

# WEIGHT MANAGEMENT ALGORITHM FOR OVERWEIGHT CHILDREN AND ADOLESCENTS<sup>1</sup>

Obtain Accurate Height (Ht) & Weight (Wt)  
**Calculate Body Mass Index (BMI-see page 3)**  
(Refer to gender-specific BMI Chart on page 4)

$$\text{BMI} = \frac{\text{Wt in kg}}{(\text{Ht in m})^2}$$

$$= \frac{\text{Wt in lb} \times 703}{(\text{Ht in inches})^2}$$

**Normal<sup>2</sup>**  
<85<sup>th</sup>ile BMI  
for Age & Gender

Reinforce Healthy Lifestyle,  
Diet, and Exercise;  
Watch for Rapid Wt Gain<sup>2</sup>

**At Risk for Overweight<sup>2</sup>**  
85<sup>th</sup>–95<sup>th</sup>ile BMI for  
Age & Gender; Rapid Wt Gain<sup>2</sup>

**Overweight<sup>2</sup>**  
>95<sup>th</sup>ile BMI for Age & Gender

**Assess for Comorbidities<sup>3</sup>**  
Sleep Apnea; Pseudotumor Cerebri; Dyslipidemia (Elevated LDL-C and/or TG; Low HDL-C); HTN;  
NAFLD; GERD; Wt-bearing Joint Pain; PCOS/Hyperandrogenism; AN; Psychological Adjustment Disorders; T2DM (FPG ≥ 126 mg/dL;  
Post Challenge PG ≥ 200 mg/dL)

**Assess for Risk Factors and/or Contributing Factors**  
Medications<sup>4</sup>; Hypothyroidism; Cushing Syndrome; Prader-Willi Syndrome; SGA; Low Birth Wt; Post Malignancy Treatment

**Initial Wt Loss Targets<sup>5</sup> (1<sup>st</sup> 6 Months)**

- >95<sup>th</sup>ile BMI for Age & Gender
- >85<sup>th</sup>ile BMI with Comorbidities

Pubertal: =10% Body Wt Loss  
Pre-pubertal: ≥age 7 = 1–2 lbs per Month Wt Loss  
<age 7 = Wt Maintenance or Modest Wt Loss

Degree of Wt Loss will Depend on the Severity of the Comorbidity

**Offer Medically Supervised Wt Management Intervention**

Pt/Family Motivated ↓

**Education; Lifestyle Changes<sup>2</sup>; Nutrition; Increased Physical Activity; Behavior Modification; Nutrition/Family Counseling.**

Pt/Family Not Motivated → Educate Patient and Family; Manage Comorbidities and Risk Factors; Reassess Readiness Periodically

Pt/Family Motivated ↓

≥6 months → **Targets Not Met**

Pt/Family Not Motivated → Educate Patient and Family; Manage Comorbidities and Risk Factors; Reassess Readiness Periodically

Pt/Family Motivated ↓

Maintain Healthy Lifestyle, Diet and Exercise;  
Reinforce Education; Monitor Wt Weekly for Life with Periodic Follow-up by HCP

**Consider Bariatric Surgery<sup>8</sup> for adolescents who meet criteria. (See page 2)**

Wt Loss Maintenance ← **Targets Met**

Targets Maintained ←

**Consider Obesity Pharmacologic Monotherapy as Adjunct to Lifestyle Changes if BMI ≥ 27 with Comorbidities or if BMI ≥ 30**

<p><b>Appetite Suppressant</b> <b>Sibutramine<sup>6</sup></b> Contraindicated in: Uncontrolled HTN; Glaucoma (Narrow-angle) Arrhythmia; CVA; CVD; CHF; Concurrent SSRI; MAOI Therapy; Pregnancy; Bulimia/Anorexia Nervosa Hx</p>	<p><b>Lipase Inhibitor</b> <b>Orlistat<sup>7</sup></b> Contraindicated in: Chronic Malabsorption Cholestasis; Orlistat Hypersensitivity; Concurrent Cyclosporin Therapy; Pregnancy</p>
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≥6 months → **Motivated & Targets Not Met**

