Cara praktis mencegah malnutrisi
Deteksi dini *at risk of FTT* dan
tatalaksana segera pada "Red flags"

Damayanti Rusli Sjarif
Div Nutrisi Pediatrik dan Penyakit Metabolik
Dep IKA FKUI/RSCM Jakarta

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Objektif

- Setelah mengikuti presentasi ini, peserta diharapkan
  - Memahami masalah malnutrisi pada balita di Indonesia
  - Memahami dampak malnutrisi yang ireversibel
  - Memahami dan Mampu mendeteksi risiko gagal tumbuh pada bayi dan batita yang mendapatkan ASI(+MPASI)
  - Memahami dan mampu menggunakan alur tatalaksana risiko gagal tumbuh pada **red flags**

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Prerequisites Pediatric competencies

- Pediatric Nutrition Care
- Infant and Toddler Feeding Practices
- Food for Special Medically Purposes

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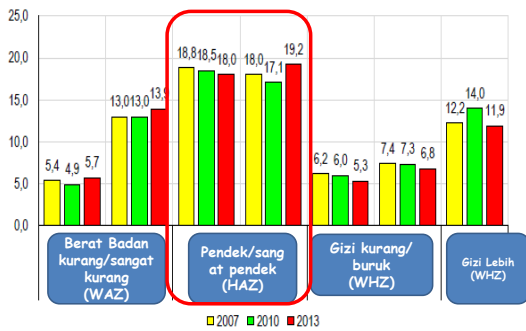
Prevalence of malnutrition in underfive children in Indonesia
(National Basic Health Research Data 2007, 2010, 2013)
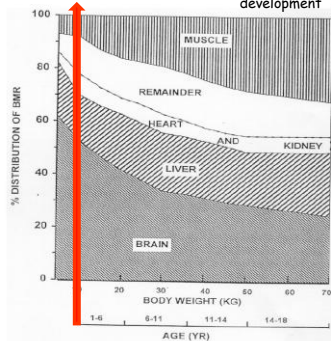

Dampak kekurangan nutrisi jangka pendek

wasted = **kurus** = **gizi kurang**
⇓
severely wasted = **sangat kurus** = **gizi buruk**

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Why early nutrition is important ?
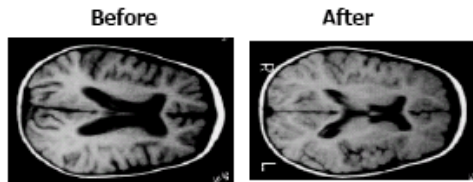70% of energy supply during fetal development is devoted to brain development

Composition of Metabolic Demand

TDEE = 1.6 x BMR
%BMR / 1.6 = %TDEE
60% BMR = 40% TDEE
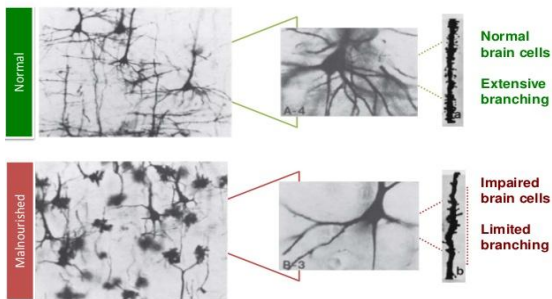**40% BMR= 25% TDEE**

Under 10 kgs, brain metabolism used 50–60% of total calories !!!

Dampak gizi kurang/gizi buruk pada perkembangan otak

Effect of Infant Malnutrition on Structural Brain Development : before and 6 wks after treatment

Before   After

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Effects of malnutrition on brain development and cognition

Normal brain cells

Extensive branching

Impaired brain cells

Limited branching

Source: Cordero E et al, 1985 (Adapted from Figure 2 & Figure 4), Benitez-Bribiesca et al. 1999 (Adapted

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Impaired IQ and academic skills in adults who experienced moderate to severe infantile malnutrition: A 40-year study (Waber et al Nutritional Neuroscience 2014)
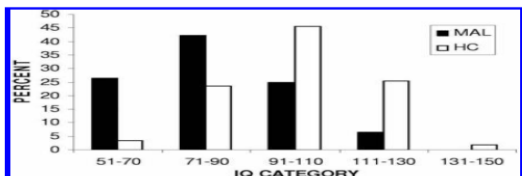

Figure 2   Distribution of IQ scores for previously malnourished (MAL, $N = 77$) and healthy control (HC, $N = 59$) groups.

25% bayi yang mengalami gizi buruk akan mempunyai IQ 51-70 pada usia 40 tahun
40% bayi yang mengalami gizi buruk akan mempunyai IQ 71-90 pada usia 40 tahun
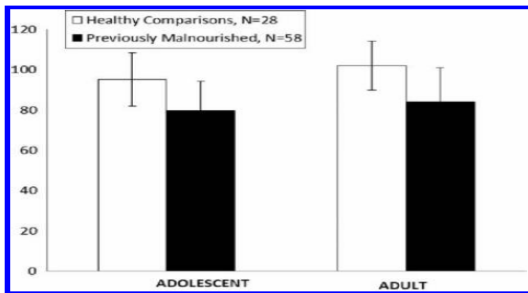
Damayanti Rusli Sjarif 2018

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Figure 3   Mean IQ scores of previously malnourished ($N = 58$) and healthy control ($N = 28$) individuals who were tested in both adolescence (WISC-R) and adulthood (WASI).

