Growth tracking to identify and intervene with nutritional growth abnormalities

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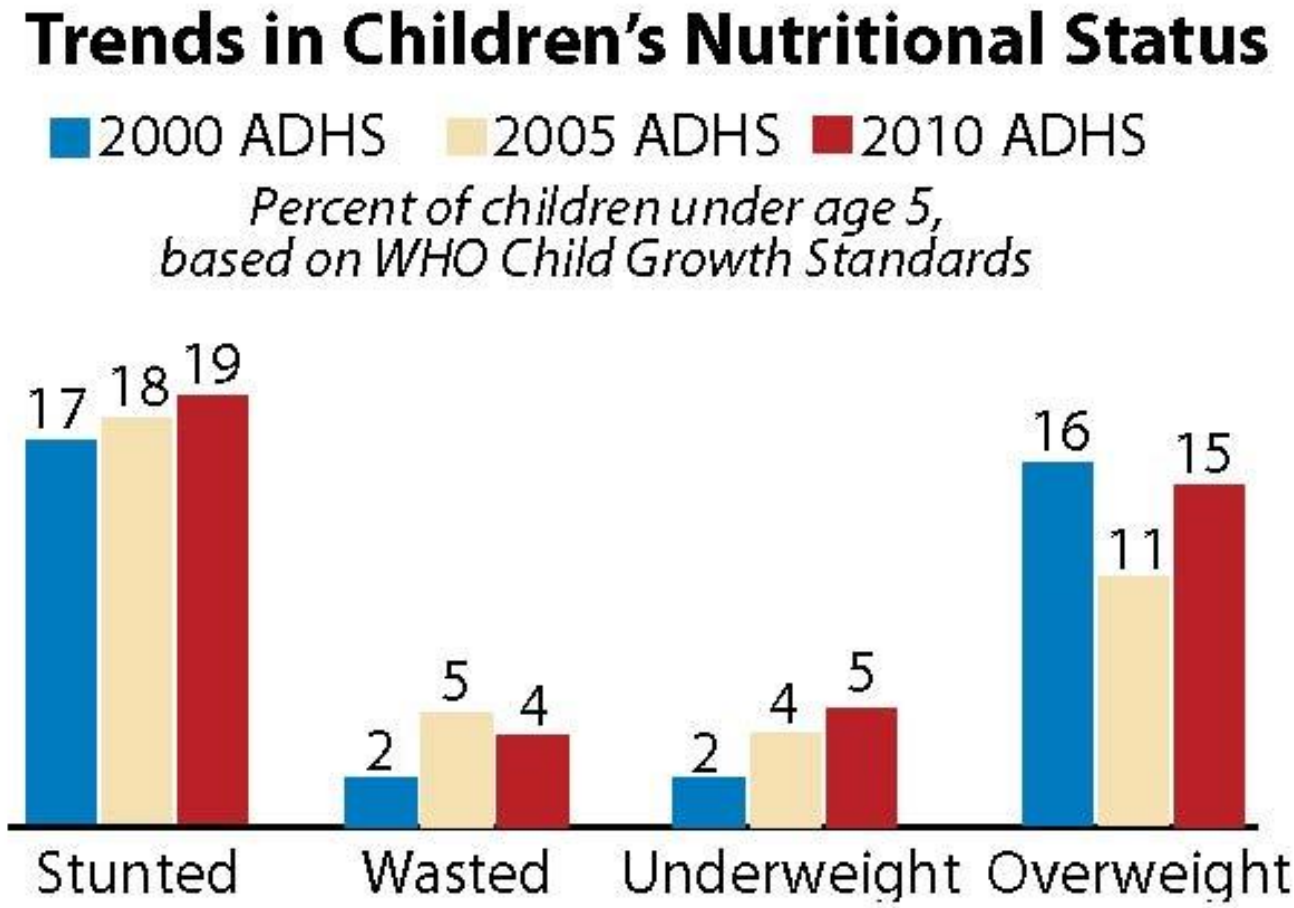
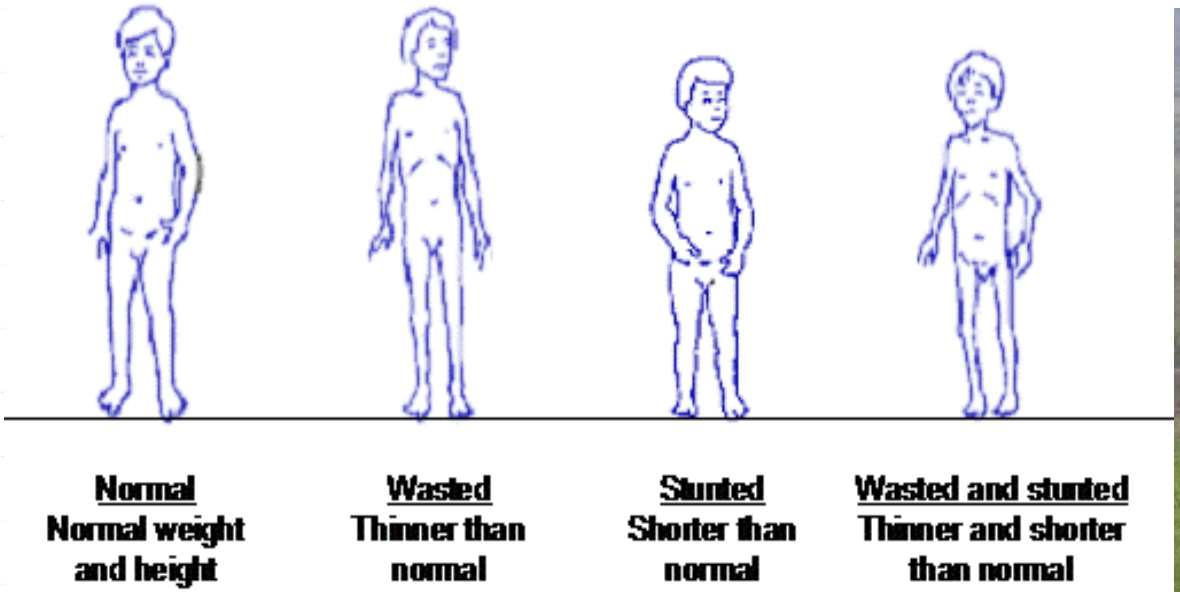
Problems with growth—under/over nutrition in Armenia



National Statistical Service, Ministry of Health [Republic of Armenia], and ICF International 2012. 2010 Armenia Demographic and Health Survey: Key Findings. Yerevan, Armenia and Calverton, Maryland, USA: National Statistical Service, Ministry of Health and ICF International.

Issues of identification and tracking of malnourished children

Definitions of growth abnormalities



All girls are 13, while the boy is 14. Girls live in US, while the boy in Armenia.

