

Table I-1 Thickness of Triceps and Subscapular Skinfolids

Age (mo)	Percentiles	Triceps (mm)		Subscapular (mm)	
		Males	Females	Males	Females
1	<3	2.9	3.5	3.1	3.8
	10	4.0	4.5	4.2	4.9
	25	4.7	5.2	4.8	5.4
	50	5.3	5.8	5.6	6.2
	75	6.2	6.7	6.5	7.0
	90	7.0	7.6	7.5	7.9
	>97	8.1	8.3	8.3	9.0
3	<3	4.5	5.0	3.5	4.7
	10	6.0	6.2	4.9	5.9
	25	6.8	7.2	5.8	6.9
	50	8.1	8.2	6.9	8.0
	75	9.2	9.2	8.1	8.6
	90	10.3	10.5	9.0	9.4
	>97	11.7	11.8	10.7	11.1
6	<3	6.3	6.7	3.8	4.0
	10	7.8	8.2	5.5	5.9
	25	8.6	9.0	6.2	6.9
	50	9.7	10.4	7.1	8.1
	75	11.1	11.3	8.4	8.9
	90	11.8	12.7	10.1	10.3
	>97	13.5	13.9	11.0	12.4
9	<3	6.0	6.7	3.4	4.7
	10	7.5	7.9	5.3	6.0
	25	8.7	8.8	6.0	6.7
	50	9.9	10.1	7.1	7.6
	75	11.2	11.3	8.5	8.8
	90	12.5	12.5	9.7	10.1
	>97	14.0	13.5	11.4	11.1
12	<3	6.2	6.4	3.8	4.5
	10	7.8	7.6	5.3	6.0
	25	8.6	8.7	6.0	6.5
	50	9.8	9.8	7.2	7.5
	75	11.1	11.2	8.6	8.7
	90	12.2	12.2	9.6	9.8
	>97	3.8	13.6	11.0	10.9
18	<3	6.4	6.8	3.9	4.2
	10	7.7	7.9	5.3	5.7
	25	8.6	8.9	6.0	6.2
	50	9.9	10.3	6.8	7.1
	75	11.4	11.3	7.9	8.0
	90	12.2	12.3	9.3	9.0
	>97	13.6	13.6	10.3	10.2
24	<3	5.8	6.5	3.0	3.9
	10	7.4	8.3	4.6	5.3
	25	8.5	8.9	5.4	5.6
	50	9.8	10.1	6.5	6.5
	75	11.6	11.6	7.4	7.3
	90	13.1	12.8	8.3	8.4
	>97	14.2	14.1	10.2	9.5
36	<3	6.6	6.4	2.9	2.6
	10	7.8	8.2	4.5	4.7
	25	9.0	9.4	5.0	5.2
	50	9.8	10.3	5.5	6.1
	75	11.0	11.5	6.4	7.2
	90	12.2	12.5	7.1	8.6
	>97	13.4	14.4	8.9	10.6

Adapted from Karlberg P, Engstrom I, Lichtenstein H, Svennberg I. The development of children in a Swedish urban community: A prospective longitudinal study. III Physical growth during the first three years of life. *Acta Paediatr Scand Suppl* 1968;187:48-66. With permission from Taylor and Francis Group.

Table I-2 Percentiles of Upper Arm Circumference and Estimated Upper Arm Muscle Circumference