Waber et al Nutritional Neuroscience 2014

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TABLE 4.2
Classification of General Ability as Measured by the Revised Stanford-Binet Scale, with Approximate Academic and Vocational Possibilities of Each Group [11]

I.Q.	Percent-age of Children[a]	Adult M.A.	Classification	Academic Possibilities	Vocational Possibilities
140 and up	0.6	21 and up	Very superior	Graduate	Professional, executive
120-139	9.9	18-0 to 20-11	Superior	Technical	Professional, technical
110-119	16.0	16-6 to 17-11	High average	College	Technical, business
90-109	47.0	13-6 to 16-5	Average	High school	Clerical, skilled
80-89	16.0	12-0 to 13-5	Low average	9th grade	Semi-skilled
70-79	7.5	10-6 to 11-11	Inferior	7th grade	Routine work
60-69	2.4	9-0 to 10-5	Borderland deficient	5th grade	Unskilled labour
50-59	0.5	7-6 to 8-11	Deficient	3rd grade	Simplest labour
Below 50	0.1	Below 7-6	Very deficient	Special class	Unemployable

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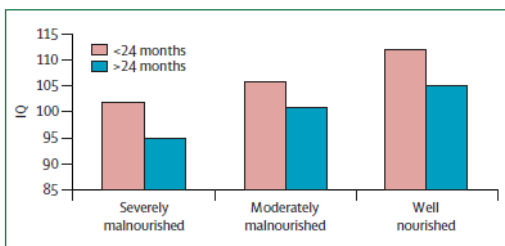## Engle et al *Lancet* 2007; 369: 229–42

Figure 2: IQ scores among female Korean orphans varying by history of malnutrition and age of adoption

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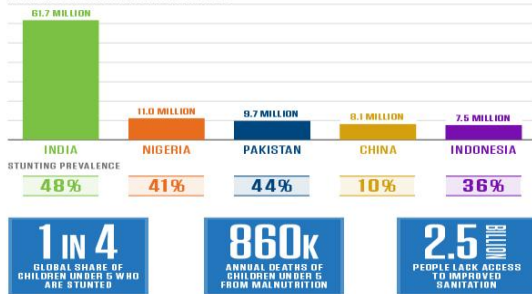**Dampak kekurangan nutrisi jangka panjang**

stunted = pendek
⇓
severely stunted = sangat pendek

AGE. 41 mos.
WT. 15.2 kg
HT. 98 cm
*Std.wt.age 99
*Std.wt.ht. 101

AGE 4 3 mos.
WT. 9.7 kg.
HT. 85.7 cm.
*Std.wt.age 62
*Std.ht. 80

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FOUR OF THE TOP FIVE COUNTRIES WITH THE LARGEST NUMBER OF THE WORLD'S STUNTED CHILDREN ARE IN ASIA.

NUMBER OF STUNTED CHILDREN UNDER AGE 5

INDIA	NIGERIA	PAKISTAN	CHINA	INDONESIA
61.7 MILLION	11.0 MILLION	9.7 MILLION	8.1 MILLION	7.5 MILLION

STUNTING PREVALENCE

| 48% | 41% | 44% | 10% | 36% |

1 IN 4 GLOBAL SHARE OF CHILDREN UNDER 5 WHO ARE STUNTED

860K ANNUAL DEATHS OF CHILDREN UNDER 5 FROM MALNUTRITION

2.5 BILLION PEOPLE LACK ACCESS TO IMPROVED SANITATION

Sources: Unicef, Improving Child Nutrition: The Achievable Imperative for Global Progress (New York: Unicef, 2013); World Health Organization, Safer Water, Better Health: Costs, Benefits, and Sustainability of Interventions to Protect and Promote Health (Geneva: WHO, 2008); and United Nations, "We Can End Poverty: Millennium Development Goals and Beyond 2015," accessed at www.un.org/millenniumgoals/environ.shtm, on July 29, 2014.

Effects of growth during early childhood on adolescent height
Sterling et al.Am J Phys Anthropol. 2012 Jul; 148(3): 451–461.

- Each SD decrease in LAZ at birth was associated with
  - ⇓ in adolescent HAZ of 0.7 SD in both boys and girls (all p<0.001)
  - 9.7 greater odds of stunting (95% CI 3.3 to 28.6).
- Each SD decrease in LAZ in the first 30 months of life was associated with
  - ⇓ in adolescent HAZ of 0.4 SD in boys and 0.6 SD in girls (all p<0.001)
  - 5.8 greater odds of stunting (95% CI 2.6 to 13.5).

Damayanti R.Sjarif 2016

Stunting syndrome

Table 3. Conditions associated to stunting in children and adults

Children	Adults
Developmental delay	Obesity
Depressed immune function	Reduced glucose tolerance
Defects of cognitive functions	Coronary heart disease
Impaired fat oxidation	Hypertension
	Osteoporosis

(Branca & Ferrari, 2002)

Mean developmental quotient (DQ) scores of five groups of children over two years. The groups are non-stunted children, and stunted children who received both stimulation and supplementation, supplementation alone, stimulation alone, and no intervention (control) [Grantham-McGregor SM, Schofield W, Powell C 1987)
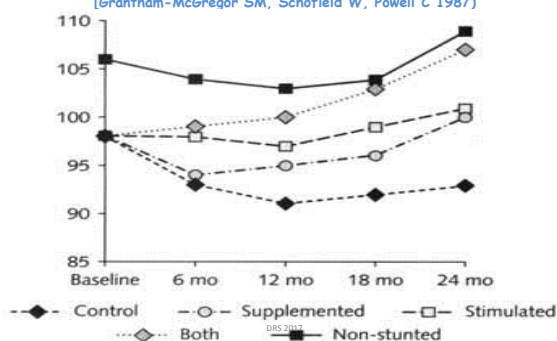
Impact of various forms of malnutrition on productivity and lifetime earnings
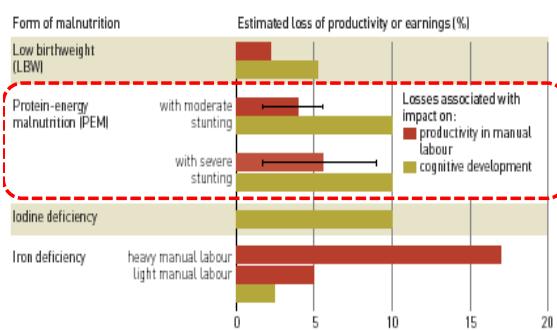
Source: Alderman and Behrman; Horton and Ross; Horton

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Masa depan 40% balita Indonesia ?