London School of Hygiene and Tropical Medicine. http://conflict.lshtm.ac.uk/page_115.htm

Growth reference vs Growth standard (NCHS vs WHO)

- US NCHS charts (2000)—growth reference
  - No assessment what is normal in optimal growing environment
  - Useful for comparison differences
- WHO charts (2006)-growth standard
  - Created to measure optimal growth in nutritionally optimal environment
  - Data from: Brazil, Ghana, India, Norway, Oman, USA
  - Longitidinal data 0-2 yrs, 50% of 1743 pt completed the study
  - Infants breastfed until 1st year, complementary foods started at 4-6 mo
  - WHO growth charts have higher median weight for infants 0-6 mo than NCHS increasing chance of diagnosis of wasting

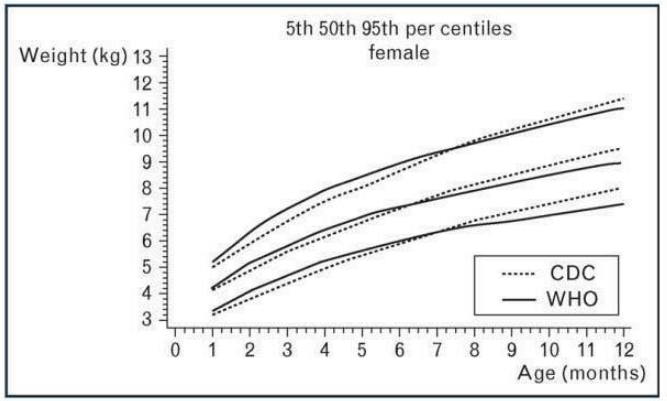


FIGURE 1. Weight-for-age percentiles (5th, 50th, 95th), female infants 0-12 months, WHO standards (WHO) and CDC

Duggan M. Annals of Tropical Pediatrics. 2010;30:1-17
Ziegler. Curr Opin Clin Nutr Metab Care. 2012;15:298–302

Problems with use of growth charts

- Difficult to measure length and height
- Problems with plotting on the growth chart
- Dr. Hovhannisyan showed that 91% of 570 charts reviewed had growth plotted, but many mistakes were made
- Parents poor at understanding growth charts
- Parental experience and literacy contribute to better understanding

Proportion of properly plotted growth

Growth parameter	Clinic		Total
	1-4	5	
Weight for age (%)	44-57	98	61
Height for age (%)	41-56	98	60
Weight for Height (%)	14-33	53	27

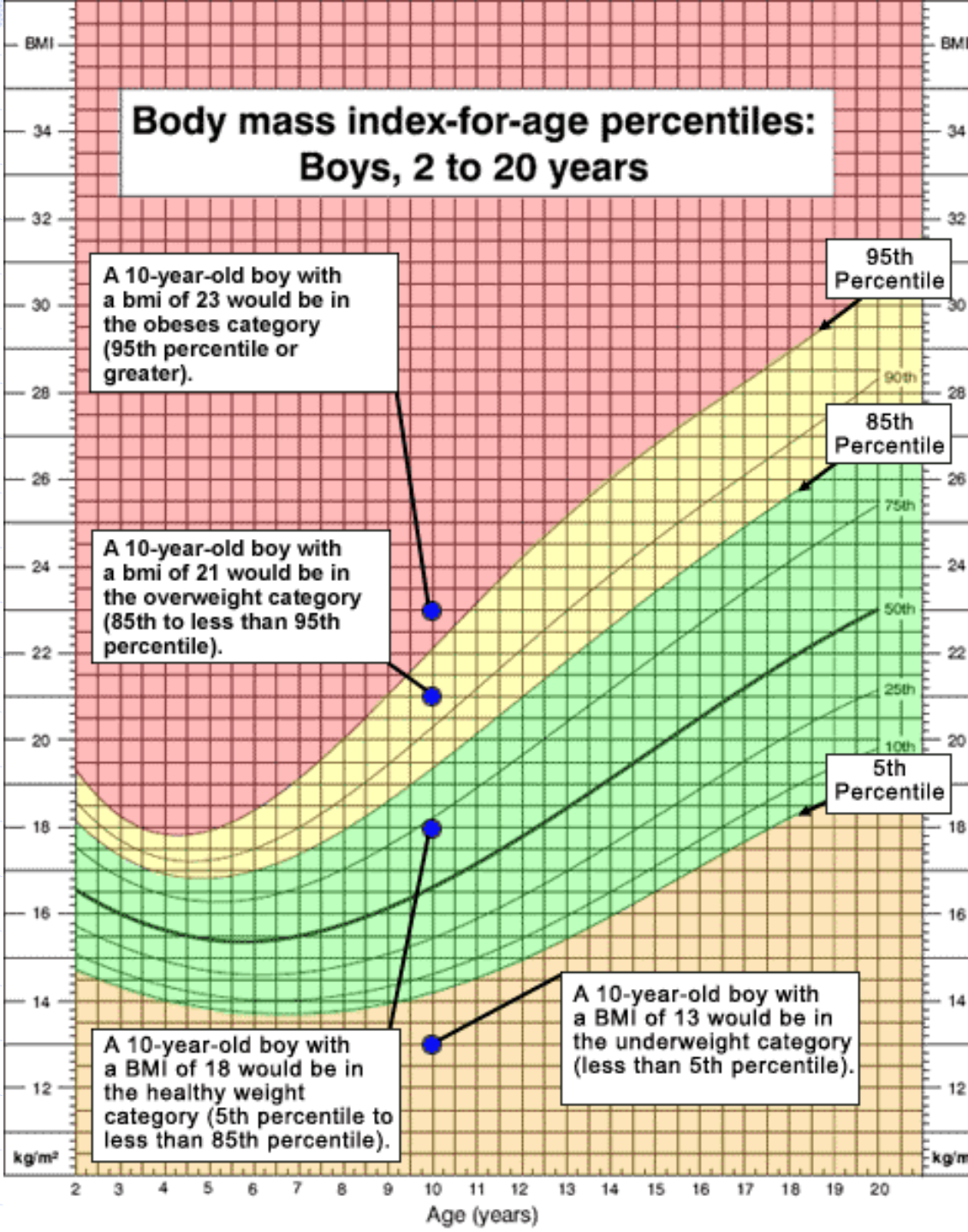
Adapted from Hovhannisyan L

Hovhannisyan L. AUA Masters Thesis 2011.
Hovhannisyan. Public Health Nutrition 2013;17:1046-53
Perl Ben-Joseph E. Parent Educ Couns. 2007;65:288-95

Possible solutions…

- Better staff training—one clinic did much better than others
- Computerized plotting
- Simplify the growth charts
  - Color-coded charts
  - WHO "Road to Health" growth chart approach—teach tracking of growth direction

Color coded growth charts



Oettinger MD. Acad Pediatr. 2009;9:330-8. http://www.fitnesshealth101.com/fitness/weight-loss/optimum-weight/body-mass-index-approach (Downloaded 5/15/2014)

