

## **Annex 1**

**Intake of breast milk and energy from breast milk by infants in developing countries (Mean $\pm$ SD); data from individual studies**

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
<b>PARTIALLY BREAST-FED:</b>						
Brown (unpublished); Macashca, Peru*	---	---	11	9	14	TW <sup>a</sup> x 12 h (+3%) <sup>b</sup>
	---	---	7.0	7.8	8.2	
	---	---	757±223	776±194	662±372	0.65 I <sup>d</sup>
	---	---	482±142	495±125	423±238	
	---	---	72±29	64±16	51±26	
Brown 1986; Bangladesh	---	---	35	5	---	TW x 24 h (--) <sup>c</sup>
	---	---	6.0	6.2	---	
	---	---	710±117	707±139	---	0.57-0.63 M <sup>d</sup>
	---	---	426±70	403±79	---	
	---	---	71±12	65±14	---	
Brown et al. 1982; Bangladesh	---	---	---	---	103	TW x 12 h (--) <sup>c</sup>
	---	---	---	---	8.0	
	---	---	---	---	532±13	0.61 I <sup>d</sup>
	---	---	---	---	324±9	
	---	---	---	---	41±1	

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
Butte et al. 1992; Mexico						
<u>N:</u>	---	---	15	---	---	<sup>2</sup> H <sub>2</sub> O dose to the mother (--) <sup>c</sup>
<u>Weight (kg):</u>	---	---	6.8	---	---	
<u>Breast-milk intake (g/d):</u>	---	---	869±150	---	---	
<u>kcal<sub>m</sub>/kg:</u>	---	---	461±80	---	---	0.53-0.56 M <sup>d</sup>
<u>kcal<sub>m</sub>/kg/d:</u>	---	---	68±9	---	---	
Cohen et al. 1994; Honduras*						
<u>N:</u>	---	91	91	---	---	TW x 48 h (+ measured IWL) <sup>b</sup>
<u>Weight (kg):</u>	---	6.7	7.4	---	---	
<u>Breast-milk intake (g/d):</u>	---	750±142	709±131	---	---	0.69 M <sup>d</sup>
<u>kcal<sub>m</sub>/d:</u>	---	500±97	477±91	---	---	
<u>kcal<sub>m</sub>/kg/d:</u>	---	76±14	65±12	---	---	
Creed de Kanashiro et al. 1990; Peru*						
<u>N:</u>	---	---	51	52	18	TW x 12 h (+3%) <sup>b</sup>
<u>Weight (kg):</u>	---	---	8.1	8.6	9.3	
<u>Breast-milk intake (g/d):</u>	---	---	715±135	647±163	543±155	0.63-0.65 M <sup>d</sup>
<u>kcal<sub>m</sub>/d:</u>	---	---	452±83	408±99	346±100	
<u>kcal<sub>m</sub>/kg/d:</u>	---	---	56±10	47±11	37±11	

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
Dickin et al. 1990; Nigeria*						
<u>N:</u>	---	---	9	18	27	TW x 12 h (+5%) <sup>b</sup>
<u>Weight (kg):</u>	---	---	6.6	7.3	8.0	
<u>Breast-milk intake (g/d):</u>	---	---	677±106	701±168	613±158	67 I <sup>d</sup>
<u>kcal<sub>hp</sub>/d:</u>	---	---	453±71	470±112	365±165	
<u>kcal<sub>hp</sub>/kg/d:</u>	---	---	70±17	65±16	47±23	
Marquis 1990; Peru*						
<u>N:</u>	---	---	---	7	20T	W x 24 h (+5%) <sup>b</sup>
<u>Weight (kg):</u>	---	---	---	8.0	9.6	
<u>Breast-milk intake (g/d):</u>	---	---	---	484±252	278±201	0.67 I <sup>d</sup>
<u>kcal<sub>hp</sub>/d:</u>	---	---	---	323±168	185±134	
<u>kcal<sub>hp</sub>/kg/d:</u>	---	---	---	39±13	20±15	
Drewett et al. 1993; Thailand						
<u>N:</u>	119	58	57	51	34	TW x 48 h (TWL) <sup>b</sup>
<u>Breast-milk intake (g/d):</u>	815±186	775±178	638±194	551±160	500±206	
<u>kcal<sub>hp</sub>/d:</u>	530±121	504±116	415±126	358±104	325±134	0.65 I <sup>d</sup>
Hennart 1980; Central Africa						
<u>N:</u>	8	22	29	39	12	TW x 24 h (-) <sup>c</sup>
<u>Breast-milk intake (g/d):</u>	517±169	605±78	525±95	580±73	533±73	
<u>kcal<sub>hp</sub>/d:</u>	336±110	393±51	341±62	377±47	346±47	0.65 I <sup>d</sup>