→ Consider Bariatric Surgery<sup>8</sup> for adolescents who meet criteria. (See page 2)

## **ABBREVIATIONS**

**AN:** Acanthosis Nigricans  
**CHF:** Congestive Heart Failure  
**CVA:** Cerebrovascular Accident  
**CVD:** Cardiovascular Disease  
**FPG:** Fasting Plasma Glucose  
**GERD:** Gastro-esophageal Reflux Disease  
**HCP:** Health Care Professional  
**HDL-C:** High-density Lipoprotein Cholesterol  
**HTN:** Hypertension (>95<sup>th</sup>ile Blood Pressure for Age & Gender & Ht)  
**LDL-C:** Low-density Lipoprotein Cholesterol  
**MAOI:** Monoamine Oxidase Inhibitors  
**NAFLD:** Non-alcoholic Fatty Liver Disease  
**PCOS:** Polycystic Ovary Syndrome  
**SGA:** Small for Gestational Age  
**SSRI:** Selective Serotonin Reuptake Inhibitors  
**T2DM:** Type 2 Diabetes Mellitus  
**TG:** Triglycerides

## **Criteria for Bariatric Surgery**<sup>8</sup>

Adolescents being considered for bariatric surgery should:

- Have failed 6 months of organized attempts at wt management, as determined by their primary care provider
- Have attained or nearly attained physiologic maturity
- Be severely obese (BMI  $\geq 40$ ) with serious obesity-related comorbidities or BMI  $\geq 50$  with less severe comorbidities
- Demonstrate commitment to comprehensive medical and psychologic evaluations both before and after surgery
- Agree to avoid pregnancy for at least 1 yr postoperatively
- Be capable of and willing to adhere to nutritional guidelines postoperatively
- Provide informed consent to surgical treatment
- Demonstrate decisional capacity
- Have a supportive family environment

## **FOOTNOTES**

1. Adapted from the Texas Diabetes Council's *Weight Loss Algorithm for Overweight and Obese Adults*
2. Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau, Health Resources and Services Administration and the Department of Health and Human Services. *Pediatrics*. 1998;102(3):E29
3. Barlow SE, Dietz WH. Obesity evaluation and treatment: Expert Committee recommendations. The Maternal and Child Health Bureau, Health Resources and Services Administration and the Department of Health and Human Services. *Pediatrics*. 1998;102(3):E29; and American Diabetes Association. Type 2 diabetes in children and adolescents. *Pediatrics*. 2000;105(3 Pt 1):671-80; Refer to appropriate Texas Diabetes Council algorithms
4. Medications that affect insulin sensitivity:

Inhaled steroids:	<u>Medications known to cause wt gain:</u>
1000 mcg/day fluticasone (Flovent)	Risperidone (Risperdal)
2000 mcg/day of all others	Olanzapine (Zyprexa)
Oral Steroids:	Clozapine (Clozaril)
20 days in previous year, or any within 60 days of screening	Quetiapine (Seroquel)
L- asparaginase	Ziprasidone (Geodon)
FK506 (Tacrolimus)	Carbamazepine (Tegretol)
Cyclosporine (Neoral/Sandimmune)	Valproic acid (Depakote/Depakene/Depacon)
Niacin	Tricyclic Antidepressants
	Lithium
	Insulin/Insulin Analogs
	Sulfonylureas
	Cyproheptadine
	Estrogens/Progestins
5. No evidence-based outcomes data are yet available for weight loss targets
6. Berkowitz RI, Wadden TA, Terhakovec AM, et al. Behavior therapy and sibutramine for the treatment of adolescent obesity: a randomized controlled trial. *JAMA*. 2003;289(14):1805-12; sibutramine is FDA-approved for ages  $\geq 16$  yr
7. McDuffie JR, Calis KA, Uwaifo GI, et al. Efficacy of orlistat as an adjunct to behavioral treatment in overweight African American and Caucasian adolescents with obesity-related co-morbid conditions. *J Pediatr Endocrinol Metab*. 2004;17(3):307-19; orlistat is FDA-approved for ages  $\geq 12$  yr
8. Inge TH, Krebs NF, Garcia VF, et al. Bariatric surgery for severely overweight adolescents: concerns and recommendations. *Pediatrics*. 2004;114(1):217-23
9. Rosner B, Prineas R, Loggie J, et al. Percentiles for body mass index in U.S. children 5 to 17 years of age. *J Pediatr*. 1998;132(2):211-22.