Figure 3 | The short-term and long-term effects of early nutrition

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THE IMPACT OF MALNUTRITION DURING A CHILD'S FIRST 1,000 DAYS IS IRREVERSIBLE.
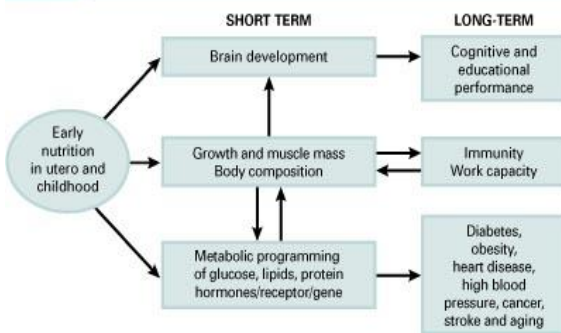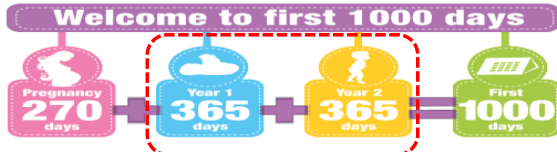
care® #StealTheseStats

HAK CIPTA MODUL DRS 2015

Welcome to first 1000 days

Pregnancy **270** days | Year 1 **365** days | Year 2 **365** days | First **1000** days

How to prevent malnutrition in the first 1000 days of life, postnatally ?

**Early detection of at risk of FTT and early adiposity rebound**
+
Good infant and toddler feeding practices

HAK CIPTA MODUL DRS 2015

What the pediatrician should do to prevent malnutrition postnatally ?

- **Early detection of malnutrition**
  - Early detection of at risk failure to thrive
    - Application of WHO weight velocity Table
  - Early detection of early adiposity rebound
    - Application of WHO BMI (Workshop Seri 2 di Bandung)
- **Application of WHO Global Infant Feeding Recommendations, 2002 with recent evidences**
  - Start breast feeding early (< 1hr after birth)
  - Exclusive breast feeding for 6 months
  - Start complementary food with adequate micronutrient density at 6 months with continued breast feeding to ≥ 2 yrs
  - Provide appropriate complementary feeding:
    - Timely
    - Adequate
    - Safe
    - Properly fed

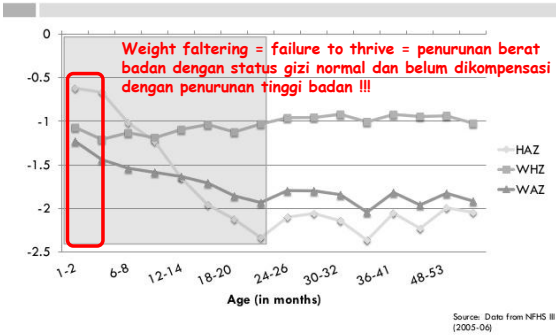*Malnutrisi* diawali dengan penurunan berat badan (*weight faltering*)
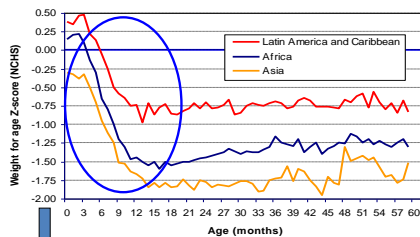
WAZ < -2 → Underweight (berat badan kurang)
WAZ < -3 → Severely underweight (berat badan sangat kurang)

4/20/2018 — COPYRIGHTS DAMAYANTI R SJARIF 2015

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Child nutrition by age, NFHS-3, 2005-06

Weight faltering = failure to thrive = penurunan berat badan dengan status gizi normal dan belum dikompensasi dengan penurunan tinggi badan !!!

Source: Data from NFHS III (2005-06)

Weight Faltering in Infancy and IQ Levels at 8 Years in the Avon Longitudinal Study of Parents and Children
Emond et al (Pediatrics 2007)

Mean IQ levels according to weight gain from birth to 8 weeks.
Shown are weight-gain z scores (eg, –1.5 represents greater than –1.75 to –1.25).
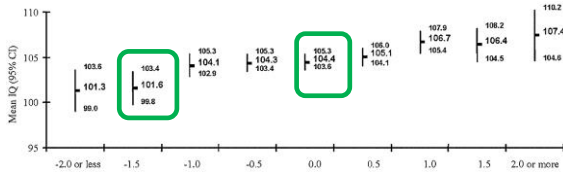
Multivariate analysis shows that early growth faltering (slowest gaining 5% of term infants in the first 8 weeks) is associated with an average deficit of ~3 IQ points

---

To what extent is failure to thrive in infancy associated with poorer cognitive development? A review and meta-analysis. J Child Psychol Psychiatry. 2004;45: 641– 654

Standardised mean difference, 95% CI
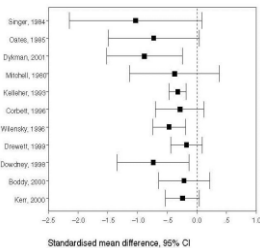
- Meta-analysis, 11 controlled studies which was based on 502 cases and 523 controls shows that early growth faltering is associated with an average deficit of 4.2 IQ points (95% CI: 2-6)

Corbett & Drewett 2004

9

Rekomendasi WHO (2003)

- Inisiasi menyusu dini (< 1 jam setelah bayi lahir)
- ASI eksklusif selama 6 bulan
- Makanan pendamping ASI diberikan *paling lambat* pada usia 6 bulan sambil melanjutkan pemberian ASI
- Berikan Makanan Pendamping ASI:
  - Tepat waktu
  - Kandungan nutrisi cukup baik makro maupun mikro dan seimbang
  - Aman
  - Diberikan dengan cara yang benar
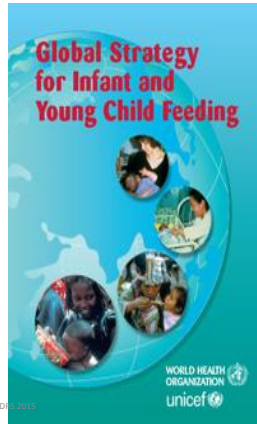
Global Strategy for Infant and Young Child Feeding

WORLD HEALTH ORGANIZATION

unicef

HAK CIPTA MODUL DRS 2015

Apa yang penting diobservasi saat pemberian ASI ?