WHO "Road to Health" growth chart

50% percentile for boys

3% Percentile for girls

NAME OF CHILD: _____

BIRTH WEIGHT: _____

Birth - 1 year

1 - 2 years

2 - 3 years

3 - 4 years

4 - 5 years

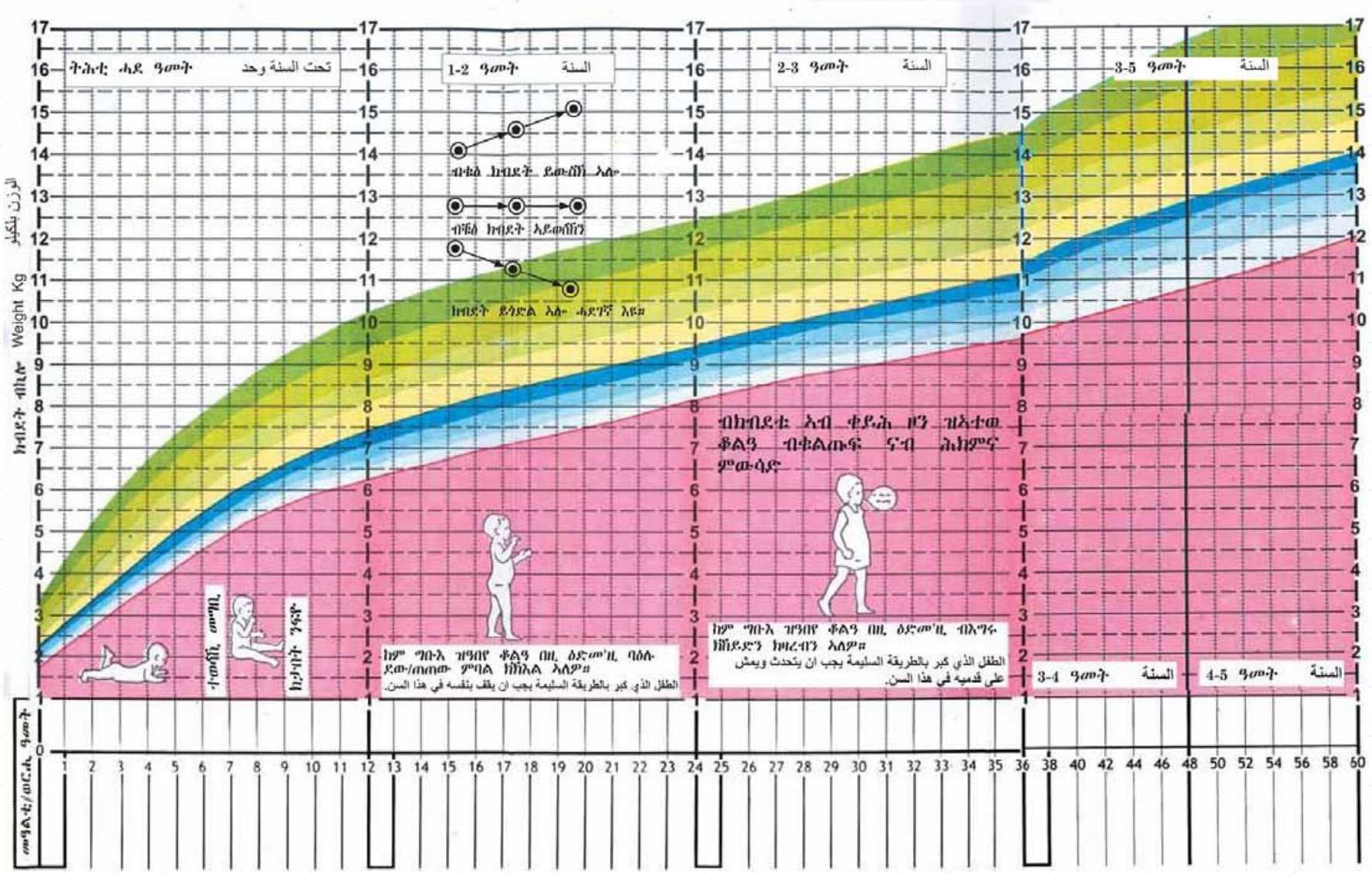
REASONS FOR SPECIAL CARE

RECORD ON THE CHART

Like this

Diarrhoea

“Road to Health” growth chart in color



Failure to thrive (FTT) and problems with using growth charts for diagnosis

- Definitions
  - Major percentile lines: 5, 10, 25, 50, 75, 90, 95
  - Failure to thrive
    1. Weight for age below the 3rd or 5th percentile on weight for age curve
    2. Deceleration of weight across 2 major percentile lines on more than 1 consecutive occasion
- Problems with FTT definition
  - Difficult to assess on the first visit
  - Does not include symmetric (Ht, Wt and HC) vs asymmetric drop off
  - Non FTT children may cross percentiles to adjust to predetermined growth post intrauterine environment

Jaffe A. Pediatrics in Review. 2011;32:100-7

Frequency of crossing 2 major percentiles up or down in healthy US children

(n=18,085, born between 1959 and 1967)

Age (mo)	Growth parameter		
	Ht for age (%)	Wt for age (%)	Wt for Ht (%)
0-6	32	30	62
6-12	15	15	27
12-18	16	7	21
18-24	14	6	21

Mei Z. Pediatrics. 2004;113:e617

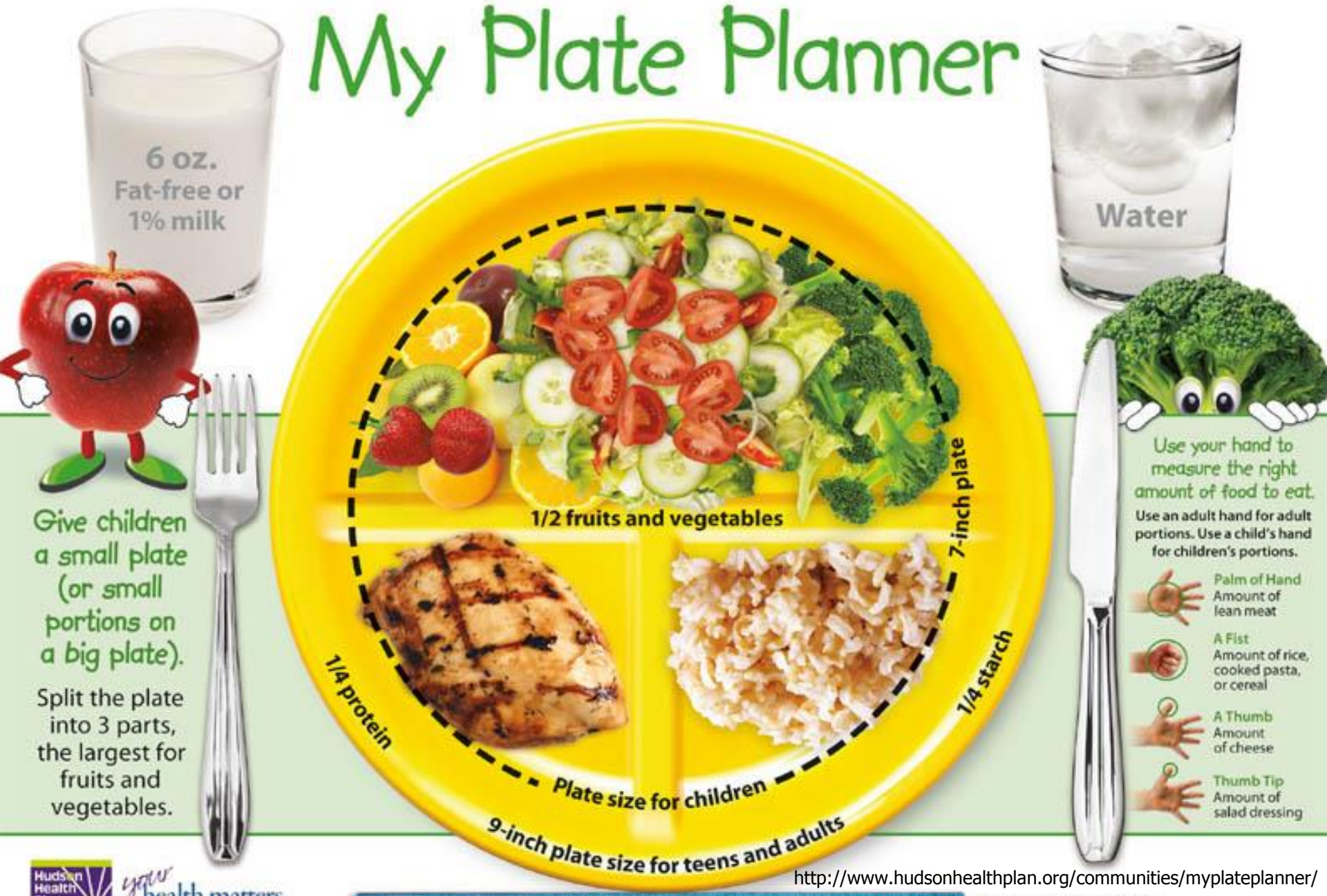
Issues of identification and tracking of overweight children

The Chronic Care Model for Obesity

Decision supports—promote scientifically based clinical care through education in weight management and effective communication

- Self-management support for parents—provision of informational material to families
- Delivery system design—provider reimbursement

My Plate Planner



Give children a small plate (or small portions on a big plate).

Split the plate into 3 parts, the largest for fruits and vegetables.

Use your hand to measure the right amount of food to eat.