Age Group (yr)	Arm Circumference (mm)							Arm Muscle Circumference (mm)						
	5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
Males														
0.0-0.4	113			134			153							
0.5-1.4	128			152			175							
1-1.9	142	146	150	159	170	176	183	110	113	119	127	135	144	147
2-2.9	141	145	153	162	170	178	185	111	114	122	130	140	146	150
3-3.9	150	153	160	167	175	184	190	117	123	131	137	143	148	153
4-4.9	149	154	162	171	180	186	192	123	126	133	141	148	156	159
5-5.9	153	160	167	175	185	195	204	128	133	140	147	154	162	169
6-6.9	155	159	167	179	188	209	228	131	135	142	151	161	170	177
7-7.9	162	167	177	187	201	223	230	137	139	151	160	168	177	190
8-8.9	162	170	177	190	202	220	245	140	145	154	162	170	182	187
9-9.9	175	178	187	200	217	249	257	151	154	161	170	183	196	202
10-10.9	181	184	196	210	231	262	274	156	160	166	180	191	209	221
11-11.9	186	190	202	223	244	261	280	159	165	173	183	195	205	230
12-12.9	193	200	214	232	254	282	303	167	171	182	195	210	223	241
13-13.9	194	211	228	247	263	286	301	172	179	196	211	226	239	245
14-14.9	220	226	237	253	283	303	322	189	199	212	223	240	260	264
15-15.9	222	229	244	264	284	311	320	199	204	218	237	254	266	272
16-16.9	244	248	262	278	303	324	343	213	225	234	249	269	287	296
17-17.9	246	253	267	285	308	336	347	224	231	245	258	273	294	312
18-18.9	245	260	276	297	321	353	379	226	237	252	264	283	298	324
19-24.9	262	272	288	308	331	355	372	238	245	257	273	289	309	321
25-34.9	271	282	300	319	342	362	375	243	250	264	279	298	314	326
35-44.9	278	287	305	326	345	363	374	247	255	269	286	302	318	327
45-54.9	267	281	301	322	342	362	376	239	249	265	281	300	315	326
55-64.9	258	273	296	317	336	355	369	236	245	260	278	295	310	320
65-74.9	248	263	285	307	325	344	355	223	235	251	268	284	298	306
Females														
0.0-0.4	107			127			150							
0.5-1.4	125			146			170							
1-1.9	138	142	148	156	164	172	177	105	111	117	124	132	139	143
2-2.9	142	145	152	160	167	176	184	111	114	119	126	133	142	147
3-3.9	143	150	158	167	175	183	189	113	119	124	132	140	146	152
4-4.9	149	154	160	169	177	184	191	115	121	128	136	144	152	157
5-5.9	153	157	165	175	185	203	211	125	128	134	142	151	159	165
6-6.9	156	162	170	176	187	204	211	130	133	138	145	154	166	171
7-7.9	164	167	174	183	199	216	231	129	135	142	151	160	171	176
8-8.9	168	172	183	195	214	247	261	138	140	151	160	171	183	194
9-9.9	178	182	194	211	224	251	260	147	150	158	167	180	194	198
10-10.9	174	182	193	210	228	251	265	148	150	159	170	180	190	197
11-11.9	185	194	208	224	248	276	303	150	158	171	181	196	217	223
12-12.9	194	203	216	237	256	282	294	162	166	180	191	201	214	220
13-13.9	202	211	223	243	271	301	338	169	175	183	198	211	226	240
14-14.9	214	223	237	252	272	304	322	174	179	190	201	216	232	247
15-15.9	208	221	239	254	279	300	322	175	178	189	202	215	228	244
16-16.9	218	224	241	258	283	318	334	170	180	190	202	216	234	249
17-17.9	220	227	241	264	295	324	350	175	183	194	205	221	239	257
18-18.9	222	227	241	258	281	312	325	174	179	191	202	215	237	245
19-24.9	221	230	247	265	290	319	345	179	185	195	207	221	236	249
25-34.9	233	240	256	277	304	342	368	183	188	199	212	228	246	264
35-44.9	241	251	267	290	317	356	378	186	192	205	218	236	257	272
45-54.9	242	256	274	299	328	362	384	187	193	206	220	238	260	274
55-64.9	243	257	280	303	335	367	385	187	196	209	225	244	266	280
65-74.9	240	252	274	299	326	356	373	185	195	208	225	244	264	279

Data collected from whites in the United States Health and Nutrition Examination Survey I (1971-1974).

Adapted from Frisancho AR. Triceps skin fold and upper arm muscle size norms for assessment of nutritional status. *Am J Clin Nutr* 1974;27:1052-58 and Frisancho AR. New norms of upper limb fat and muscle areas for assessment of nutritional status. *Am J Clin Nutr* 1981;34:2540-5. With permission from the American Society for Nutrition.