Menilai Kecukupan ASI dan
<u>menginformasikannya pada ibu</u> !!!!

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Mengapa harus diinformasikan pada ibu ?

TABLE 4.4
PATTERN OF BREASTFEEDING INFANTS AGED 0-5 MONTHS BY AGE GROUP, 2010

Age Group	Pattern of Breastfeeding		
	Exclusively	Predominant	Partially
0 month	39.8	5.1	55.1
1 month	32.5	4.4	63.1
2 month	30.7	4.1	65.2
3 month	25.2	4.4	70.4
4 month	26.3	3.0	70.7
5 month	15.3	1.5	83.2

Source : National Board of Health Research and Development, MoH RI, Riskesdas 2010

Remarks:
Exclusively = feeding infants only with breastmilk.
Predominant = breastfeeding but having been feeding baby with water or water base, e.g. tea, as prelacteal food/drink before breastmilk comes in
Partially = breastfeeding and feeding with processed food, e.g. formula milk, porridge or other food before baby age 6 months, given as prelacteal or continued feed

- Penelitian di RSCM menunjukkan bahwa ibu-ibu yang yakin ASInya cukup 19-66 X lebih berhasil menyusui eksklusif ketimbang yang tidak yakin (Dwinanda & Sjarif, 2012)

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Bagaimana cara praktis mengetahui bahwa ASI dan MPASI cukup ?

- Pemantauan pertumbuhan bayi dan batita menggunakan WHO Growth-Chart 2006
- Mendeteksi masalah gizi sedini mungkin meskipun status gizi masih baik (risiko gagal tumbuh) menggunakan Tabel WHO Weight Velocity 2006)

HAK CIPTA MODUL DRS 2015

Bagaimana menilai kecukupan ASI ?

- Bayi menyusu dengan posisi, perlekatan serta isapan yang benar
- Berkemih setiap 3-4 jam (6-8 x sehari)
- Bayi **menyusu on cues** setiap 1-3 jam (8-12 x sehari)
- Bayi menyusu minimal 10 menit disatu payudara agar mendapatkan hindmilk
- Bayi mengalami kenaikan berat badan yang cukup sesuai usia (growth velocity Chart WHO 2006 ≥ 5th percentile)

HAK CIPTA MODUL DRS 2015

Bayi menyusu dengan posisi, perlekatan serta isapan yang benar

Proper Breastfeeding Position and Latch-On

Hold Your Baby With Her Whole Body Facing Your Body

Your Baby Should Draw Both Your Nipple and Areola Into Her Mouth

Place Your Baby's Nose and Chin Against Your Breast

Support Your Baby's Head, Neck, and Back

Areola
Milk Duct
Nipple
Milk
Tongue

HAK CIPTA MODUL DRS 2015

**Menyusukan saat bayi menunjukan rasa lapar
on demand atau lebih tepat *on cues***

HAK CIPTA MODUL DRS 2015
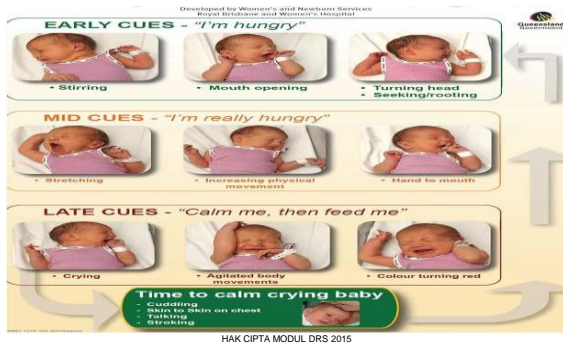
Menyusui minimal 10 menit !

HAK CIPTA MODUL DRS 2015
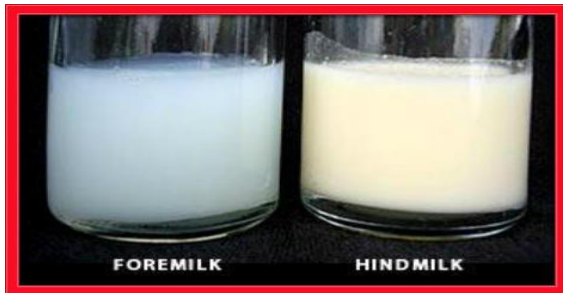
**Perbedaan enerji pada ASI setiap 5 menit
diperah (pengamatan 6 bulan)
(Sjarif et al 2013)**

HAK CIPTA MODUL DRS 2015

Fore milk — Hind milk

Fat (lipid)
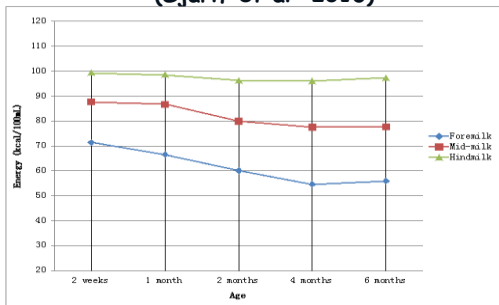
HAK CIPTA MODUL DRS 2015

Bagaimana panduan memperkirakan kenaikkan berat badan yang cukup ?