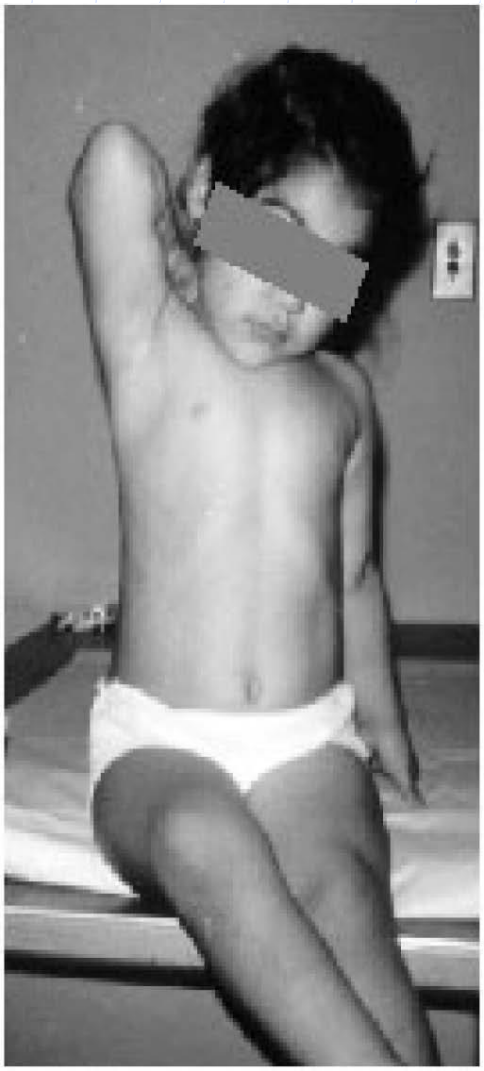
Use an adult hand for adult portions. Use a child's hand for children's portions.

- Palm of Hand — Amount of lean meat
- A Fist — Amount of rice, cooked pasta, or cereal
- A Thumb — Amount of cheese
- Thumb Tip — Amount of salad dressing

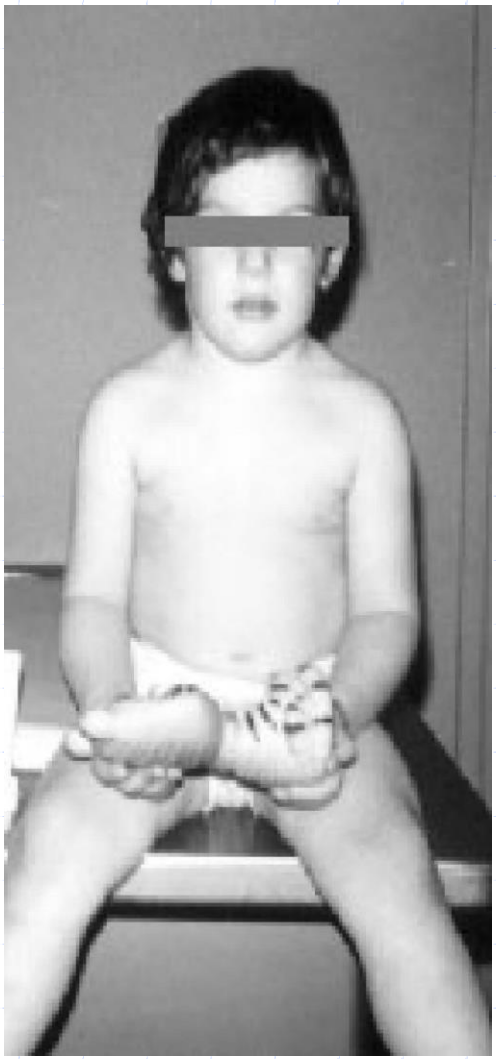
Hudson Health Plan — your health matters

http://www.hudsonhealthplan.org/communities/myplateplanner/

Who is overweight?



85-95%



≈ 95%

>99th

Courtesy of Dr. Mary Horlick, NIH/NIDDK

BMI (1835)

$$BMI = \frac{Weight}{Height^2}$$

Adolphe Quetelet
1796 -1874

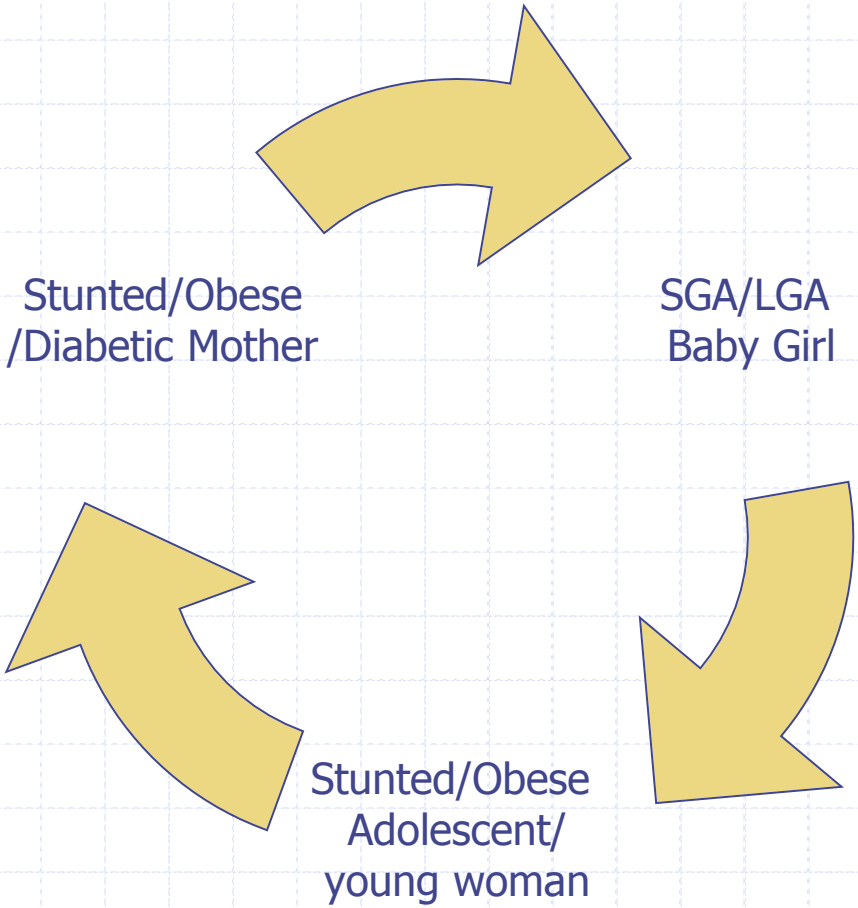
- Utility
  - Readily available in primary care
  - Related to cardiometabolic disease in adults
- Limitations
  - Difficult to measure reliably in children
  - Requires tracking percentiles
  - Risk between BMI in childhood and disease is attenuated
  - Does not distinguish between fat and muscle

Staiano A, Katzmarzyk P. Int J Obesity. 2012; 36:1261–1269

Key strategies

- Prevention must be specific to child's age
  - Pregestational and Gestational period
  - Birth to 3 years
  - Preschool and Elementary school age children (3-10 yrs)
  - Middle school and older children
- Messages to parents must be culturally based
- Children's age must be tracked by clinicians over time
- A gram of PRIMARY prevention is worth many kilograms of cure

