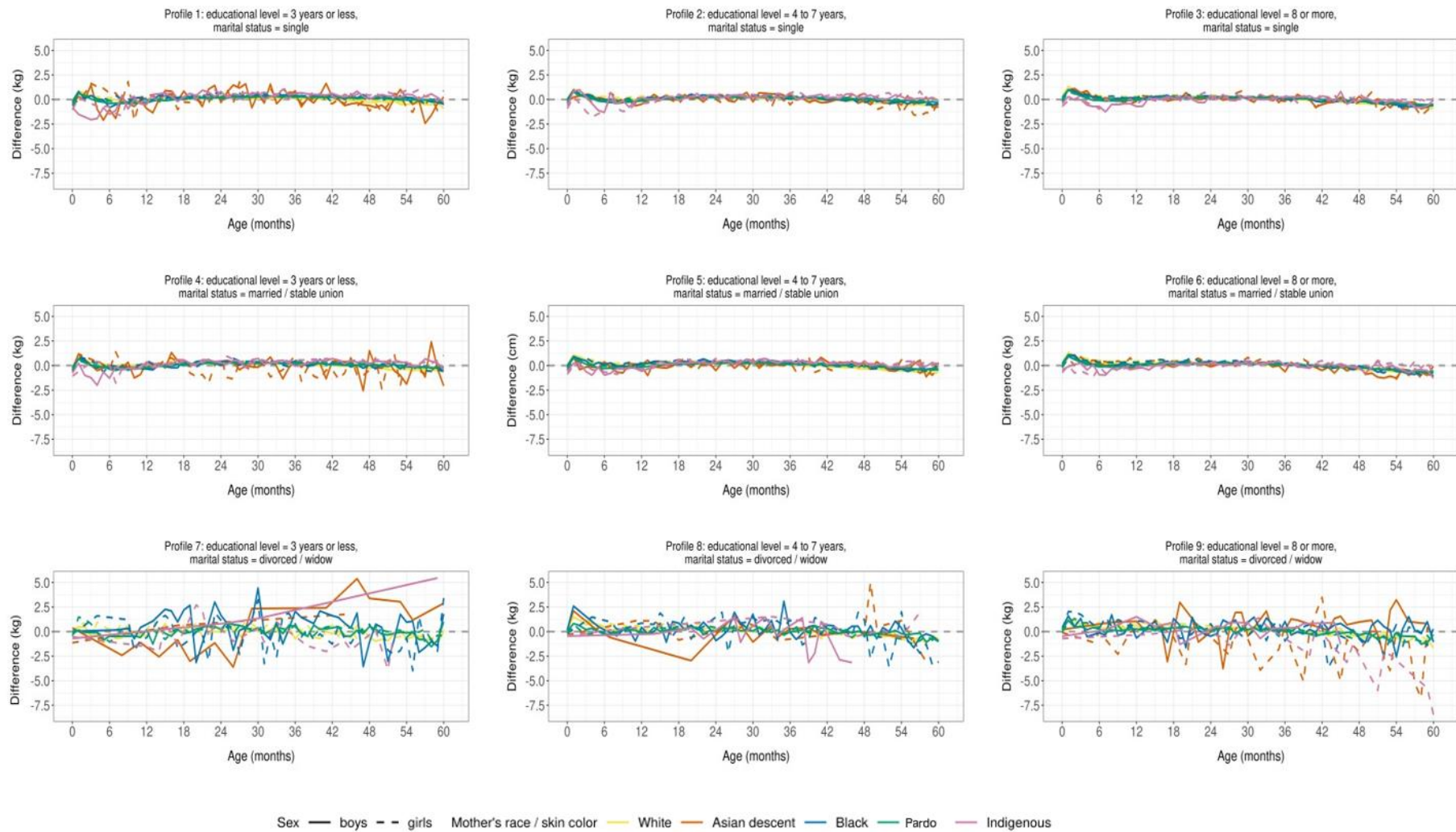


Figure S2: Difference between estimated and observed mean weight curves for the testing dataset, based on parameter estimates of the training dataset.

