

KENYA

Last Updated: 2006-10-13

Level	Date	Location and sample descriptor	Sex	Age (years)	Sample size	Prevalence of xerophthalmia (%)							Serum / plasma retinol concentration (µmol/l)			Reference	Notes			
						Current XN	Previous XN	X1B	X2	X3A	X3B	XS	Prevalence (%)				Mean	SD	General	Line
													<0.35	<0.70	< 1.05					
L	2003 P	Kitui and Nairobi: Pre-SAC/SAC: Total	B	4.00-7.99	342	1.50		0.60				0.00					4106	*		
		Pre-SAC/SAC by age	B	4.00-4.99	73	0.00		0.00												
		Pre-SAC/SAC by age	B	5.00-5.99	91	0.30		0.30												
		Pre-SAC/SAC by age	B	6.00-6.99	79	0.90		0.00												
		Pre-SAC/SAC by age	B	7.00-7.99	99	0.30		0.30												
N	1999	National: Pre-SAC: Total	B	0.17-5.07	945								24.2	84.4			3442	*	1	
		National: Women: Total	F	NS-50.99	1674									10.3	50.7				2	
		National: Men: Total	M	15.00-50.99	618									5.3	42.4				3	
		Pre-SAC by age	B	0.17-0.49	NS									34.3						
		Pre-SAC by age	B	0.50-1.07	NS									22.3						
		Pre-SAC by age	B	1.08-2.07	NS									25.9						
		Pre-SAC by age	B	2.08-3.07	NS									19.5						
		Pre-SAC by age	B	4.08-5.07	NS									24.5						
		Pre-SAC by age	B	3.08-4.07	NS									27.7						
		Pre-SAC by city: Nairobi	B	0.17-5.07	62									29.0	77.4				4	
		Pre-SAC by cluster: Osiri	B	0.17-5.07	60									40.0	91.7				5	
		Pre-SAC by cluster: Kandiang'a	B	0.17-5.07	65									27.7	90.8				6	
		Pre-SAC by cluster: Sisenye	B	0.17-5.07	78									30.8	89.8				7	
		Pre-SAC by cluster: Nakhwana	B	0.17-5.07	82									52.4	89.0				8	
		Pre-SAC by cluster: Misikhu	B	0.17-5.07	75									44.0	94.7				9	
		Pre-SAC by cluster: Mwamosioma	B	0.17-5.07	79									20.3	87.4				10	
		Pre-SAC by cluster: Birongo	B	0.17-5.07	69									13.0	84.0				11	
		Pre-SAC by cluster: Sirwet	B	0.17-5.07	26									3.8	76.9				12	
		Pre-SAC by cluster: Ruii	B	0.17-5.07	73									5.5	67.1				13	
		Pre-SAC by cluster: Njabini	B	0.17-5.07	45									4.4	86.6				14	
		Pre-SAC by cluster: Kibaranayaki	B	0.17-5.07	64									4.7	62.5				15	
		Pre-SAC by cluster: Ng'aratuko	B	0.17-5.07	8									0.0	75.0				16	
		Pre-SAC by cluster: Kibureni	B	0.17-5.07	63									19.0	88.8				17	
		Pre-SAC by cluster: Kyratune	B	0.17-5.07	37									0.0	78.4				18	
		Pre-SAC by cluster: Wii	B	0.17-5.07	25									0.0	60.0				19	
Pre-SAC by cluster: Elan	B	0.17-5.07	8									0.0	75.0				20			
Pre-SAC by cluster: Kikoneni	B	0.17-5.07	35									57.1	97.1				21			
Pre-SAC by cluster: Kifyonzo	B	0.17-5.07	8									12.5	87.5				22			
Pre-SAC by cluster: Miritini	B	0.17-5.07	6									66.7	100.0				23			
Pre-SAC by cluster: Utange	B	0.17-5.07	9									55.5	99.9				24			
Pre-SAC by cluster: Korkora	B	0.17-5.07	30									33.3	90.0				25			
		Women by physiological status: NPW	F	NS-50.99	1342									47.5						