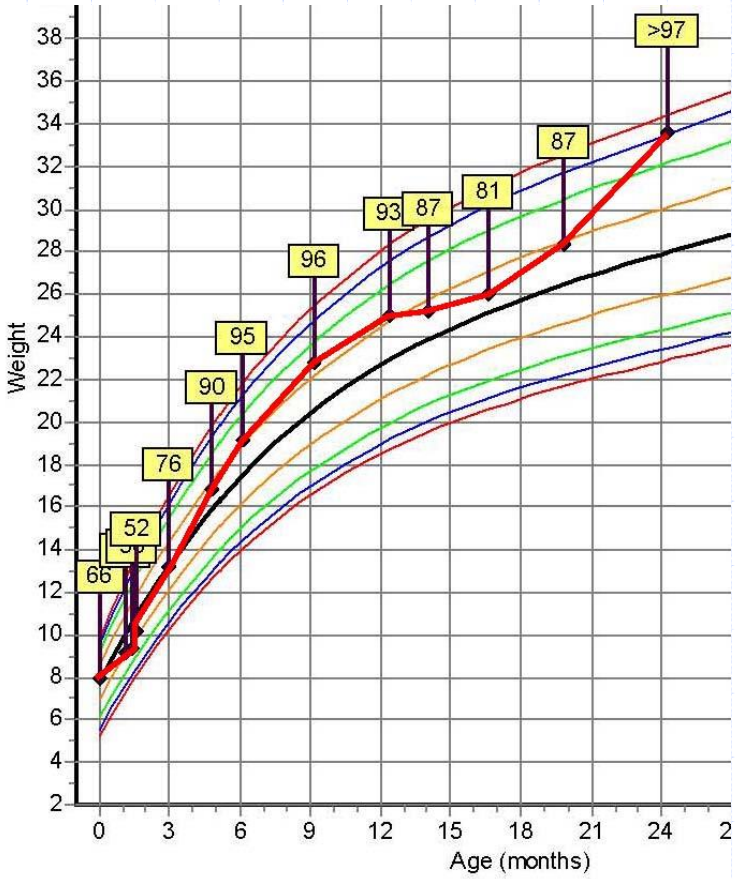
Intergenerational Malnutrition/Obesity Cycle



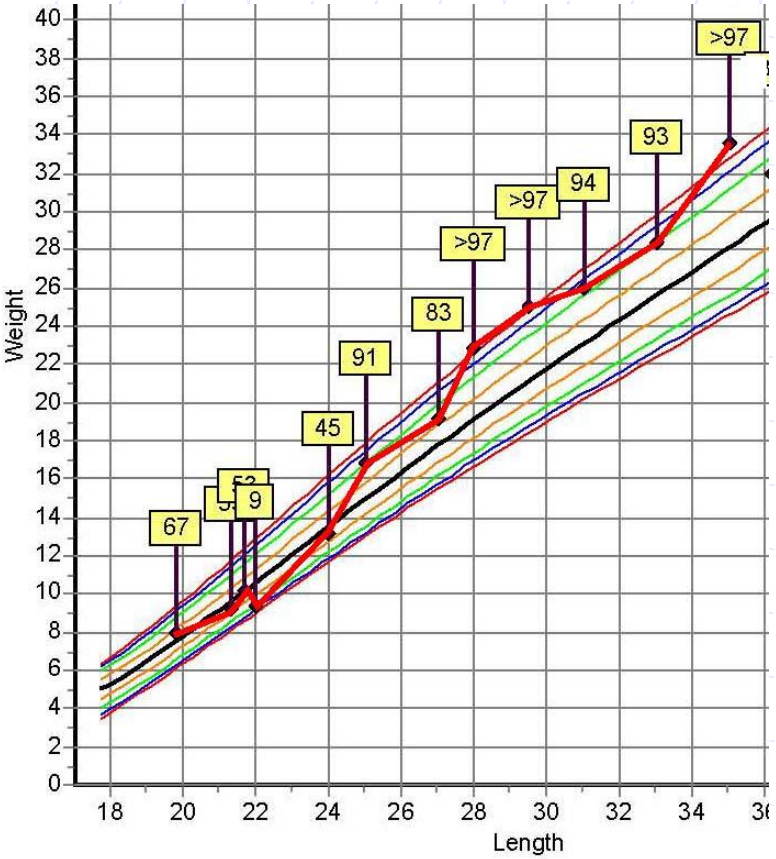
Atkinson R. Int J Obesity. 2012;36:1259-1260. Martorell R. Adv Nutr. 2012;3:227-33

Obesity in 0-3 yr old patient: JB

Weight



Weight for Length



Prevention strategies: birth to 3 yrs

- Assess parental concern
  - Do you think that your child is too thin, too heavy (big) or just right?
  - Do you worry when your child doesn't eat?
  - Do you make your child eat when s/he refuses?
  - Do you sometimes give your child junk or fast food when he/she didn't eat?

Prevention strategies: birth to 3 yrs

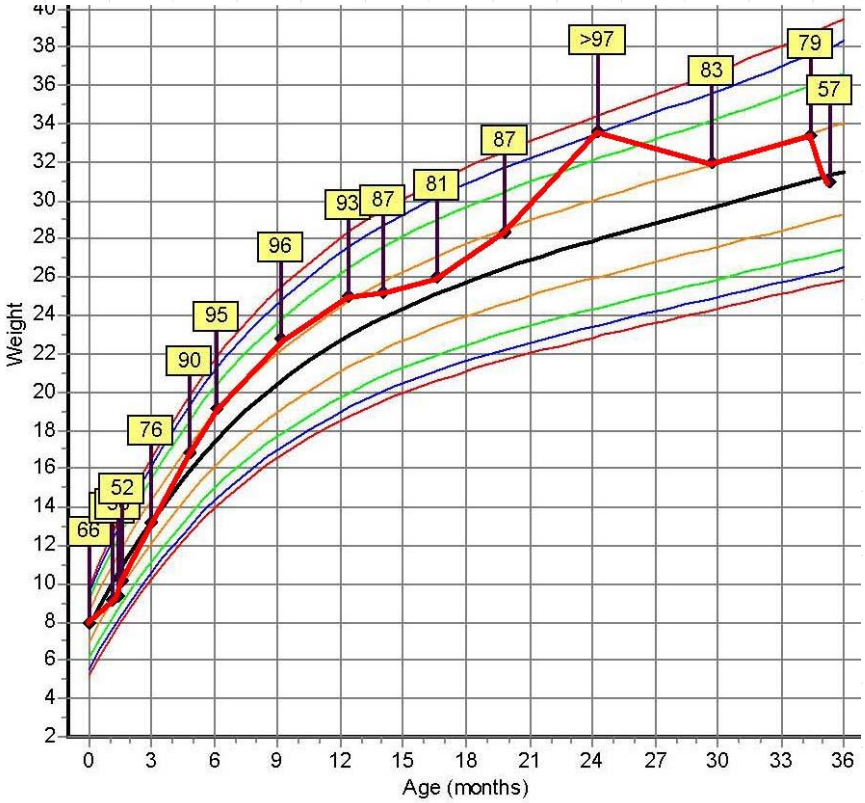
- Provide specific counseling
  - Discuss and demonstrate normal growth
    - Show growth chart
    - Tripling of weight from birth to 1 yr, and again at 9-10 yrs of age
  - Discuss the "3-day eating cycle" for toddlers
  - Use The Ellyn Satter Method for eating responsibilities
    - The parent is responsible for ***what***
    - The child is responsible for ***how much*** (and everything else)

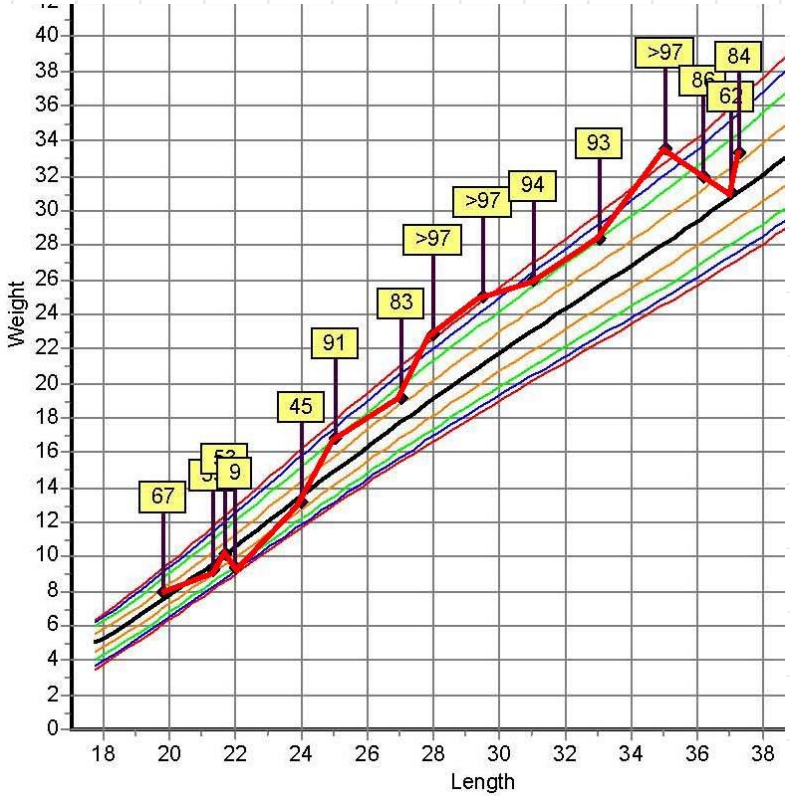
http://www.ellynsatter.com/ellyn-satters-division-of-responsibility-in-feeding-i-80.html