## **Additional References**

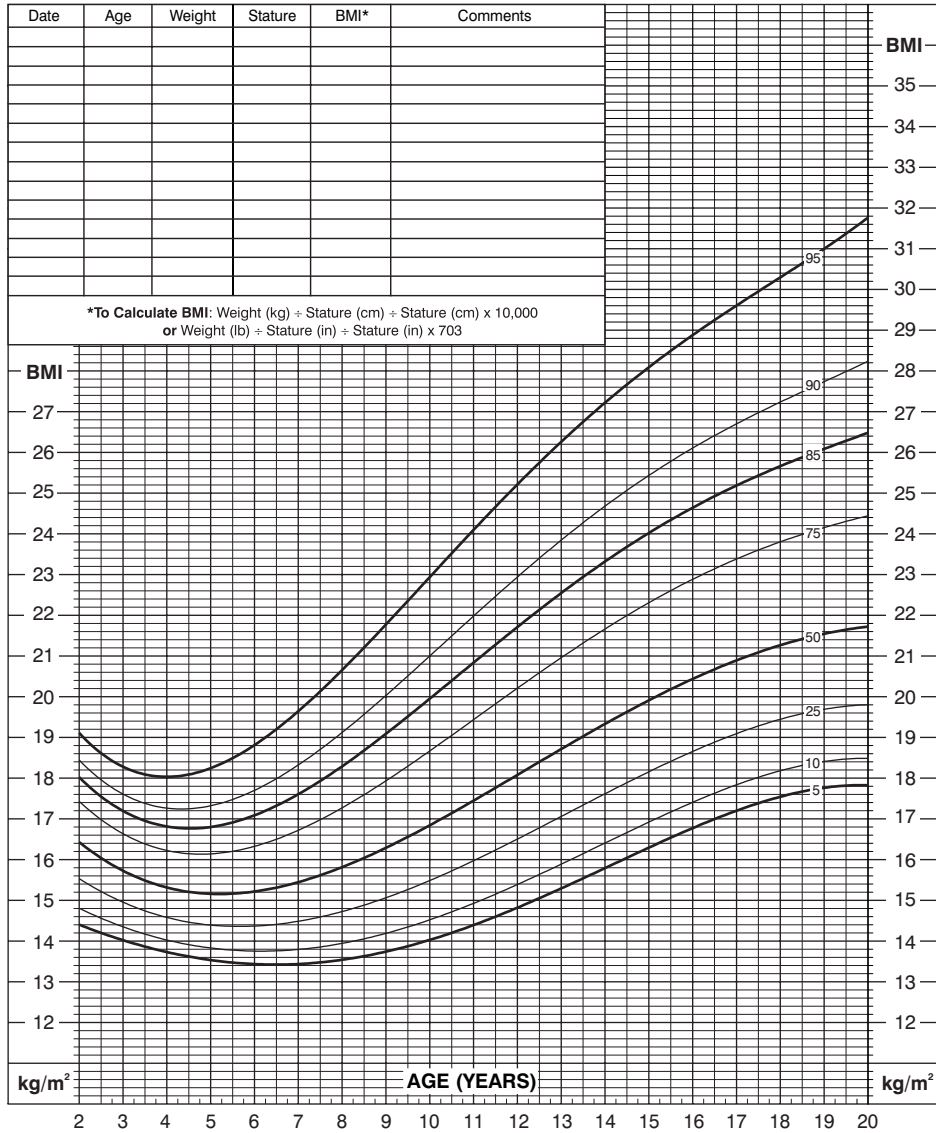
Bobo N, Evert A, Gallivan J, et al. An update on type 2 diabetes in youth from the National Diabetes Education Program. *Pediatrics*. 2004;114(1):259-63  
Garcia VF, Langford L, Inge TH. Application of laparoscopy for bariatric surgery in adolescents. *Curr Opin Pediatr*. 2003;15(3):248-55  
Krebs NF, Jacobson MS; American Academy of Pediatrics Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112(2):424-30