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						Current XN	Previous XN	X1B	X2	X3A	X3B	XS	Prevalence (%)				Mean	SD	General	Line
													<0.35	<0.70	< 1.05					
N	1999	Women by physiological status: PW	F	15.00-50.99	204												3442			
		Women by cluster: Osiri	F	NS-50.99	61								9.8	66.7					26	
		Women by cluster: Kandiang'a	F	NS-50.99	72								19.4	61.1					27	
		Women by cluster: Sisenye	F	NS-50.99	102								6.9	58.9					28	
		Women by cluster: Nakhwana	F	NS-50.99	86								12.8	58.1					29	
		Women by cluster: Misikhu	F	NS-50.99	83								7.2	61.4					30	
		Women by cluster: Mwamosioma	F	NS-50.99	88								4.5	45.4					31	
		Women by cluster: Birongo	F	NS-50.99	71								0.0	42.3					32	
		Women by cluster: Sirwet	F	NS-50.99	60								3.3	40.0					33	
		Women by cluster: Ruii	F	NS-50.99	80								2.5	22.5					34	
		Women by cluster: Njabini	F	NS-50.99	56								0.0	30.4					35	
		Women by cluster: Kibaranyaki	F	NS-50.99	81								0.0	19.8					36	
		Women by cluster: Ng'aratuko	F	NS-50.99	48								0.0	33.3					37	
		Women by cluster: Kibureni	F	NS-50.99	78								3.8	43.5					38	
		Women by cluster: Kyatune	F	NS-50.99	162								0.0	19.8					39	
		Women by cluster: Wii	F	NS-50.99	116								0.0	16.4					40	
		Women by cluster: Elan	F	NS-50.99	37								8.1	73.0					41	
		Women by cluster: Kikoneni	F	NS-50.99	184								31.0	82.6					42	
		Women by cluster: Kifyonzo	F	NS-50.99	51								3.9	54.9					43	
		Women by cluster: Mintini	F	NS-50.99	69								50.8	98.3					44	
		Women by cluster: Utange	F	NS-50.99	37								45.9	100.0					45	
		Women by cluster: Korkora	F	NS-50.99	60								11.7	86.7					46	
		PW by trimester: 1st trimester	F	15.00-50.99	56									46.4						
		PW by trimester: 2nd trimester	F	15.00-50.99	69									72.4						
		PW by trimester: 3rd trimester	F	15.00-50.99	79									76.0						
		Men by cluster: Osiri	M	15.00-50.99	19								21.1	42.2					47	
		Men by cluster: Kandiang'a	M	15.00-50.99	29								13.8	62.1					48	
		Men by cluster: Sisenye	M	15.00-50.99	37								16.2	70.3					49	
		Men by cluster: Nakhwana	M	15.00-50.99	55								3.6	45.4					50	
		Men by cluster: Misikhu	M	15.00-50.99	20								0.0	35.0					51	
		Men by cluster: Mwamosioma	M	15.00-50.99	31								0.0	25.8					52	
		Men by cluster: Birongo	M	15.00-50.99	21								4.8	14.3					53	
		Men by cluster: Sirwet	M	15.00-50.99	41								0.0	14.6					54	
		Men by cluster: Ruii	M	15.00-50.99	12								0.0	16.7					55	
		Men by cluster: Njabini	M	15.00-50.99	5								0.0	20.0					56	
		Men by cluster: Kibaranyaki	M	15.00-50.99	33								0.0	21.2					57	
		Men by cluster: Ng'aratuko	M	15.00-50.99	39								0.0	15.4					58	
		Men by cluster: Kibureni	M	15.00-50.99	34								0.0	35.3					59	