Patient JB—post counseling

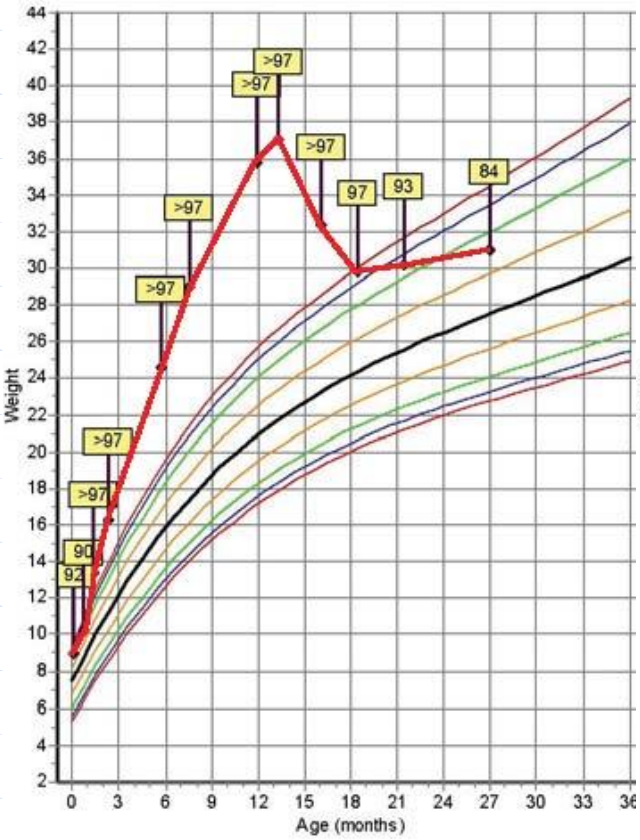
Weight

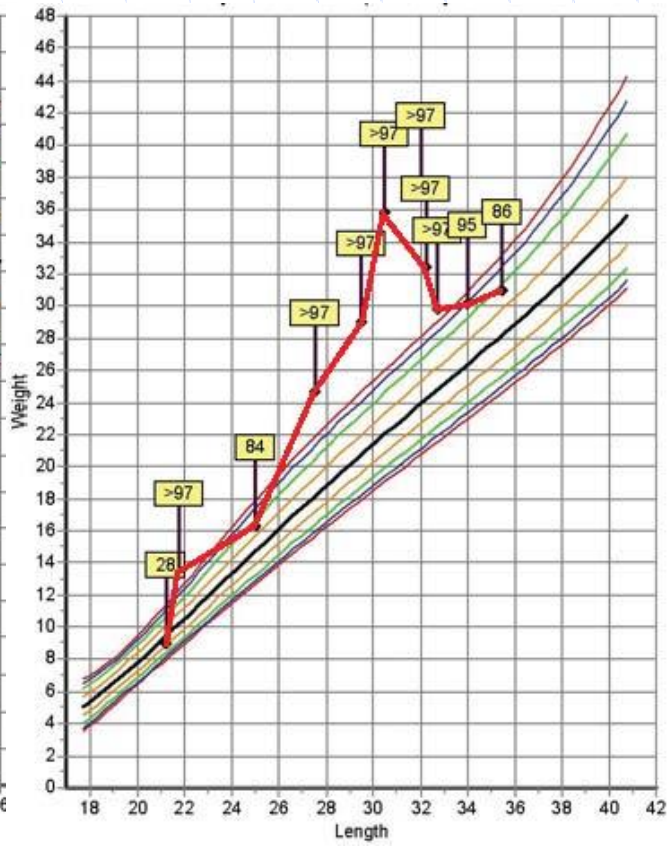
Weight for Length





Toddlers: Patient AH: DOB 11-30-09 F



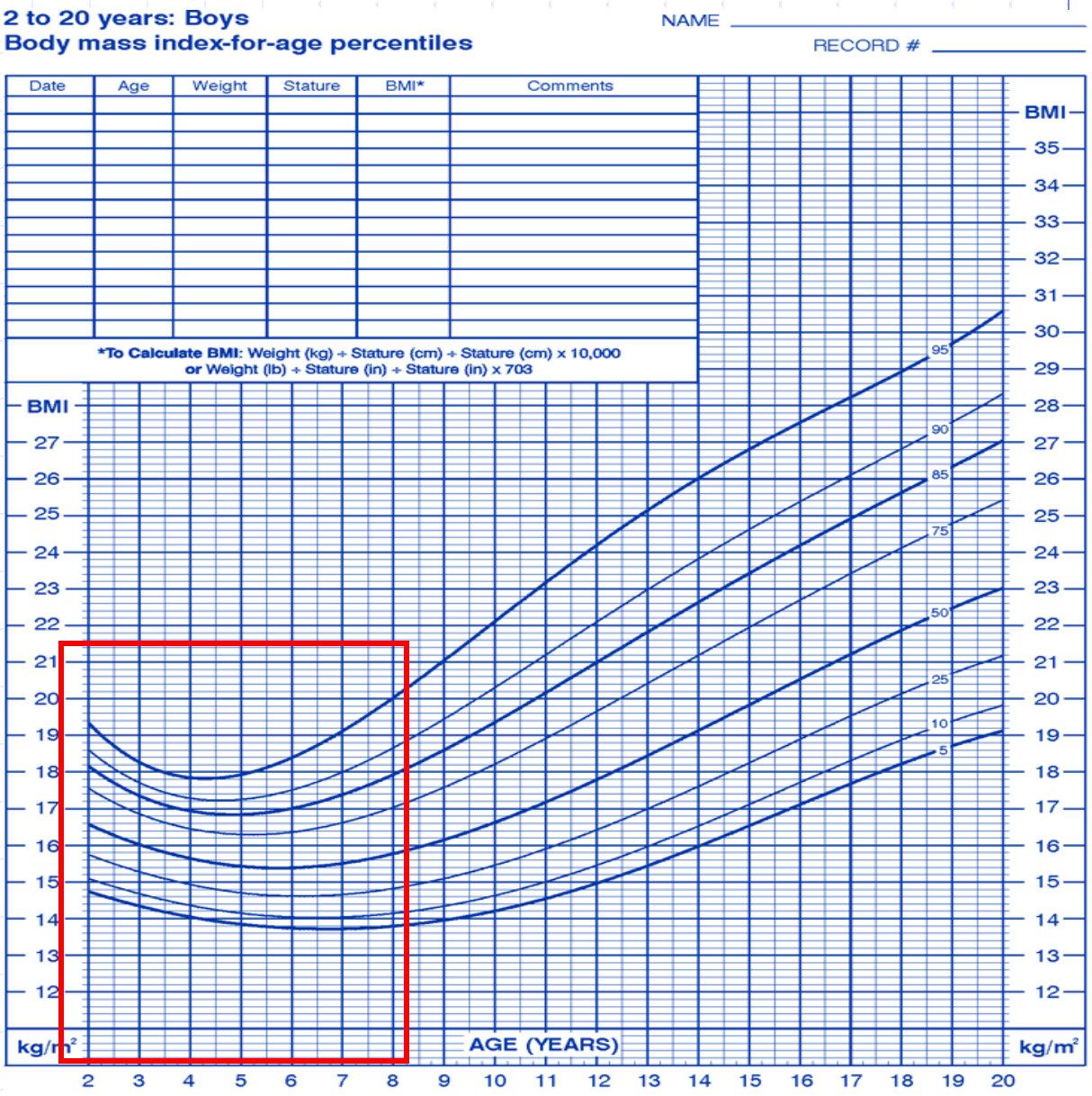


Preschool through elementary school-- no need to lose weight!