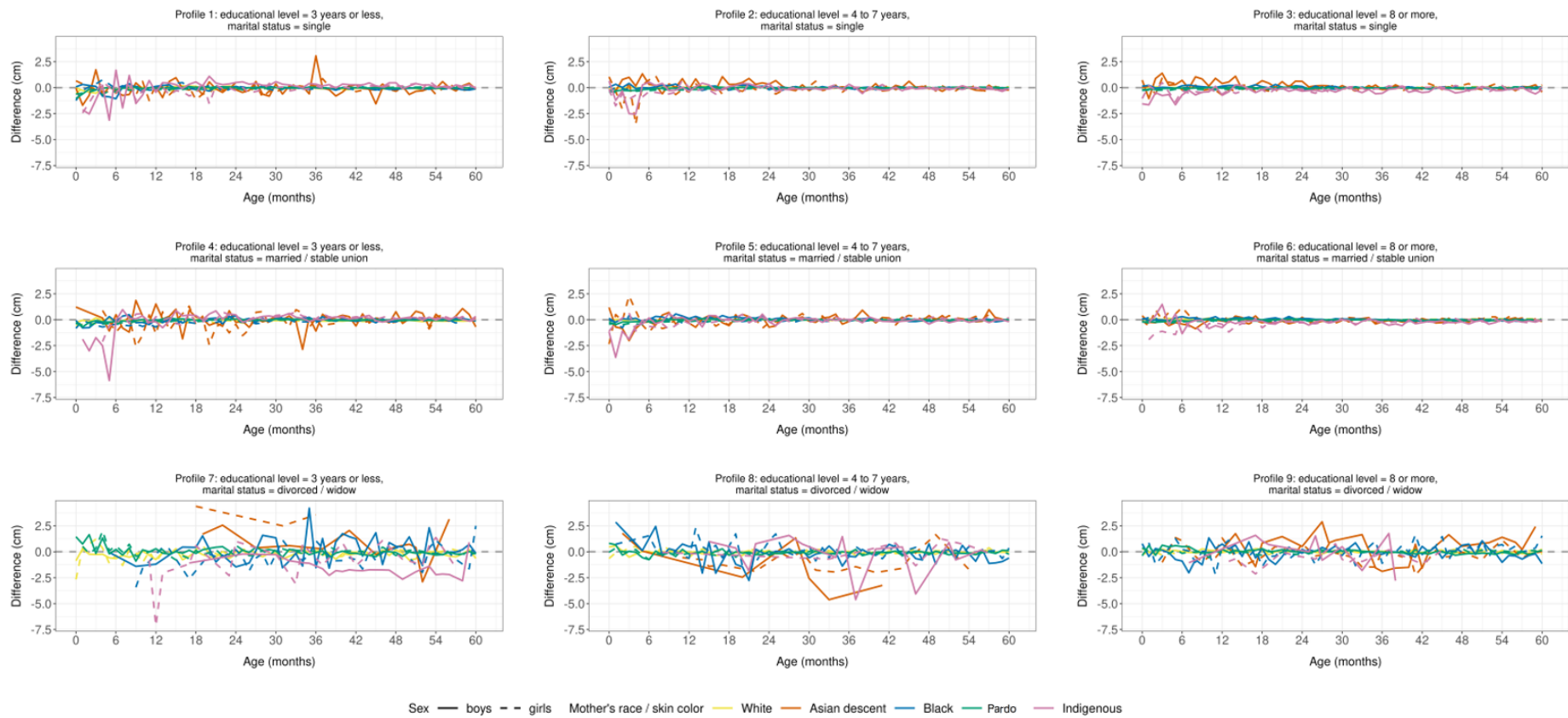


Figure S3: Difference between estimated and observed mean L/HAZ curves for the testing dataset, based on parameter estimates of the training dataset.