- WHO pada tahun 2006 memperkenalkan Tabel Kecepatan Penambahan Berat Badan (Weight Increment)
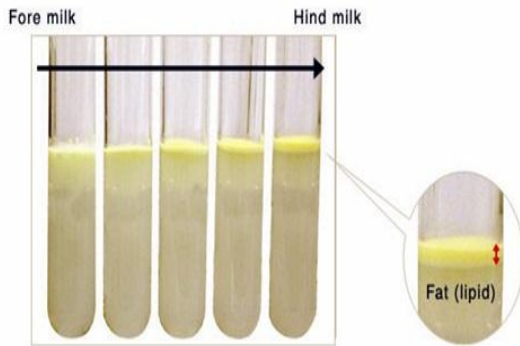- Menilai kenaikkan berat badan bayi pada interval waktu seminggu, 2 minggu, 4 minggu, 2 bulan, 3 bulan, 4 bulan dan 6 bulan
- Tabel yang berbeda untuk bayi laki-laki dan perempuan
- Jika kenaikkan berat badan di bawah persentil 5 diklasifikasikan sebagai berisiko gagal tumbuh (*weight faltering*)

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Weight increments (g) by birth-weight groups BOYS — World Health Organization

Age (days)		Birth weight (g)					
		2000-2500	2500-3000	3000-3500	3500-4000	4000+	All
0-7	Median	150	150	150	150	50	150
	25th	-*	0	0	0	-50	0
	10th	-*	-150	-150	-250	-250	-150
	5th	-*	-200	-250	-300	-250	-250
	(n)	(7)	(88)	(142)	(100)	(46)	(383)
7-14	Median	275	250	250	250	275	250
	25th	-*	150	150	100	150	150
	10th	-*	0	50	0	50	0
	5th	-*	-100	-50	-50	-100	-50
	(n)	(6)	(88)	(141)	(100)	(46)	(381)
14-28	Median	600	700	650	700	725	650
	25th	-*	550	550	500	550	550
	10th	-*	450	450	400	400	450
	5th	-*	450	350	350	400	350
	(n)	(7)	(95)	(154)	(113)	(48)	(417)
28-42	Median	600	550	550	550	548	550
	25th	-*	500	450	450	450	450
	10th	-*	350	350	350	300	350
	5th	-*	300	300	300	300	300
	(n)	(7)	(95)	(156)	(113)	(46)	(417)
42-60	Median	450	650	650	650	611	650
	25th	-*	550	500	500	400	500
	10th	-*	450	400	400	300	400
	5th	-*	450	350	350	217	350
	(n)	(7)	(96)	(153)	(113)	(47)	(416)

WHO Growth Velocity Standards

Note: Results are based on empirical centiles. HAK CIPTA MODUL DRS 2015
*: n is too small to estimate lower centiles.

Simplified field tables

1-month weight increments (g) GIRLS Birth to 12 months (percentiles)										World Health Organization	
Interval	1st	3rd	5th	15th	25th	50th	75th	85th	95th	97th	99th
0 - 4 wks	280	388	446	602	697	879	1068	1171	1348	1418	1551
4 wks - 2 mo	410	519	578	734	829	1011	1198	1301	1476	1545	1677
2 - 3 mo	233	321	369	494	571	718	869	952	1094	1150	1256
3 - 4 mo	133	214	259	376	448	585	726	804	937	990	1090
4 - 5 mo	51	130	172	286	355	489	627	703	833	885	983
5 - 6 mo	-24	52	93	203	271	401	537	611	739	790	886
6 - 7 mo	-79	-4	37	146	214	344	480	555	684	734	832
7 - 8 mo	-119	-44	-2	109	178	311	450	526	659	711	811
8 - 9 mo	-155	-81	-40	70	139	273	412	489	623	675	776
9 - 10 mo	-184	-110	-70	41	110	245	385	464	598	652	754
10 - 11 mo	-206	-131	-89	24	95	233	378	459	598	653	759
11 - 12 mo	-222	-145	-102	15	88	232	383	467	612	670	781
WHO Growth Velocity Standards											

Contoh kasus

- Seorang bayi lelaki berusia 3 bulan dikonsultasikan pada anda, ibunya ingin memberikan MPASI karena kuatir ASInya tidak cukup.
- Bayi masih mendapatkan ASI eksklusif, yang diberikan setiap bayi menunjukkan tanda lapar teratur setiap 1,5-2 jam, selama 15-20 menit
- Bayi sejak awal pemberian ASI selalu rewel terutama malam hari.
- Riwayat atopik dalam keluarga : ibu asma
- Berat Lahir 3,5 kg dan Panjang Lahir 49 cm sedangkan BB saat ini adalah 5,5 kg dan panjang badan adalah 60 cm

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Apa yang anda lakukan ?

- Lakukan penimbangan berat badan dan ukur panjang badan dengan cara yang benar
- Plot di grafik dan tabel PB menurut umur dan BB menurut PB (WHO 2006) - *dapat menggunakan program WHO Anthro*
- Analisis status gizi dan status perawakan
- Evaluasi kenaikkan BB menggunakan tabel kenaikkan berat badan (WHO 2006)
- Jika kenaikkan BB < persentil 5, perbaiki pola ASI dan MPASI sambil mengonsulkan ke dokter untuk mencari penyebab medis.

HAK CIPTA MODUL DRS 2015

Measuring weight and length

*Demo, baby scale only
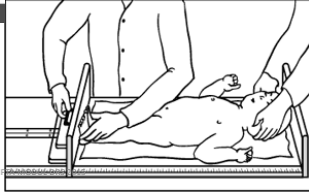
Analisis antropometri