BMI Chart

- Obesity screening—primary prevention
  - Plot BMI
  - Follow BMI % change

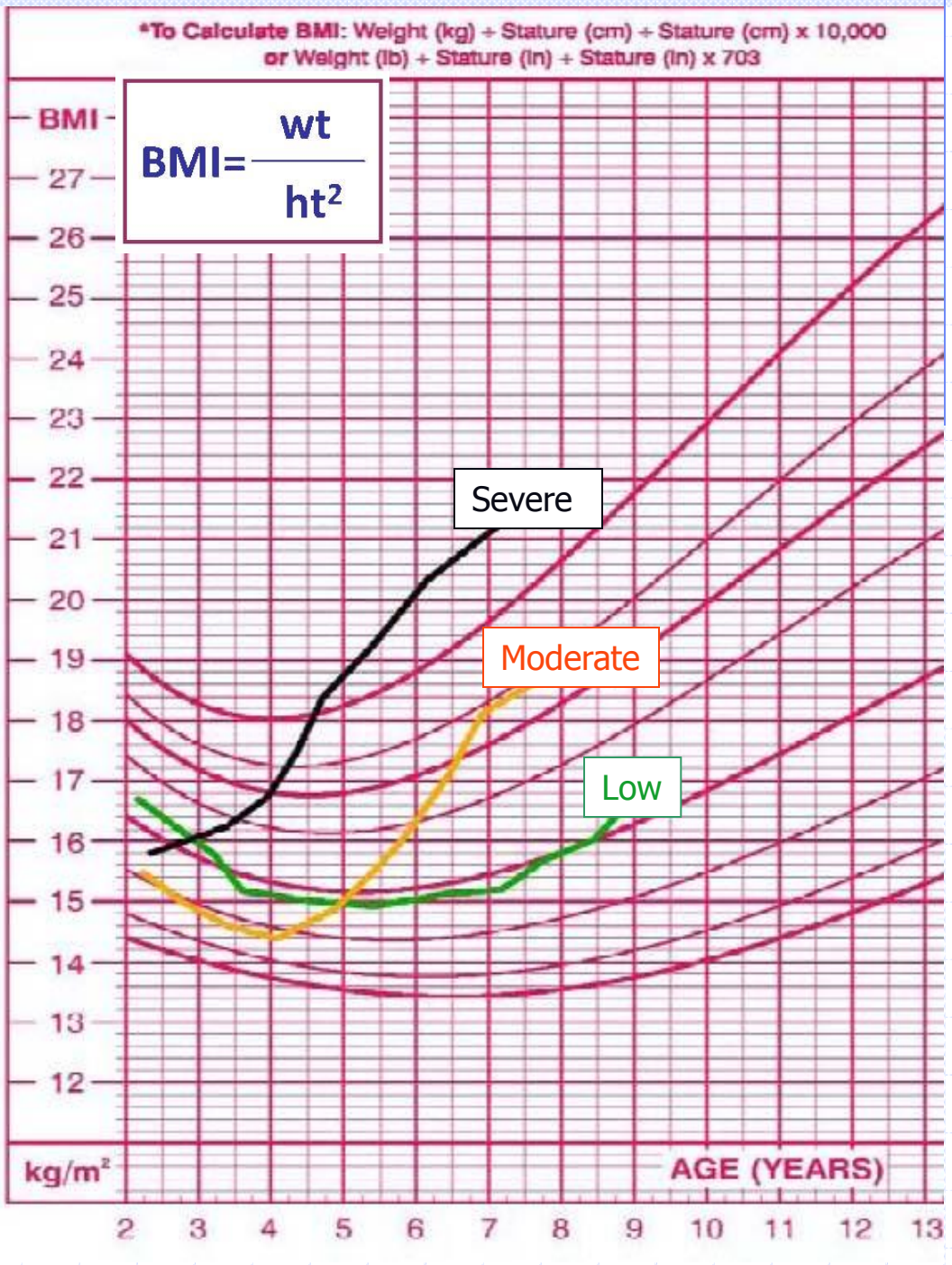
$$BMI = \frac{Weight}{Height^2}$$



Track BMI!

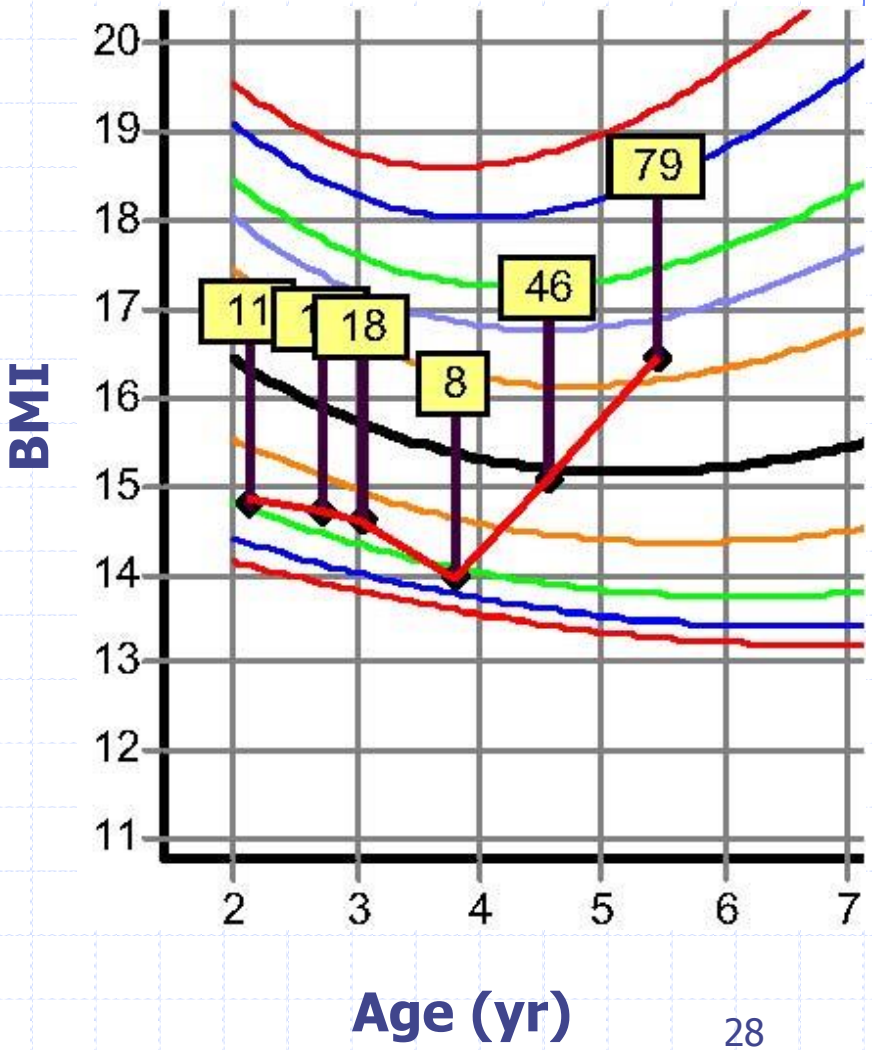
Risk stratification

- Low risk
  - Prevalence: 36
  - Risk of obesity: 5% by 7 yr
- Severe risk
  - Prevalence: 15%
  - Risk of obesity: OR 24.0 by 7 yr
  - BMI<85% at Dx: 43%
- High risk
  - Prevalence: 48%
  - Risk: OR 4.0
  - BMI<85% at Dx: 70%