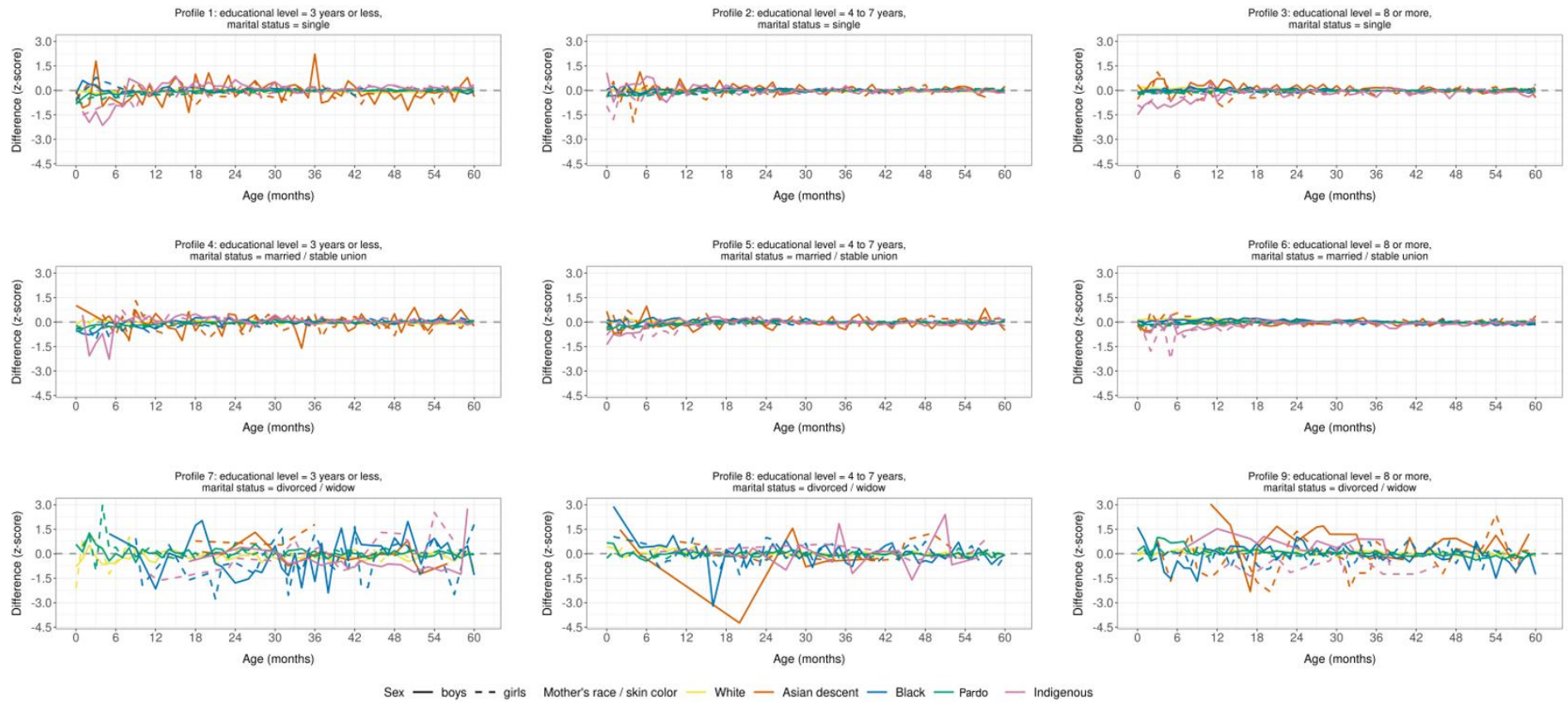


Figure S4: Difference between estimated and observed mean WAZ curves for the testing dataset, based on parameter estimates of the training dataset.