APPENDIX. Weight (lb) for different combinations of height (inch) and BMI (kg/m<sup>2</sup>)<sup>9</sup>

Height (in)	Weight (lb)																	
36	24	26	28	29	31	33	35	37	39	40	42	44	46	48	50	52	53	55
37	25	27	29	31	33	35	37	39	41	43	45	47	49	51	52	54	56	58
38	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61
39	28	30	32	35	37	39	41	43	45	47	50	52	54	56	58	60	63	65
40	30	32	34	36	39	41	43	45	48	50	52	55	57	59	61	64	66	68
41	31	33	36	38	41	43	45	48	50	52	55	57	60	62	64	67	69	72
42	33	35	38	40	43	45	48	50	53	55	58	60	63	65	68	70	73	75
43	34	37	39	42	45	47	50	52	55	58	60	63	66	68	71	73	76	79
44	36	38	41	44	47	49	52	55	58	60	63	66	69	71	74	77	80	82
45	37	40	43	46	49	52	55	57	60	63	66	69	72	75	78	80	83	86
46	39	42	45	48	51	54	57	60	63	66	69	72	75	78	81	84	87	90
47	41	44	47	50	53	56	60	63	66	69	72	75	78	82	85	88	91	94
48	43	46	49	52	56	59	62	65	69	72	75	78	82	85	88	92	95	98
49	44	48	51	55	58	61	65	68	72	75	78	82	85	89	92	95	99	102
50	46	50	53	57	60	64	67	71	75	78	82	85	89	92	96	99	103	106
51	48	52	55	59	63	66	70	74	78	81	85	89	92	96	100	103	107	111
52	50	54	58	61	65	69	73	77	81	84	88	92	96	100	104	107	111	115
53	52	56	60	64	68	72	76	80	84	88	92	96	100	104	108	112	116	120
54	54	58	62	66	70	74	79	83	87	91	95	99	103	108	112	116	120	124
55	56	60	64	69	73	77	82	86	90	94	99	103	107	112	116	120	125	129
56	58	62	67	71	76	80	85	89	93	98	102	107	111	116	120	125	129	134
57	60	65	69	74	78	83	88	92	97	101	106	111	115	120	125	129	134	138
58	62	67	72	76	81	86	91	95	100	105	110	115	119	124	129	134	138	143
59	64	69	74	79	84	89	94	99	104	109	114	119	124	128	133	138	143	148
60	66	72	77	82	87	92	97	102	107	112	118	123	128	133	138	143	148	153
61	69	74	79	85	90	95	100	106	111	116	121	127	132	137	143	148	153	158
62	71	76	82	87	93	98	104	109	115	120	125	131	136	142	147	153	158	164
63	73	79	85	90	96	101	107	113	118	124	130	135	141	146	152	158	163	169
64	76	81	87	93	99	105	110	116	122	128	134	140	145	151	157	163	169	174
65	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180
66	80	87	93	99	105	111	117	124	130	136	142	148	155	161	167	173	179	185
67	83	89	96	102	108	115	121	127	134	140	147	153	159	166	172	178	185	191
68	85	92	98	105	112	118	125	131	138	144	151	158	164	171	177	184	190	197
69	88	95	101	108	115	122	128	135	142	149	155	162	169	176	182	189	196	203
70	90	97	104	111	118	125	132	139	146	153	160	167	174	181	188	195	202	209
71	93	100	107	114	122	129	136	143	150	157	165	172	179	186	193	200	207	215
72	96	103	110	118	125	132	140	147	155	162	169	177	184	191	199	206	213	221
73	98	106	113	121	129	136	144	151	159	166	174	182	189	197	204	212	219	227
74	101	109	117	124	132	140	148	155	163	171	179	187	194	202	210	218	225	233
75	104	112	120	128	136	144	152	160	168	176	184	192	200	208	216	224	232	240
76	107	115	125	131	139	148	156	164	172	180	189	197	205	213	221	230	238	246
77	109	118	126	135	143	151	160	168	177	185	194	202	210	219	227	236	244	252
78	112	121	130	138	147	155	164	173	181	190	199	207	216	225	233	242	250	259
BMI (kg/m <sup>2</sup> )	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