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						Current XN	Previous XN	X1B	X2	X3A	X3B	XS	Prevalence (%)				Mean	SD	General	Line	
													<0.35	<0.70	< 1.05						
N	1999	Men by cluster: Kyatune	M	15.00-50.99	53								0.0	30.2			3442		60		
		Men by cluster: Wii (Kit)	M	15.00-50.99	49								2.0	22.4				61			
		Men by cluster: Elan	M	15.00-50.99	4								0.0	100.0				62			
		Men by cluster: Kikoneni	M	15.00-50.99	36								26.9	80.7				63			
		Men by cluster: Kifyonzo	M	15.00-50.99	24								0.0	37.5				64			
		Men by cluster: Miritini	M	15.00-50.99	27								11.1	85.2				65			
		Men by cluster: Utange	M	15.00-50.99	47								8.5	87.2				66			
		Men by cluster: Korkora	M	15.00-50.99	12								8.3	66.6				67			
L	1998 -2000	Mombasa: Women	F	18.00-42.99	200								6.0	29.0	1.28		4184	*			
LR	1998 -1999	Kokwet rural community: LW	F	15.00-45.99	62								45.2		0.69	0.26	5038	*	68		
L	1998	Kyeni South: SAC	B	6.00-14.99	442							22.0	90.6				4123	*	69		
N	1994	National: Pre-SAC: Total	B	0.50-6.07	6425				0.10			0.10						1967	*	70	
		Pre-SAC by sex	F	0.50-6.07	3127				0.10			0.10								71	
		Pre-SAC by sex	M	0.50-6.07	3298				0.10			0.10									72
		National: Pre-SAC: Total	B	0.50-6.07	6425								7.7	40.6	0.84	0.58					
		Pre-SAC by sex	F	0.50-6.07	3127								8.2	40.9	0.87	0.65					
		Pre-SAC by sex	M	0.50-6.07	3298								9.2	45.2	0.82	0.51					
		Pre-SAC by age	B	0.50-0.99	NS								11.2	61.9							
		Pre-SAC by age	B	1.00-1.99	NS								9.6	44.5							
		Pre-SAC by age	B	2.00-2.99	NS								8.4	43.1							
		Pre-SAC by age	B	3.00-3.99	NS								7.6	43.0							
		Pre-SAC by age	B	4.00-4.99	NS								6.9	43.5							
		Pre-SAC by age	B	5.00-6.07	NS								6.8	38.1							
		Pre-SAC by district: Baringo	B	0.50-6.07	NS								4.0	37.1							
		Pre-SAC by district: Bungoma	B	0.50-6.07	NS								18.4	56.2							
		Pre-SAC by district: Garisa	B	0.50-6.07	NS								3.8	61.4							
		Pre-SAC by district: Kiambu	B	0.50-6.07	NS								0.9	22.3							
		Pre-SAC by district: Kisii	B	0.50-6.07	NS								21.5	62.4							
		Pre-SAC by district: Kisumu	B	0.50-6.07	NS								13.4	61.7							
		Pre-SAC by district: Kitiui	B	0.50-6.07	NS								4.6	35.1							
		Pre-SAC by district: Kwale	B	0.50-6.07	NS								8.4	42.3							
Pre-SAC by district: Mandera	B	0.50-6.07	NS								5.3	48.1									
Pre-SAC by district: Meru	B	0.50-6.07	NS								0.6	16.2									
Pre-SAC by district: Mombasa	B	0.50-6.07	NS								10.6	47.2									

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						Current XN	Previous XN	X1B	X2	X3A	X3B	XS	Prevalence (%)			Mean		SD	General	Line
													<0.35	<0.70	< 1.05					
N	1994	<i>Pre-SAC by district: Nakuru</i>	<i>B</i>	<i>0.50-6.07</i>	<i>NS</i>								<i>0.8</i>	<i>18.4</i>				1967		
		<i>Pre-SAC by district: Nyeri</i>	<i>B</i>	<i>0.50-6.07</i>	<i>NS</i>								<i>0.9</i>	<i>13.2</i>						
		<i>Pre-SAC by district: S. Nyanza</i>	<i>B</i>	<i>0.50-6.07</i>	<i>NS</i>								<i>12.8</i>	<i>57.4</i>						
D	1990P	Turkana district: All: Total	B	0.00-NS	900													1628	*	73
		Pre-SAC by age	B	0.00-4.99	150															74
		SAC by age	B	5.00-9.99	97															75
		SAC by age	B	10.00-14.99	126															76
		Adults by age	B	15.00-24.99	137															77
		Adults by age	B	25.00-34.99	237															78
		Adults by age	B	35.00-44.99	79															79
		Adults by age	B	45.00-54.99	42															80
		Adults by age	B	55.00-64.99	22															81
		Adults by age	B	65.00-74.99	7															82
		Adults by age	B	75.00-NS	3															83

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Reference No: 4106

General notes: *Sample comprised of children from Mathare, slum area in Nairobi and Tiva/Ithiani of Kitui.*

Reference No: 3442

General notes: *National survey, data collected from 21 clusters drawn from 12 districts that represent dominant ecological-altitude zones in the country. Districts included: Nyando, Kisumu, Busia, Kisii, Bungoma, Nyandarua, Meru, Baringo, Kitui, Mombasa, Kwale and Garissa. Separate facility-based study for pre-SAC from the area of Kibera, Nairobi included. Serum retinol concentrations converted from $\mu\text{g}/\text{mL}$ to $\mu\text{mol}/\text{L}$*