Table I-3 Percentiles of Triceps Skinfolts

Age Group (yr)	5th	10th	25th	50th	75th	90th	95th
Males							
1-1.9	6	7	8	10	12	14	16
2-2.9	6	7	8	10	12	14	15
3-3.9	6	7	8	10	11	14	15
4-4.9	6	6	8	9	11	12	14
5-5.9	6	6	8	9	11	14	15
6-6.9	5	6	7	8	10	13	16
7-7.9	5	6	7	9	12	15	17
8-8.9	5	6	7	8	10	13	16
9-9.9	6	6	7	10	13	17	18
10-10.9	6	6	8	10	14	18	21
11-11.9	6	6	8	11	16	20	24
12-12.9	6	6	8	11	14	22	28
13-13.9	5	5	7	10	14	22	26
14-14.9	4	5	7	9	14	21	24
15-15.9	4	5	6	8	11	18	24
16-16.9	4	5	6	8	12	16	22
17-17.9	5	5	6	8	12	16	19
18-18.9	4	5	6	9	13	20	24
19-24.9	4	5	7	10	15	20	22
25-34.9	5	6	8	12	16	20	24
35-44.9	5	6	8	12	16	20	23
45-54.9	6	6	8	12	15	20	25
55-64.9	5	6	8	11	14	19	22
65-74.9	4	6	8	11	15	19	22
Females							
1-1.9	6	7	8	10	12	14	16
2-2.9	6	8	9	10	12	15	16
3-3.9	7	8	9	11	12	14	15
4-4.9	7	8	8	10	12	14	16
5-5.9	6	7	8	10	12	15	18
6-6.9	6	6	8	10	12	14	16
7-7.9	6	7	9	11	13	16	18
8-8.9	6	8	9	12	15	18	24
9-9.9	8	8	10	13	16	20	22
10-10.9	7	8	10	12	17	23	27
11-11.9	7	8	10	13	18	24	28
12-12.9	8	9	11	14	18	23	27
13-13.9	8	8	12	15	21	26	30
14-14.9	9	10	13	16	21	26	28
15-15.9	8	10	12	17	21	25	32
16-16.9	10	12	15	18	22	26	31
17-17.9	10	12	13	19	24	30	37
18-18.9	10	12	15	18	22	26	30
19-24.9	10	11	14	18	24	30	34
25-34.9	10	12	16	21	27	34	37
35-44.9	12	14	18	23	29	35	38
45-54.9	12	16	20	25	30	36	40
55-64.9	12	16	20	25	31	36	38
65-74.9	12	14	18	24	29	34	36

Adapted from Frisancho AR. New norms of upper limb fat and muscle areas for assessment of nutritional status. *Am J Clin Nutr* 1981;34:2540-5. With permission from the American Society for Nutrition.

Table I-4 Percentiles for Estimates of Upper Arm Muscle Area and Upper Arm Fat Area