**2 to 20 years: Girls**  
**Body mass index-for-age percentiles**

NAME \_\_\_\_\_  
 RECORD # \_\_\_\_\_



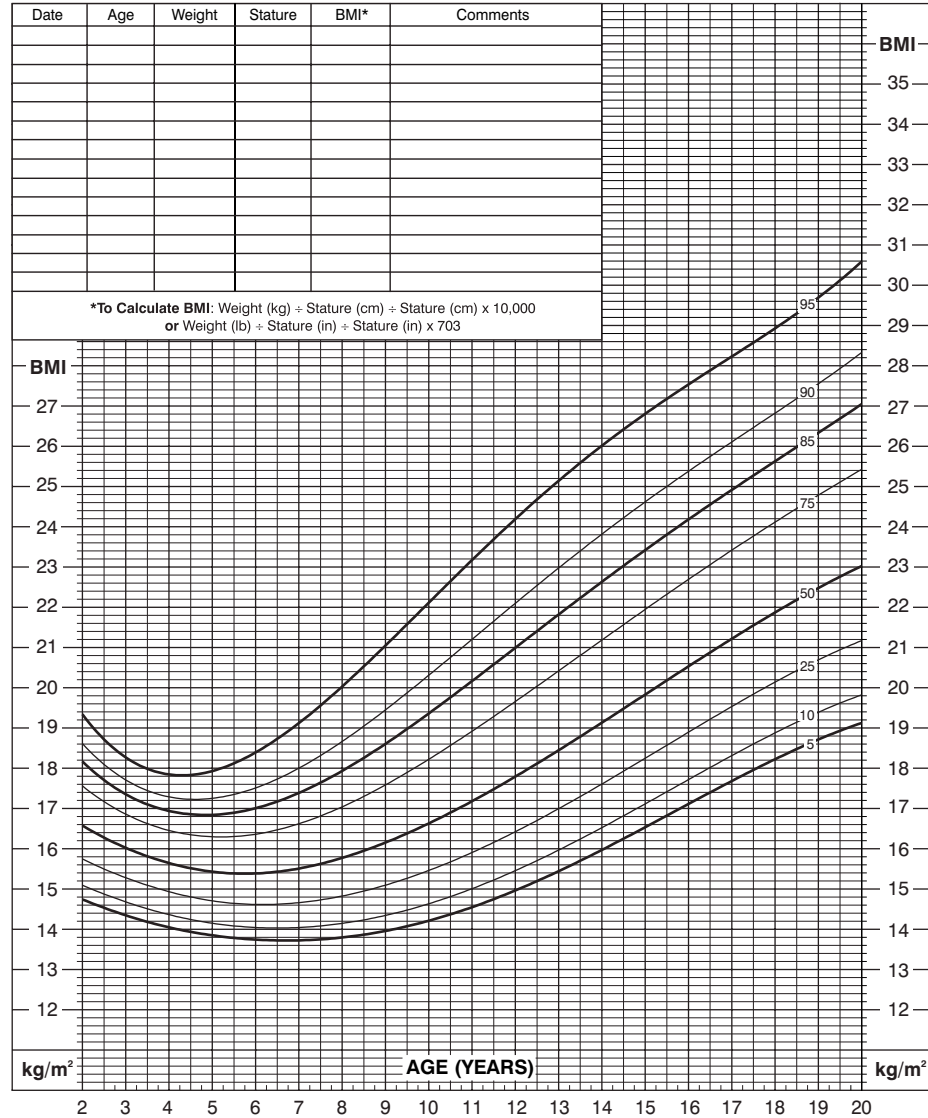
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 SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).  
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**2 to 20 years: Boys**  
**Body mass index-for-age percentiles**

NAME \_\_\_\_\_  
 RECORD # \_\_\_\_\_



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