Note 1 Geometric mean: 0.46 $\mu\text{mol}/\text{L}$

Note 2 Geometric mean: 0.66 $\mu\text{mol}/\text{L}$

Note 3 Geometric mean: 0.75 $\mu\text{mol}/\text{L}$

Note 4 Geometric mean: 0.55 (SD 0.25) $\mu\text{mol}/\text{L}$, median: 0.51 $\mu\text{mol}/\text{L}$

Note 5 Kisumu district. Geometric mean: 0.39 $\mu\text{mol}/\text{L}$

Note 6 Nyando district. Geometric mean: 0.40 $\mu\text{mol}/\text{L}$

Note 7 Busia district. Geometric mean: 0.44 $\mu\text{mol}/\text{L}$

Note 8 Bungoma district. Geometric mean: 0.36 $\mu\text{mol}/\text{L}$

Note 9 Bungoma district. Geometric mean: 0.35 $\mu\text{mol}/\text{L}$

Note 10 Kisii district. Geometric mean: 0.48 $\mu\text{mol}/\text{L}$

Note 11 Kisii district. Geometric mean: 0.49 $\mu\text{mol}/\text{L}$

Note 12 Baringo district. Geometric mean: 0.57 $\mu\text{mol}/\text{L}$

Note 13 Nyandarua district. Geometric mean: 0.62 $\mu\text{mol}/\text{L}$

Note 14 Nyandarua district. Geometric mean: 0.53 $\mu\text{mol}/\text{L}$

Note 15 Meru district. Geometric mean: 0.62 $\mu\text{mol}/\text{L}$

Note 16 Baringo district. Geometric mean: 0.59 $\mu\text{mol}/\text{L}$

Note 17 Meru district. Geometric mean: 0.48 $\mu\text{mol}/\text{L}$

Note 18 Kitui district. Geometric mean: 0.63 $\mu\text{mol}/\text{L}$

Note 19 Kitui district. Geometric mean: 0.73 $\mu\text{mol}/\text{L}$

Note 20 Garissa district. Geometric mean: 0.53 $\mu\text{mol}/\text{L}$

Note 21 Kwale district. Geometric mean: 0.31 $\mu\text{mol}/\text{L}$

Note 22 Kwale district. Geometric mean: 0.49 $\mu\text{mol}/\text{L}$

Note 23 Mombasa district. Geometric mean: 0.22 $\mu\text{mol}/\text{L}$

Note 24 Mombasa district. Geometric mean: 0.26 $\mu\text{mol}/\text{L}$

Note 25 Garissa district. Geometric mean: 0.41 $\mu\text{mol}/\text{L}$

Note 26 Kisumu district. Geometric mean: 0.56 $\mu\text{mol}/\text{L}$

Note 27 Nyando district. Geometric mean: 0.55 $\mu\text{mol}/\text{L}$

Note 28 Busia district. Geometric mean: 0.66 $\mu\text{mol}/\text{L}$

Note 29 Bungoma district. Geometric mean: 0.63 $\mu\text{mol}/\text{L}$

Note 30 Bungoma district. Geometric mean: 0.63 $\mu\text{mol}/\text{L}$

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Note 31	Kisumu district. Geometric mean: 0.71 µmol/L
Note 32	Kisumu district. Geometric mean: 0.75 µmol/L
Note 33	Baringo district. Geometric mean: 0.76 µmol/L
Note 34	Nyando district. Geometric mean: 0.92 µmol/L
Note 35	Nyando district. Geometric mean: 0.82 µmol/L
Note 36	Meru district. Geometric mean: 0.95 µmol/L
Note 37	Baringo district. Geometric mean: 0.84 µmol/L
Note 38	Meru district. Geometric mean: 0.75 µmol/L
Note 39	Kitui district. Geometric mean: 0.90 µmol/L