- Status perawakan normal
- Status gizi cukup
- Kenaikkan berat badan
  - BB lahir 3,5 kgs; BB 3 bulan 5,5 kgs
  - Kenaikkan BB dalam interval 3 bulan ; 2 kg = 2000g → apakah kenaikkan BB adekuat ?
  - Analisis dengan Tabel kenaikkan Berat WHO interval 3 bulan → persentil 5 adalah 2083
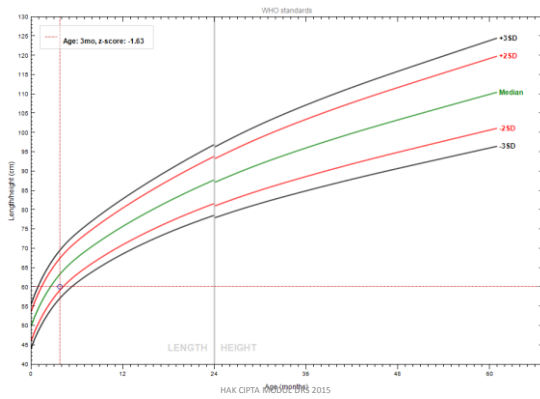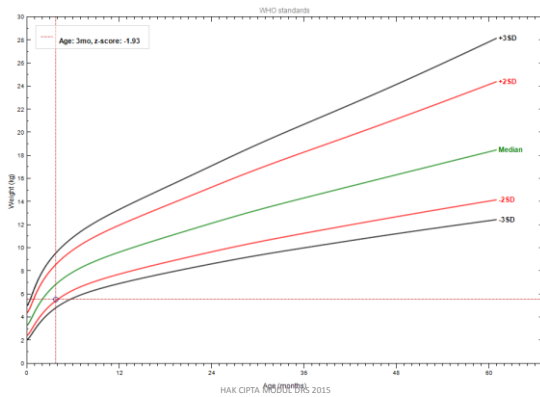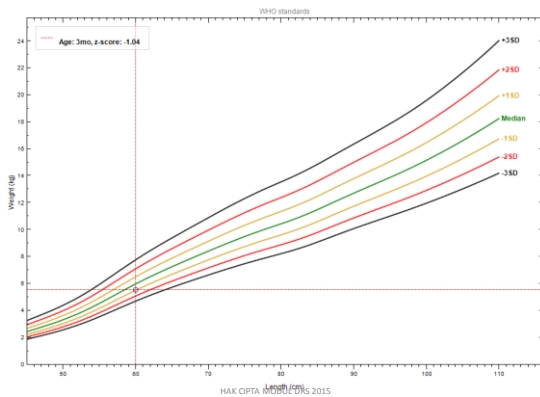 - Artinya bayi berisiko gagal tumbuh (*at risk of FTT*)

Simplified field tables

3-month weight increments (g) BOYS
Birth to 24 months (percentiles) — World Health Organization

Interval	1st	3rd	5th	15th	25th	50th	75th	85th	95th	97th	99th
0-3 mo	1733	1960	2083	2409	2608	2989	3383	3600	3972	4119	4401
1-4 mo	1415	1621	1733	2031	2214	2565	2931	3132	3480	3618	3882
2-5 mo	1011	1187	1284	1542	1702	2012	2337	2518	2833	2958	3199
3-6 mo	704	856	940	1166	1307	1582	1874	2038	2323	2438	2659
4-7 mo	496	632	707	910	1038	1289	1558	1709	1975	2082	2289
5-8 mo	355	480	550	739	859	1096	1350	1494	1748	1850	2049
6-9 mo	249	369	436	618	733	962	1208	1348	1595	1694	1888
7-10 mo	162	280	346	526	639	865	1108	1246	1489	1587	1778
8-11 mo	86	205	271	452	567	793	1036	1173	1414	1511	1700
9-12 mo	21	142	210	393	509	738	982	1120	1360	1457	1644
10-13 mo	-35	90	159	347	465	696	942	1080	1320	1416	1602
11-14 mo	-80	48	119	310	430	665	913	1051	1291	1387	1571
12-15 mo	-115	16	88	283	404	641	891	1029	1269	1364	1547
13-16 mo	-141	-8	65	263	385	624	874	1012	1252	1347	1529
14-17 mo	-159	-25	49	248	372	611	861	1000	1239	1334	1515
15-18 mo	-171	-36	38	238	362	602	852	991	1230	1324	1505
16-19 mo	-177	-42	32	231	355	595	846	984	1223	1317	1499
17-20 mo	-180	-46	28	227	351	590	841	979	1218	1313	1494
18-21 mo	-180	-47	26	224	347	586	836	975	1214	1308	1490
19-22 mo	-180	-49	24	220	342	580	829	968	1207	1302	1484
20-23 mo	-183	-53	19	213	334	571	819	957	1196	1291	1473
21-24 mo	-189	-61	10	202	322	557	804	941	1179	1274	1455

WHO Growth Velocity Standards

Evaluation of Failure to Thrive

Are red flag signs or symptoms present (Table 3)?

No → Proceed with evaluation and management of appropriate caloric intake

Yes → Consider complete blood count, serum electrolyte levels, blood urea nitrogen measurement, creatinine levels, urinalysis, urine culture, erythrocyte sedimentation rate, thyroid function testing, liver function testing

If indicated by history, physical examination, or initial laboratory testing, consider the following: complement levels, echocardiography, human immunodeficiency virus or hepatitis serology, immunoglobulin levels, purified protein derivative test, stool culture for ova and parasites, stool analysis for fat content and reducing substances
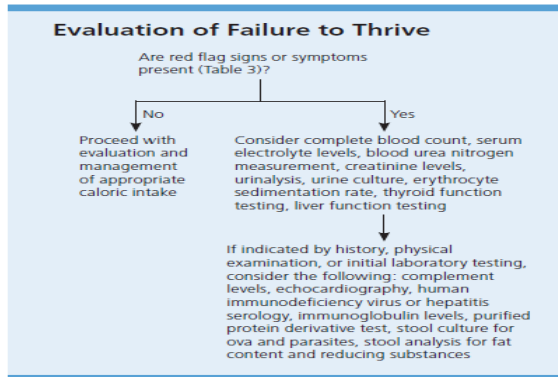
Figure 1. Algorithm for the evaluation of failure to thrive.
Information from references 20, 23, and 29.