Age Group (yr)	Arm Muscle Area (mm)							Arm Fat Area (mm)						
	5	10	25	50	75	90	95	5	10	25	50	75	90	95
Males														
1-1.9	956	1,014	1,133	1,278	1,447	1,644	1,720	452	486	590	741	895	1,036	1,176
2-2.9	973	1,040	1,190	1,345	1,557	1,690	1,787	434	504	578	737	871	1,044	1,148
3-3.9	1,095	1,201	1,357	1,484	1,618	1,750	1,853	464	519	590	736	868	1,071	1,151
4-4.9	1,207	1,264	1,408	1,579	1,747	1,926	2,008	428	494	598	722	859	989	1,085
5-5.9	1,298	1,411	1,550	1,720	1,884	2,089	2,285	446	488	582	713	914	1,176	1,299
6-6.9	1,360	1,447	1,605	1,815	2,056	2,297	2,493	371	446	539	678	896	1,115	1,519
7-7.9	1,497	1,548	1,808	2,027	2,246	2,494	2,886	423	473	574	758	1,011	1,393	1,511
8-8.9	1,550	1,664	1,895	2,089	2,296	2,628	2,788	410	460	588	725	1,003	1,248	1,558
9-9.9	1,811	1,884	2,067	2,288	2,657	3,053	3,257	485	527	635	859	1,252	1,864	2,081
10-10.9	1,930	2,027	2,182	2,575	2,903	3,486	3,882	523	543	738	982	1,376	1,906	2,609
11-11.9	2,016	2,156	2,382	2,670	3,022	3,359	4,226	536	595	754	1,148	1,710	2,348	2,574
12-12.9	2,216	2,339	2,649	3,022	3,496	3,968	4,640	554	650	874	1,172	1,558	2,536	3,580
13-13.9	2,363	2,546	3,044	3,553	4,081	4,502	4,794	475	570	812	1,096	1,702	2,744	3,322
14-14.9	2,830	3,147	3,586	3,963	4,575	5,368	5,530	453	563	786	1,082	1,608	2,746	3,508
15-15.9	3,138	3,317	3,788	4,481	5,134	5,631	5,900	521	595	690	931	1,423	2,434	3,100
16-16.9	3,625	4,044	4,352	4,951	5,753	6,576	6,980	542	593	844	1,078	1,746	2,280	3,041
17-17.9	3,998	4,252	4,777	5,286	5,950	6,886	7,726	598	698	827	1,096	1,636	2,407	2,888
18-18.9	4,070	4,481	5,066	5,552	6,374	7,067	8,355	560	665	860	1,264	1,947	3,302	3,928
19-24.9	4,508	4,777	5,274	5,913	6,660	7,606	8,200	594	743	963	1,406	2,231	3,098	3,652
25-34.9	4,694	4,963	5,541	6,214	7,067	7,847	8,436	675	831	1,174	1,752	2,459	3,246	3,786
35-44.9	4,844	5,181	5,740	6,490	7,265	8,034	8,488	703	851	1,310	1,792	2,463	3,098	3,624
45-54.9	4,546	4,946	5,589	6,297	7,142	7,918	8,458	749	922	1,254	1,741	2,359	3,245	3,928
55-64.9	4,422	4,783	5,381	6,144	6,919	7,670	8,149	658	839	1,166	1,645	2,236	2,976	3,466
65-74.9	3,973	4,411	5,031	5,716	6,432	7,074	7,453	573	753	1,122	1,621	2,199	2,876	3,327
Females														
1-1.9	885	973	1,084	1,221	1,378	1,535	1,621	401	466	578	706	847	1,022	1,140
2-2.9	973	1,029	1,119	1,269	1,405	1,595	1,727	469	526	642	747	894	1,061	1,173
3-3.9	1,014	1,133	1,227	1,396	1,563	1,690	1,846	473	529	656	822	967	1,106	1,158
4-4.9	1,058	1,171	1,313	1,475	1,644	1,832	1,958	490	541	654	766	907	1,109	1,236
5-5.9	1,238	1,301	1,423	1,598	1,825	2,012	2,159	470	529	647	812	991	1,330	1,536
6-6.9	1,354	1,414	1,513	1,683	1,877	2,182	2,323	464	508	638	827	1,009	1,263	1,436
7-7.9	1,330	1,441	1,602	1,815	2,045	2,332	2,469	491	560	706	920	1,135	1,407	1,644
8-8.9	1,513	1,566	1,808	2,034	2,327	2,657	2,996	527	634	769	1,042	1,383	1,872	2,482
9-9.9	1,723	1,788	1,976	2,227	2,571	2,987	3,112	642	690	933	1,219	1,584	2,171	2,524
10-10.9	1,740	1,784	2,019	2,296	2,583	2,873	3,093	616	702	842	1,141	1,608	2,500	3,005
11-11.9	1,784	1,987	2,316	2,612	3,071	3,739	3,953	707	802	1,015	1,301	1,942	2,730	3,690
12-12.9	2,092	2,182	2,579	2,904	3,225	3,655	3,847	782	854	1,090	1,511	2,056	2,666	3,369
13-13.9	2,269	2,426	2,657	3,130	3,529	4,081	4,568	726	838	1,219	1,625	2,374	3,272	4,150
14-14.9	2,418	2,562	2,874	3,220	3,704	4,294	4,850	981	1,043	1,423	1,818	2,403	3,250	3,765
15-15.9	2,426	2,518	2,847	3,248	3,689	4,123	4,756	839	1,126	1,396	1,886	2,544	3,093	4,195
16-16.9	2,308	2,567	2,865	3,248	3,718	4,353	4,946	1,126	1,351	1,663	2,006	2,598	3,374	4,236
17-17.9	2,442	2,674	2,996	3,336	3,883	4,552	5,251	1,042	1,267	1,463	2,104	2,977	3,864	5,159
18-18.9	2,398	2,538	2,917	3,243	3,694	4,461	4,767	1,003	1,230	1,616	2,104	2,617	3,508	3,733
19-24.9	2,538	2,728	3,026	3,406	3,877	4,439	4,940	1,046	1,198	1,596	2,166	2,959	4,050	4,896
25-34.9	2,661	2,826	3,148	3,573	4,138	4,806	5,541	1,173	1,399	1,841	2,548	3,512	4,690	5,560
35-44.9	2,750	2,948	3,359	3,783	4,428	5,240	5,877	1,336	1,619	2,158	2,898	3,932	5,093	5,847
45-54.9	2,784	2,956	3,378	3,858	4,520	5,375	5,964	1,459	1,803	2,447	3,244	4,229	5,416	6,140
55-64.9	2,784	3,063	3,477	4,045	4,750	5,632	6,247	1,345	1,879	2,520	3,369	4,360	5,276	6,152
65-74.9	2,737	3,018	3,444	4,019	4,739	5,566	6,214	1,363	1,681	2,266	3,063	3,943	4,914	5,530

Adapted from Frisancho AR. New norms of upper limb fat and muscle areas for assessment of nutritional status. *Am J Clin Nutr* 1981;34:2540-45. With permission from the American Society for Nutrition.