Note 40	Kitui district. Geometric mean: 0.92 µmol/L
Note 41	Garissa district. Geometric mean: 0.56 µmol/L
Note 42	Kwale district. Geometric mean: 0.44 µmol/L
Note 43	Kwale district. Geometric mean: 0.63 µmol/L
Note 44	Mombasa district. Geometric mean: 0.31 µmol/L
Note 45	Mombasa district. Geometric mean: 0.32 µmol/L
Note 46	Garissa district. Geometric mean: 0.49 µmol/L
Note 47	Kisumu district. Geometric mean: 0.66 µmol/L
Note 48	Nyando district. Geometric mean: 0.61 µmol/L
Note 49	Busia district. Geometric mean: 0.54 µmol/L
Note 50	Bungoma district. Geometric mean: 0.73 µmol/L
Note 51	Bungoma district. Geometric mean: 0.92 µmol/L
Note 52	Kisumu district. Geometric mean: 0.86 µmol/L
Note 53	Kisumu district. Geometric mean: 1.02 µmol/L
Note 54	Baringo district. Geometric mean: 1.07 µmol/L
Note 55	Nyando district. Geometric mean: 0.95 µmol/L
Note 56	Nyando district. Geometric mean: 0.88 µmol/L
Note 57	Meru district. Geometric mean: 0.92 µmol/L
Note 58	Baringo district. Geometric mean: 0.95 µmol/L
Note 59	Meru district. Geometric mean: 0.80 µmol/L
Note 60	Kitui district. Geometric mean: 0.84 µmol/L
Note 61	Kitui district. Geometric mean: 0.88 µmol/L
Note 62	Garissa district. Geometric mean: 0.57 µmol/L
Note 63	Kwale district. Geometric mean: 0.44 µmol/L
Note 64	Kwale district. Geometric mean: 0.75 µmol/L
Note 65	Mombasa district. Geometric mean: 0.49 µmol/L
Note 66	Monbasa district. Geometric mean: 0.49 µmol/L
Note 67	Garissa district. Geometric mean: 0.60 µmol/L

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Reference No: 4184

General notes: *Sample comprised of randomly selected women (HIV-1-seronegative) attending outpatient clinics at Coast Provincial General Hospital in Mombasa. Data on HIV-1-seropositive women not included in the database.*

Reference No: 5038

General notes: *Sample comprised of LW from 7 villages in Kokwet, a rural community located in Nandi district. Same survey reported in reference No. 4379 (sample size 69).*

Note 68 SR <0.07 µmol/L: 50.7%

Reference No: 4123

General notes: *Facility based survey (12 schools, Kyeni South) in Embu district.*

Note 69 Median: 0.45 µmol/L, plasma retinol interquartile range: 0.36-0.58 umol/L

Reference No: 1967

General notes: *Multi-stage cluster sampling. Nairobi not included. Same survey reported in reference No. 47.*

Note 70 Combined prevalence (X1A, X1B): 1.00%

Note 71 Combined prevalence (X1A, X1B): 0.70%

Note 72 Combined prevalence (X1A, X1B): 1.40%

Reference No: 1628

General notes: *Sample comprised of subjects from the Turkana Tribe, from 10 different sites in the Turkana district, north-west, Kenya.*