Table 3. Red Flag Signs and Symptoms Suggesting Medical Causes of Failure to Thrive

Cardiac findings suggesting congenital heart disease or heart failure (e.g., murmur, edema, jugular venous distention)

Developmental delay

Dysmorphic features

Failure to gain weight despite adequate caloric intake

Organomegaly or lymphadenopathy

Recurrent or severe respiratory, mucocutaneous, or urinary infection

Recurrent vomiting, diarrhea, or dehydration

Information from references 20, 23, 25, 26, and 29.

Evaluasi gagal tumbuh

- Asupan makanan adekuat ?
  - Nilai kecukupan ASI
    - Posisi dan perlekatan ?
    - Frekuensi menyusu ? Teratur ? Every 1,5-2 hours
    - Lama menyusui < 5-10 min ? 15-20 minutes
    - Tanda-tanda dehidrasi ?
    - Terlihat lapar ?
  - Koreksi dan evaluasi setelah 1-2 minggu
- Red flags signs and symptoms ? (+)
- Evaluasi adakah kontra indikasi pemberian ASI ?
  - WHO 2009 → Food for special medically puposed

Prompt Treatment

- Appropriate breast feeding practices (+)
- Red flags :
  - Failure to gain weight despite adequate caloric intake
  - Insomnia (rewel menangis setiap malam)
  - Mother atopic (+)
  - IgE RAST cow milk & stools occult blood ?

Insomnia and Cow's Milk Allergy in Infants
Pediatrics 1985;76:880-884

TABLE 2. Sleep Characteristics Before and After Exclusion Regimen*

Characteristic	Before Treatment	P1	After Treatment	P2
Sleep time during the night (min/12 h)				
Reported by parents	266.3 ± 68.9		588.4 ± 120.0	.01
Recorded in sleep lab	305.3 ± 123.1			
Controls in sleep lab	509.9 ± 37.7	.01		
Total sleep time/24 h (h)				
Median	4.5		11.75	
Range	3.5–6.5		9–14	.01
No. of arousals during the night/12 h				
Reported by parents	5.4 ± 1.9		0.5 ± 0.1	.01
Recorded in sleep lab	4.8 ± 2.6			
Controls in sleep lab	0.9 ± 0.1	.01		
Duration of arousals (min)				
Reported by parents	35.5 ± 8.0		10.5 ± 5.0	.01
Recorded in sleep lab	27.4 ± 8.7			
Controls in sleep lab	10.2 ± 5.2	.01		

* Results are expressed as means ± SD. Controls were 20 normal infants studied under similar conditions. Statistical analysis (Wilcoxon rank test) compared the infants' sleep recorded in the laboratory with that of controls (*P1*) and the infants' sleep, as described by the parents, before and after treatment (*P2*).

- It is concluded that, when no evident cause for sleeplessness can be found in an infant, the possibility of milk allergy should be given serious consideration.

Pediatrics 1985;76:880-884

Pediatric Nutrition Care

- Assessment

    At risk of FTT & normal stature
    Uncontrolable crying during nights
    IgE RAST cow milk (+ 2) & Stool occult blood (+)
    ↓
    severe cow milk allergy
    ↓
    Breast milk & mother elliminate dairy product
    OR
    Hypoallergenik infant formula

Hypoallergenic formulas ?

- To be labeled 'hypoallergenic',
  - these formulas must not provoke reactions in 90% of infants or children with confirmed cow's milk allergy with 95% confidence when given in prospective randomized, double-blind, placebo-controlled trials
  - **Fulfill by extensively hydrolyzed and amino acid based formula**
  - Soy formula and Partially Hydrolyzed *are not classified as hypoallergenic* because provoke reaction more than 10% in infant or children with confirmed CMA

ESPACI And ESPGHAN, Arch Dis Child. 81, 1999
*AAP Committee on Nutrition, Pediatrics 106, 2000*

Damayanti Rusli Sjarif 2018

Weight-for-length BOYS
Birth to 2 years (z-scores) — World Health Organization

cm	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
60.0	4.7	5.1	5.5	6.0	6.5	7.1	7.8
60.5	4.8	5.2	5.6	6.1	6.7	7.3	8.0
61.0	4.9	5.3	5.8	6.3	6.8	7.4	8.1
61.5	5.0	5.4	5.9	6.4	7.0	7.6	8.3
62.0	5.1	5.6	6.0	6.5	7.1	7.7	8.5
62.5	5.2	5.7	6.1	6.7	7.2	7.9	8.6
63.0	5.3	5.8	6.2	6.8	7.4	8.0	8.8

- Requirement : 6 x 120 kcal/kg = 720 kcal
  - Height age : 2-3 mos → RDA 120 kcal/kgs
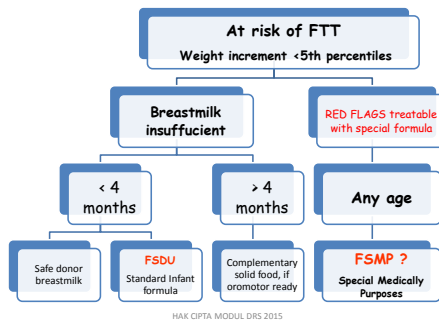 - IBW : 6 kgs

HAK CIPTA MODUL DRS 2015

Tata Laksana Alergi Susu Sapi pada Bayi dengan Susu Formula
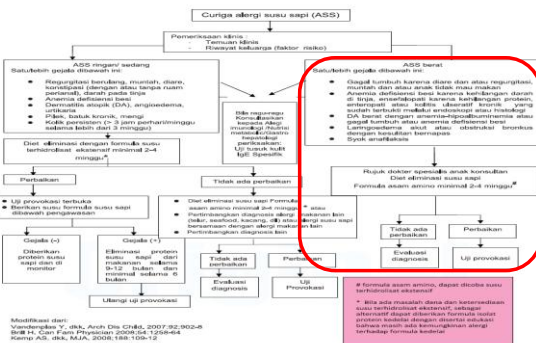
Pediatric Nutrition Care

- Route : oral or enteral
- Type of food :
  - *amino acids based formula (classified as FSMP)*
- Monitoring
  - Acceptability
  - Adverse reactions
  - effectiveness