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
Prentice et al. 1986 <sup>c</sup> , Gambia						
N:	15	33	16	16	15	TW x 24 h (--) <sup>c</sup>
Breast-milk intake (g/d):	678±152	669±163	608±132	595±180	633±142	
kcal <sub>hp</sub> /d:	474±106	468±114	425±92	416±126	443±99	0.70 M <sup>d</sup>
van Steenbergen et al. 1991, Indonesia						
N:	126	118	104	31	21	TW x 48 h (--) <sup>c</sup>
Breast-milk intake (g/d):	697±137	701±114	669±107	680±110	643±143	
kcal <sub>hp</sub> /d:	390±77	393±64	375±59	381±61	360±80	0.56 M <sup>d</sup>
WHO 1985a						
Guatemala (Urban poor)						TW x 24 h (0.56-0.66 M)
N:	27	30	28	24	---	
Breast-milk intake (g/d):	519±186	548±173	586±185	587±186	---	
kcal <sub>hp</sub> /d:	291±109	320±113	338±121	330±101	---	
Guatemala (Rural)						
N:	27	26	28	27	---	
Breast-milk intake (g/d):	543±131	686±151	588±142	602±187	---	
kcal <sub>hp</sub> /d:	302±80	374±96	326±81	331±113	---	
Philippines (Urban poor)						
N:	32	31	30	31	---	
Breast-milk intake (g/d):	540±165	612±144	597±214	558±183	---	
kcal <sub>hp</sub> /d:	313±110	396±108	332±140	308±99	---	

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
Philippines (Rural)						
<u>N:</u>	27	28	29	32	---	
<u>Breast-milk intake (g/d):</u>	630±202	618±211	589±136	534±176	---	
<u>kcal<sub>m</sub>/d:</u>	372±152	364±144	340±118	328±145	---	
<b>EXCLUSIVELY BREAST-FED:</b>						
Brown 1986; Bangladesh						
<u>N:</u>	89	62	---	---	---	TW x 24 h (--) <sup>c</sup>
<u>Weight (kg):</u>	5.1	---	---	---	---	
<u>Breast-milk intake (g/d):</u>	571±132	692±110	---	---	---	0.57-0.63 M <sup>d</sup>
<u>kcal<sub>m</sub>/d:</u>	360±83	422±67	---	---	---	
<u>kcal<sub>m</sub>/kg/d:</u>	109±27	82±14	---	---	---	
Butte et al. 1992; Mexico						
<u>N:</u>	---	15	---	---	---	<sup>2</sup> H <sub>2</sub> O dose to the mother (--) <sup>c</sup>
<u>Weight (kg):</u>	---	6.2	---	---	---	
<u>Breast-milk intake (g/d):</u>	---	885±145	---	---	---	0.53-0.56 M
<u>kcal<sub>m</sub>/kg:</u>	---	496±81	---	---	---	
<u>kcal<sub>m</sub>/kg/d:</u>	---	80±13	---	---	---	
Creed de Kanashiro et al. 1990; Peru*						
<u>N:</u>	51	52	---	---	---	TW x 12 h (+3%) <sup>b</sup>
<u>Weight (kg):</u>	7.1	---	---	---	---	
<u>Breast-milk intake (g/d):</u>	809±115	785±113	---	---	---	0.63-0.65 M <sup>d</sup>
<u>kcal<sub>m</sub>/d:</u>	524±72	497±69	---	---	---	
<u>kcal<sub>m</sub>/kg/d:</u>	98±12	71±10	---	---	---	

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
Cohen et al. 1994; Honduras						
<u>N:</u>	----	100	50	----	----	TW x 48 h (+measured IWL) <sup>b</sup>
<u>Weight (kg):</u>	----	6.9	7.6	----	----	
<u>Breast-milk intake (g/d):</u>	----	816±152	813±126	----	----	0.69 M
<u>kcal<sub>hw</sub>/d:</u>	----	536±96	553±88	----	----	
<u>kcal<sub>hw</sub>/kg/d:</u>	----	79±12	73±12	----	----	
van Steenbergen et al. 1991; Indonesia						
<u>N:</u>	32	30	20	----	----	TW x 48 h (--) <sup>e</sup>
<u>Breast-milk intake (g/d):</u>	761±145	744±114	738±154	----	----	
<u>kcal<sub>hw</sub>/d:</u>	426±81	417±84	413±86	----	----	0.56 M

\*: Computed from the original dataset

a: TW indicates test weighing x its duration in hours

b: Adjustment for underestimation of breast-milk intake due to insensible water loss (IWL)

c: (----) No adjustment mode for IWL

d: Energy density of breast milk (kcal<sub>hw</sub>/g) and method of estimation; I - imputed or M- measured analytically.

e: Infants received a dietary supplement between the ages of 3-12 months.