Patient: Healthy African-American girl

- BMI between 8th and 18th percentile from 2 to 4 years old
- Gained 71% in BMI over 1.5 years
- Weight gain discussed at the 4.5 yr old visit
- Lifestyle/nutritional counseling started



Effective counseling for preschool families: assess current practices*

- Nutrition:
  - Eating (fast food) outside of home/school per week
  - Intake of juice and milk daily
  - Eating breakfast per week
  - What kind of snacks
- Activity:
  - TV/screen time per week:
  - Regular exercise per week:

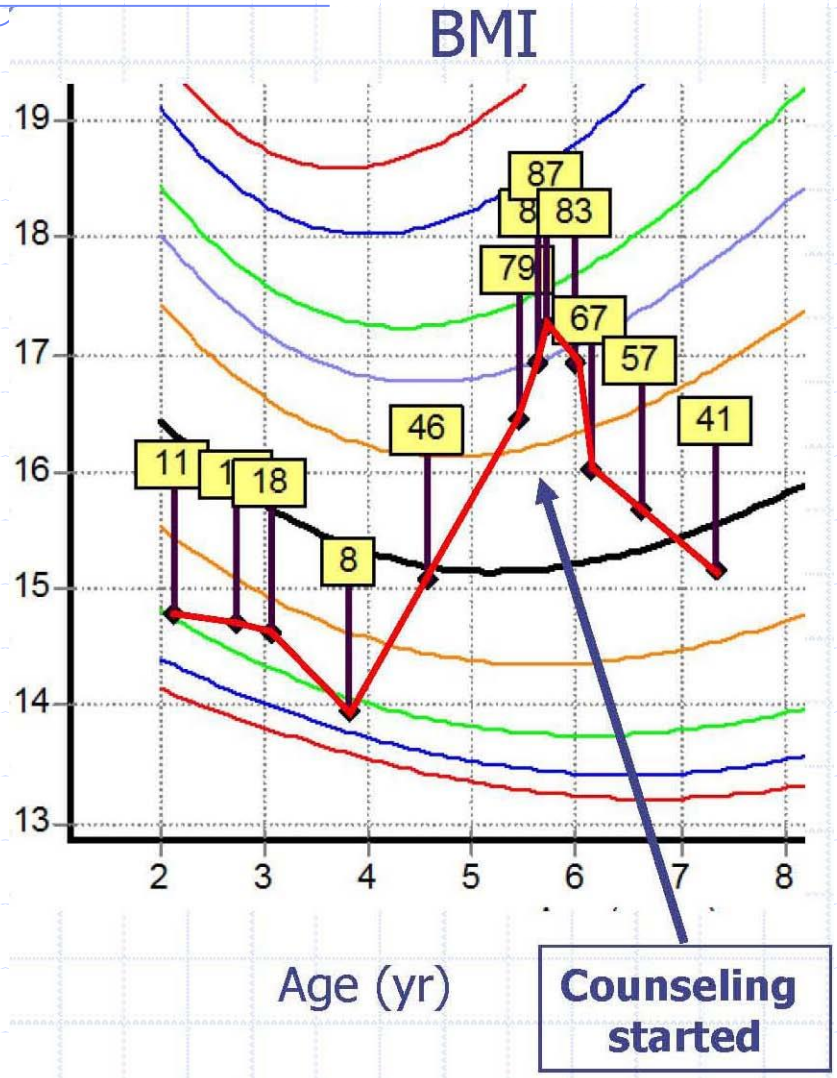
*Based on the "15 min obesity prevention protocol" from Davis M. Pediatrics. 2007:120:S245

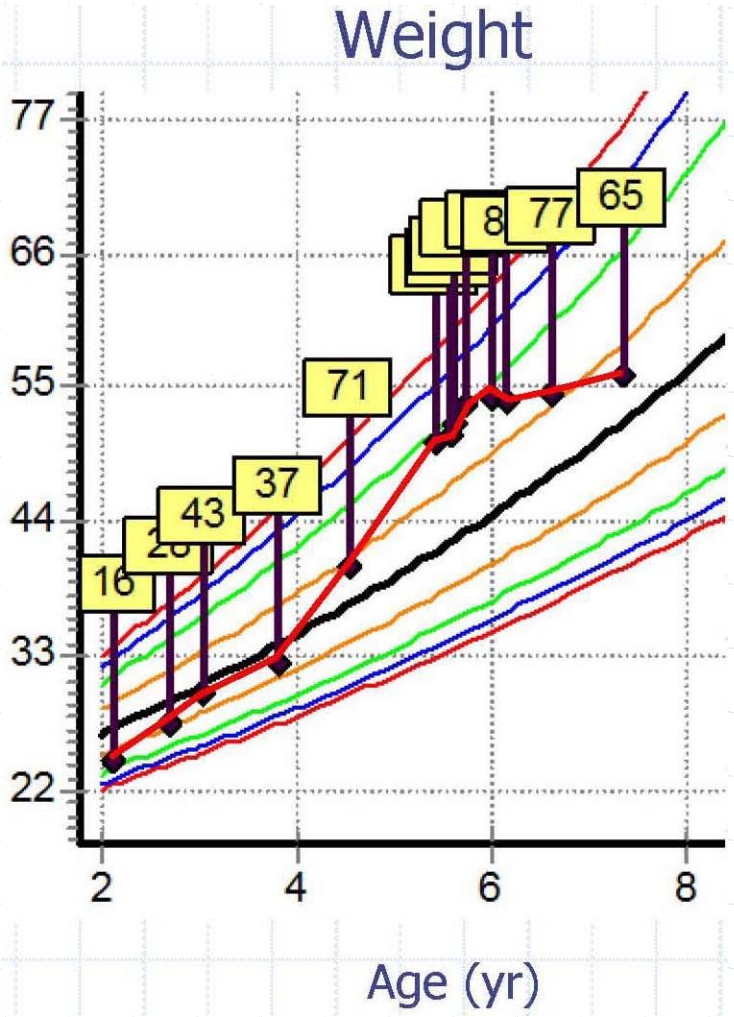
Intervention: Assessment motivation, develop a joint plan (modified MI)

- Assess concern (scale of 1-10)
  - Importance to change
  - Confidence in being successful
- Develop 3 targets for change
  - 2 Dietary targets
    - Family choose from eating habits discussion
    - Try for 1 positive (start eating breakfast) and one negative (cut down to 1 glass of juice, Fast food 2 times per months), be specific
  - 1 Physical activity issues (Screen time, walking to school, playing in park, sports)
- Provide positive feedback
- Agree on a follow-up time (3 months)

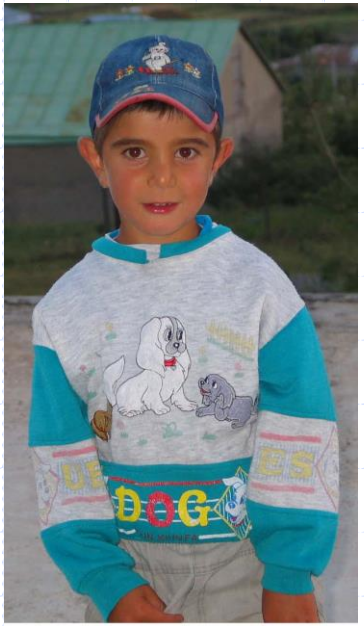
Adapted from: Barlow S. Pediatrics. 2007;120 Suppl 4:S164-92

Recognition of early AR: breaking the obesity trajectory—2 year follow up





Conclusion



- Primary care clinicians are key in the assessment and intervention with nutritional problems
- Growth tracking is required from infancy and through adolescence to identify stunted and overweight children before they become severely affected
- Collaborations of primary care clinicians, public health specialist and national leadership will be required to achieve this goal