Alur tatalaksana jika ASI tidak cukup jika Red Flags (+)
(Sjarif, 2018)

At risk of FTT
Weight increment <5th percentiles

Breastmilk insuffucient

RED FLAGS treatable with special formula

< 4 months

> 4 months

Any age

Safe donor breastmilk

FSDU
Standard Infant formula

Complementary solid food, if oromotor ready

FSMP ?
Special Medically Purposes

HAK CIPTA MODUL DRS 2015

Foods for special medical purposes
.(CODEX STAN 72-1981)
Description

- **category of foods for special dietary uses which are specially**
  - processed or formulated and presented for the dietary management of patients and <u>may be used only under medical supervision.</u>
  - intended for the exclusive or partial feeding of patients with limited or impaired capacity to take, digest, absorb or metabolize ordinary foodstuffs or certain nutrients contained therein, or who have other special medically-determined nutrient requirements, whose dietary management cannot be achieved only by modification of the normal diet, by other foods for special dietary uses, or by a combination of the two.

DRS 2014

20

FORMULA FOR SPECIAL MEDICALLY PURPOSES (FMSP) INTENDED FOR INFANT

- **Formula for premature infant**
  - Human Milk Fortifier
  - Premature infant formula
- **Formula for cow-milk allergy** → "predigested" formulas
  - Extensively hydrolyzed formulas
  - Amino-acid based formula
- **Formula for inborn errors of metabolism**
  - Phenylalanine free formula (PKU), branc-chain amino acids free formula (MSUD, MMA), etc
- **Formula for gastrointestinal disorders**
  - Lactose-free formulas: lactose intolerance
  - Malabsorbtion ; peptamen junior, enfaport, galactomin19
- **Enteral Nutrition (Oral Nutrition Supplement)**
 - 1 kcal/mL or 1,5 kcal/mL
- **Formula ketogenic**, etc

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How to prescribe amino acids based formula
Neocate LCP/advance or Puramino (amino acids based formula yang tersedia di Indonesia)

- Amino acids based Infant Formula®
  - 1 scoop 4,6 g/22 kcal
  - 720/22 = 8 x 4 scoops ≈ 148g/day
  - 1 can = 400 g → for 2 weeks ?
  - ℞ AA infant formula® No VI
    - ∫ 8 dd 4 scoops (diluted to 120 mL water)

World Health Organization 2009

Acceptable medical reasons for use of breast-milk substitutes
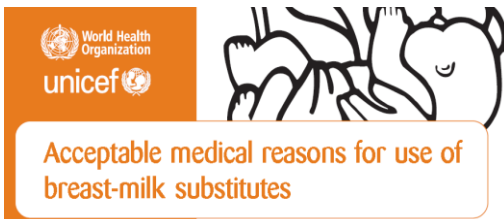
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Infant conditions

Infants who should not receive breast milk or any other milk except specialized formula

- Infants with classic galactosemia: a special galactose-free formula is needed.
- Infants with maple syrup urine disease: a special formula free of leucine, isoleucine and valine is needed.
- Infants with phenylketonuria: a special phenylalanine-free formula is needed (some breastfeeding is possible, under careful monitoring).

Infants for whom breast milk remains the best feeding option but who may need other food in addition to breast milk for a limited period

- Infants born weighing less than 1500 g (very low birth weight).
- Infants born at less than 32 weeks of gestational age (very pre-term).
- Newborn infants who are at risk of hypoglycaemia by virtue of impaired metabolic adaptation or increased glucose demand (such as those who are preterm, small for gestational age or who have experienced significant intrapartum hypoxic/ischaemic stress, those who are ill and those whose mothers are diabetic) (5) if their blood sugar fails to respond to optimal breastfeeding or breast-milk feeding.

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Metabolic disorders
E70-E88 >

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Developmental delay

Dysmorphic features

Failure to gain weight despite adequate caloric intake

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Recurrent vomiting, diarrhea, or dehydration

Information from references 20, 23, 25, 26, and 29.

Bayi R, mengalami perut kembung setiap di beri ASI
hepatospleno megali (-) konfirmasi USG, berat badan
sulit naik → diberi pelbagai jenis susu formula medis
khusus dengan bantuan ngt → berat tetap tidak naik.

Genetic Disorders of Membrane Transport :
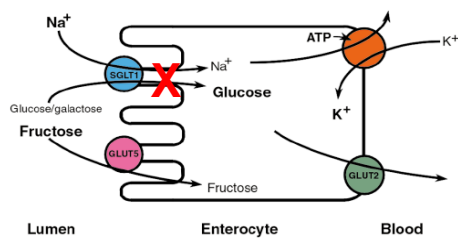## Glucose Galactose Malabsorption

Fig. 1. A model for sugar transport across the enterocyte showing the
brush-border SGLT1 and GLUT5 transporters and the basolateral
Na+-K+-pumps and sugar transporter GLUT2. Kindly provided by
Dr. Bruce Hirayama.

Damayanti Rusli Sjarif 2018

By R 18 bulan dengan BB 4,425 kgs menderita penyakit glucosa-galactosa malabsorption (GGM) syndrome
(Penyakit Langka hanya ada 200 kasus diseluruh dunia

Formula carbohydrate malabsobtion
Free glucosa snf gslactose

Kesimpulan

- Malnutrisi pada bayi dan batita bersifat ireversibel
- Deteksi dini risiko gagal tumbuh dan penerapan alur tatalaksana diharapkan dapat mencegah berat badan kurang, gizi kurang, gizi buruk bahkan stunting.
- Alur tata laksana red flags kemungkinan membutuhkan Food For Special Medically Purposed yang membutuhkan preskripsi dan supervisi dokter yang kompeten menangani penyakit terkait (dokter spesialis anak)

HAK CIPTA MODUL DRS 2015

Children are like buds in a garden and should be carefully and lovingly nurtured, as they are the future of the nation and the citizens of tomorrow.
~ Jawaharlal Nehru