## **Annex II.**

**Intake of breast milk and energy from breast milk by infants in developed countries (Mean $\pm$ SD); data from individual studies**

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
<b>PARTIALLY BREAST-FED:</b>						
Dewey et al. 1992c; California, U.S.A.						
<u>N:</u>	---	---	44	43	40	TW x 72-96h (+measured IWL) <sup>b</sup>
<u>Weight (kg):</u>	---	---	7.6	8.5	9.2	
<u>Breast-milk intake (g/d):</u>	---	---	769±171	646±217	448±251	0.68-0.72 M
<u>kcal<sub>lip</sub>/d:</u>	---	---	545±105	468±141	313±178	
<u>kcal<sub>lip</sub>/kg/d:</u>	---	---	72±14	55±17	34±19	
Krebs et al. 1994; Colorado, U.S.A.						
<u>N:</u>	---	142	71	---	---	TW x 72 h (--) <sup>c</sup>
<u>Weight (kg):</u>	---	6.4	7.5	---	---	0.65 I
<u>Breast-milk intake (g/d):</u>	---	705±120	640±150	---	---	
<u>kcal<sub>lip</sub>/d:</u>	---	458±78	416±98	---	---	
<u>kcal<sub>lip</sub>/kg/d:</u>	---	72±12	55±11	---	---	
Michaelsen et al. 1994; Copenhagen, Denmark						
<u>N:</u>	16	26	---	18	---	TW x 48-120h (+measured IWL) <sup>b</sup>
<u>Weight (kg):</u>	5.5	6.6	---	8.8	---	0.70 M
<u>Breast-milk intake (g/d):</u>	488±232	531±277	---	318±201	---	
<u>kcal<sub>lip</sub>/d:</u>	341±162	372±194	---	223±141	---	
<u>kcal<sub>lip</sub>/kg/d:</u>	62±29	56±29	---	25±16	---	

Author	Age Group (months)						Methods
	0-2	3-5	6-8	9-11	12-23		
Prentice et al. 1986; Cambridge, U.K.	N:	48	137	114	19	---	TW x 96 h (--)°
	<u>Weight (kg):</u>	6.5	7.8	8.4	8.4	---	
	<u>Breast-milk intake (g/d):</u>	741±141	761±184	474±217	329±291	---	0.70 M
	<u>kcal<sub>nl</sub>/d:</u>	519±99	533±129	332±152	230±204	---	
	<u>kcal<sub>nl</sub>/kg/d:</u>	80±15	68±17	40±18	27±24	---	
van Raaij 1991; Netherlands	N:	---	---	16	---	---	TW x 48 h (--)°
	<u>Weight (kg):</u>	---	---	7.1	---	---	
	<u>Breast-milk intake (g/d):</u>	---	---	573±187	---	---	0.70 I
	<u>kcal<sub>nl</sub>/d:</u>	---	---	401±131	---	---	
	<u>kcal<sub>nl</sub>/kg/d:</u>	---	---	81±26	---	---	
WHO 1985a							TW x 24 h (--)°
Hungary	N:	83	83	78	---	---	0.60-0.83 M
	<u>Breast-milk intake (g/d):</u>	640±134	656±158	539±150	---	---	
	<u>kcal<sub>nl</sub>/d:</u>	359±87	392±106	339±104	---	---	
Sweden	N:	28	28	28	28	---	
	<u>Breast-milk intake (g/d):</u>	693±149	783±114	560±208	452±301	---	
	<u>kcal<sub>nl</sub>/d:</u>	461±160	602±196	430±160	368±238	---	

Author	Age Group (months)					Methods
	0-2	3-5	6-8	9-11	12-23	
<b>EXCLUSIVELY BREAST-FED:</b>						
Butte 1991; Houston, Texas						
<u>N:</u>	104	174	8	---	---	TW x 24-120h (--) <sup>c</sup>
<u>Weight (kg):</u>	5.1	6.7	7.6	---	---	
<u>Breast-milk intake (g/d):</u>	732±145	740±140	818±166	---	---	
<u>kcal<sub>tp</sub>/d:</u>	484±122	480±120	542±94	---	---	0.63-0.68 M
<u>kcal<sub>tp</sub>/kg/d:</u>	95±20	72±17	71±12	---	---	
Chandra 1981; Canada						
<u>N:</u>	---	108	72	---	---	
<u>Breast-milk intake (g/d):</u>	---	867±93	843±106	---	---	
<u>kcal<sub>tp</sub>/d:</u>	---	564±60	548±69	---	---	
Dewey et al. 1992c; California, U.S.A.						
<u>N:</u>	---	19	16	---	---	TW x 72-96h (+ measured IWL) <sup>b</sup>
<u>Weight (kg):</u>	---	6.3	7.9	---	---	
<u>Breast-milk intake (g/d):</u>	---	812±133	866±121	---	---	0.68-0.72 M
<u>kcal<sub>tp</sub>/d:</u>	---	537±80	605±65	---	---	
<u>kcal<sub>tp</sub>/kg/d:</u>	---	85±10	77±11	---	---	
Kohler 1984; Sweden						
<u>N:</u>	26	34	12	---	---	TW x 48 h (--) <sup>c</sup>
<u>Weight (kg):</u>	4.7	6.8	7.9	---	---	
<u>Breast-milk intake (g/d):</u>	746±101	724±133	689±120	---	---	0.70 I
<u>kcal<sub>tp</sub>/d:</u>	525±71	617±99	663±85	---	---	
<u>kcal<sub>tp</sub>/kg/d:</u>	112±15	91±15	84±11	---	---	