Note 73 Total xerophtahalmia (XN and/or X1B) prevalence: 4.40%

Note 74 Total xerophtahalmia (XN and/or X1B) prevalence: 0.70%

Note 75 Total xerophtahalmia (XN and/or X1B) prevalence: 0.00%

Note 76 Total xerophtahalmia (XN and/or X1B) prevalence: 4.80%

Note 77 Total xerophtahalmia (XN and/or X1B) prevalence: 13.10%

Note 78 Total xerophtahalmia (XN and/or X1B) prevalence: 3.80%

Note 79 Total xerophtahalmia (XN and/or X1B) prevalence: 6.30%

Note 80 Total xerophtahalmia (XN and/or X1B) prevalence: 2.40%

Note 81 Total xerophtahalmia (XN and/or X1B) prevalence: 0.00%

Note 82 Total xerophtahalmia (XN and/or X1B) prevalence: 0.00%

Note 83 Total xerophtahalmia (XN and/or X1B) prevalence: 0.00%

REFERENCES

KENYA

- Reference 1628** Loewenthal R, Pe'er J. A prevalence survey of ophthalmic diseases among the Turkana tribe in north-west Kenya. *British Journal of Ophthalmology*, 1990, 74 :84-88.
- Reference 1967** Ngare DK, Muttunga JN, Njonge E. Vitamin A deficiency in pre-school in children in Kenya. *East African Medical Journal*, 2000, 77 :421-424.
- Reference 3442** Mwaniki DL, Omwega AM, Muniu EM, Mutunga JN, Akelola R, Shako BR, Gotink MH, Pertet AM. Anaemia and status of iron, vitamin A and zinc in Kenya. The 1999 National Survey. Nairobi, Ministry of Health, 2002.
- Reference 4106** Munene RM, Adala HS, Masinde MS, Rana FS. Vitamin A deficiency among Kenyan children as detected by conjunctival impression cytology. *East African Medical Journal*, 2003, 80 :476-479.
- Reference 4123** Siekmann JH, Allen LH, Bwibo NO, Demment MW, Murphy SP, Neumann CG. Kenyan school children have multiple micronutrient deficiencies, but increased plasma vitamin B-12 is the only detectable micronutrient response to meat or milk supplementation. *Journal of Nutrition*, 2003, 133 (11 Suppl 2):3972S-3980S.
- Reference 4184** Baeten JM, Richardson BA, Bankson DD, Wener MH, Kreiss JK, Lavreys L, Mandaliya K, Bwayo JJ, McClelland RS. Use of serum retinol-binding protein for prediction of vitamin A deficiency: effects of HIV-1 infection, protein malnutrition, and the acute phase response. *American Journal of Clinical Nutrition*, 2004, 79 :218-225.
- Reference 5038** Bharati P, Ghosh R, Gupta R. Socioeconomic condition and anaemia among the Mahishya population of southern West Bengal, India. *Malaysian Journal of Nutrition*, 2004, 10 :23-30.

ADDITIONAL REFERENCES

KENYA

- Reference 5 Sauter JJM. Xerophthalmia and measles in Kenya [dissertation]. Documenta Ophthalmologica. Advances in Ophthalmology, 1976, 42 :1-235.
- Reference 6 Ministry of Health. Summary of 8 ocular disease prevalence surveys between 1976 and 1981. Nairobi, 1983.
- Reference 47 UNICEF [Kenya]. Vitamin A deficiency in Kenya - a report of the National Micronutrients Survey. Government of Kenya, 1995.
- Reference 106 [Anonymous]. Country assessment prepared for 'Ending Hidden Hunger', Kenya. A Policy Conference on Micronutrient Malnutrition;1991 Oct 10-12; Montreal, Canada. Atlanta, Task Force for Child Survival and Development, 1991.
- Reference 217 Steinkuller PG. Nutritional blindness in Africa. Social Science & Medicine (1982), 1983, 17 :1715-1721.
- Reference 1627 Central Bureau of Statistics, Ministry of Planning and National Development. Fourth Rural Child Nutrition Survey 1987. Nairobi, 1991.
- Reference 2062 Jansen AAJ, Horelli HT. Vitamin A deficiency in Kenya past and present. East African Medical Journal, 1982, 59 :107-112.
- Reference 3025 Kusin JA, Van Rens MM, Lakhani S, Jansen AA. Vitamin A status of pregnant and lactating women as assessed by serum levels in Machakos area, Kenya. East African Medical Journal, 1985, 62 :476-479.
- Reference 3975 International Rescue Committee, UNHCR, Centre for International Child Health, Institute of Child Health. Anthropometric and Micronutrient Nutrition Survey, Kakuma refugee camp, NW Kenya, 22 March-12 April 2001. London, UK, Institute of Child Health, 2001
- Reference 4122 Neumann CG, Bwibo NO, Murphy SP, Sigman M, Whaley S, Allen LH, Guthrie D, Weiss RE, Demment MW. Animal source foods improve dietary quality, micronutrient status, growth and cognitive function in Kenyan school children: background, study design and baseline findings. Journal of Nutrition, 2003, 133 (11 Suppl 2):3941S-3949S.
- Reference 4379 Etyang GA, van Marken Lichtenbelt WD, Oloo A, Saris WHM. Serum retinol, iron status and body composition of lactating women in Nandi, Kenya. Annals of Nutrition & Metabolism, 2003, 47 :276-283.
- Reference 4947 Central Bureau of Statistics [Kenya], Ministry of Health [Kenya], Kenya Medical Research Institute, National Council for Population and Development [Kenya], ORC Macro, Centers for Disease, Control and Prevention [Kenya]. Kenya Demographic and Health Survey 2003. Calverton, MD, ORC Macro, 2004.
- Reference 5058 Etyang G, Oloo A, van Marken Lichtenbelt W, Saris W. Consumption of vitamin A by breastfeeding children in rural Kenya. Food and Nutrition Bulletin, 2004, 25 :256-263.