Author	Age Group (months)						Methods
	0-2	3-5	6-8	9-11	12-23		
Krebs et al. 1994; Colorado, U.S.A.	<u>N:</u>	71	---	---	---	---	TW x 72 h (--) <sup>c</sup>
	<u>Weight (kg):</u>	3.8	---	---	---	---	
	<u>Breast-milk intake (g/d):</u>	600±120	---	---	---	---	0.65 I
	<u>kcal<sub>0</sub>/d:</u>	390±78	---	---	---	---	
	<u>kcal<sub>0</sub>/kg/d:</u>	103±21	---	---	---	---	
Michaelsen et al. 1994; Copenhagen, Denmark	<u>N:</u>	60	36	---	---	---	TW x 48-120h (+ measured IWL) <sup>b</sup>
	<u>Weight (kg):</u>	5.4	6.7	---	---	---	0.73 M
	<u>Breast-milk intake (g/d):</u>	754±167	827±139	---	---	---	
	<u>kcal<sub>0</sub>/d:</u>	550±122	604±102	---	---	---	
	<u>kcal<sub>0</sub>/kg/d:</u>	102±22	90±15	---	---	---	
Salmenpera 1985; Helsinki, Finland	<u>N:</u>	---	12	31	26	---	TW x 72 h (--) <sup>c</sup>
	<u>Weight (kg):</u>	---	6.5	7.3	8.7	---	
	<u>Breast-milk intake (g/d):</u>	---	790±40	800±20	900±39	---	0.65 I
	<u>kcal<sub>0</sub>/d:</u>	---	514±26	520±13	585±25	---	
	<u>kcal<sub>0</sub>/kg/d:</u>	---	79±4	72±2	67±3	---	
van Raaij 1991; Netherlands	<u>N:</u>	72	16	---	---	---	TW x 48 h (--) <sup>c</sup>
	<u>Weight (kg):</u>	4.7	5.6	---	---	---	0.70 I
	<u>Breast-milk intake (g/d):</u>	718±125	746±175	---	---	---	
	<u>kcal<sub>0</sub>/d:</u>	503±87	522±123	---	---	---	
	<u>kcal<sub>0</sub>/kg/d:</u>	107±14	93±15	---	---	---	

---

\*: Computed from the original dataset

a: TW indicates test weighing x its duration in hours

b: Adjustment for underestimation of breast-milk intake due to insensible water loss (IWL)

c: (---) No adjustment made for IWL

d: Energy density of breast milk (kcal<sub>lit</sub>/g) and method of estimation; I - imputed or M- measured analytically.

e: Infants received a dietary supplement between the ages of 3-12 months.

### **Annex III.**

## **Estimated zinc requirements during the first two years of life**

Zinc Requirements (mg/d)	Age	
	0-1years	1-2 years
Urine + Sweat losses	0.15 <sup>a</sup>	0.22 <sup>b</sup>
Endogenous fecal losses <sup>c</sup>	0.20	0.30
For growth	0.33 <sup>a</sup>	0.19 <sup>d</sup>
Total losses and incorporation in newly synthesized tissue	0.68	0.71
Estimated Average Requirement (EAR) <sup>e</sup>	2.3	2.3
Recommended Nutrient Intake <sup>f</sup>	2.8	2.8

<sup>a</sup> From Krebs & Hambidge, 1986.

<sup>b</sup> Based on body weight from NCHS x 20 µg Zn/kg (Krebs & Hambidge, 1986).

<sup>c</sup> Based on endogenous fecal losses in 4 month old breast-fed infants (Krebs et al., 1993). Losses are more closely related to zinc intake than to body weight, so there is little change with age in breast-fed infants; nonetheless the values for the second year of life are assumed to be 50% higher than those in first year of life.

<sup>d</sup> Based on lean tissue accrual of 6.3 g/d (Fomon et al., 1982) x 30 mg Zn per kg lean tissue.

<sup>e</sup> Based on 30% absorption (Department of Health, 1991).

<sup>f</sup> Recommended nutrient intake = EAR + 2 SD. SD was assumed to be 11% based on British DRV for zinc (Department of Health, 1991).