PART 3

RESULTS AND DISCUSSION

CHAPTER 7

QUANTITATIVE RESEARCH RESULTS

PART 3 RESULTS AND DISCUSSION

Chapter 7 will deal with the quantitative results and Chapter 8 and 9 will deal with the qualitative results. The recommendations and conclusions will be presented in Chapter 10. The quantitative and qualitative results on the two clinics will be presented and discussed comparatively. Due to assumed socio-economic differences the two clinics (Makapanstad and Mathibestad) were chosen. Both were non-urban areas situated in the Moretele district in the Hammanskraal area outside Pretoria. The Mathibestad area clinic was approximately 30 kilometres outside the Hammanskraal town area and the Makapanstad area clinic was situated approximately 10 kilometres further in the more rural area of the same district.

CHAPTER 7 QUANTITATIVE RESEARCH RESULTS

"We have to interpret our data in order to analyse it. But analysis can go beyond interpretation. We can try to create conceptual tools to classify and compare the important or essential features of the phenomena we are studying. This involves a process of abstracting from the immense detail and complexity of our data those features which are most salient for our purpose" (Dey, 1993:94)(92).

7.1 DESCRIPTION OF THE STUDY GROUP

The study group consisted of two groups of children (N=174), aged naught to 36 months of age , from two different clinics in the Moretele district / Hammanskraal area. The chosen clinics were the Makapanstad clinic (n = 85) and the Mathibestad clinic (n = 89) respectively. The children were allocated to different study subgroups according to their ages. Six age categories were identified according to the set phases (10) where diet changes typically occur, namely:

Group 1: 0-3 months (exclusive breast feeding)
Group 2: 3-6 months (breast feeding and grains)
Group 3: 6-9 months (breast feeding, grains, soft fruits and vegetables)
Group 4: 9-12 months (breast feeding, grains, soft fruits and vegetables and meat)
Group 5: 12-24 months (breast feeding (supplement) and regular solid food)
Group 6: 24-36 months (no breast feeding, only solid food)

7.1.1 AGE, GENDER AND ETHNICITY

The age, ethnicity and sex of children in the study group are compared in Tables 28 - 33. In all the age groups (in both clinics) the most common ethnic group was the Tswana's, with a representation of at least 58.3% in each of the age categories and 71.3% (n = 124) of the total group. In most of the age groups there were more girls than boys; in the total study group 42% (n=73) were boys and 58% (n=101) were girls.

TABLE 28: ETHNICITY AND GENDER OF CHILDREN (n=30) IN THE AGE GROUP 0-3 MONTHS

AGE CATEGORY: 0-3 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=13)		MATHIBESTAD (n=17)		TOTAL (n=30)	
		n	%	n	%	n	%
ETHNICITY	Tswana	10	76.9	10	58.8	20	66.7
	Northern-Sotho	0	0	0	0	0	0
	Venda	0	0	0	0	0	0
	Southern-Sotho	0	0	0	0	0	0
	Pedi	1	7.7	0	0	1	3.3
	Xhosa	1	7.7	0	0	1	3.3
	Shangaan	1	7.7	6	35.3	7	23.3
	Zulu	0	0	0	0	0	0
	Ndebele	0	0	1	5.9	1	3.3
GENDER	Boys	7	53.8	7	41.2	14	46.7
	Girls	6	46.2	10	58.8	16	53.3

TABLE 29: ETHNICITY AND GENDER OF CHILDREN (n=25) IN THE AGE GROUP 3.1 - 6 MONTHS

AGE CATEGORY: 3.1-6 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=13)		MATHIBESTAD (n=12)		TOTAL (n=25)	
		n	%	n	%	n	%
ETHNICITY	Tswana	9	69.2	7	58.3	16	64.0
	Northern-Sotho	1	7.7	0	0	1	4.0
	Venda	1	7.7	0	0	1	4.0
	Southern-Sotho	0	0	0	0	0	0
	Pedi	1	7.7	3	25.0	4	16.0
	Xhosa	0	0	0	0	0	0
	Shangaan	0	0	1	8.3	1	4.0
	Zulu	0	0	1	8.3	1	4.0
	Ndebele	1	7.7	0	0	1	4.0
GENDER	Boys	5	38.5	7	58.3	12	48.0
	Girls	8	61.5	5	41.7	13	52.0

TABLE 30: ETHNICITY AND GENDER OF CHILDREN (n=30) IN THE AGE GROUP 6.1 - 9 MONTHS

AGE CATEGORY: 6.1-9 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=16)		MATHIBESTAD (n=14)		TOTAL (n=30)	
		n	%	n	%	n	%
ETHNICITY	Tswana	12	75.0	12	85.7	24	80.0
	Northern-Sotho	0	0	1	7.1	1	3.3
	Venda	0	0	0	0	0	0
	Southern-Sotho	0	0	0	0	0	0
	Pedi	1	6.3	1	7.1	2	6.7
	Xhosa	0	0	0	0	0	0
	Shangaan	2	12.5	0	0	2	6.7
	Zulu	0	0	0	0	0	0
	Ndebele	1	6.3	0	0	1	3.3
GENDER	Boys	9	56.3	6	42.9	15	50.0
	Girls	7	43.7	8	57.1	15	50.0

TABLE 31: ETHNICITY AND GENDER OF CHILDREN (n=27) IN THE AGE GROUP 9.1 - 12 MONTHS

AGE CATEGORY: 9.1-12 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=11)		MATHIBESTAD (n=16)		TOTAL (n=27)	
		n	%	n	%	n	%
ETHNICITY	Tswana	8	72.7	10	62.5	18	66.7
	Northern-Sotho	0	0	1	6.3	1	3.7
	Venda	0	0	0	0	0	0
	Southern-Sotho	0	0	1	6.3	1	3.7
	Pedi	0	0	1	6.3	1	3.7
	Xhosa	0	0	0	0	0	0
	Shangaan	2	18.2	2	12.5	4	14.8
	Zulu	0	0	1	6.3	1	3.7
	Ndebele	1	9.1	0	0	1	3.7
GENDER	Boys	4	36.4	6	37.5	10	37.0
	Girls	7	63.6	10	62.5	17	63.0

TABLE 32: ETHNICITY AND GENDER OF CHILDREN (n=37) IN THE AGE GROUP 12.1 - 24 MONTHS

AGE CATEGORY: 12.1-24 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=20)		MATHIBESTAD (n=17)		TOTAL (n=37)	
		n	%	n	%	n	%
ETHNICITY	Tswana	18	90.0	13	76.5	31	83.8
	Northern-Sotho	2	10.0	2	11.8	4	10.8
	Venda	0	0	0	0	0	0
	Southern-Sotho	0	0	0	0	0	0
	Pedi	0	0	0	0	0	0
	Xhosa	0	0	0	0	0	0
	Shangaan	0	0	2	11.8	2	5.4
	Zulu	0	0	0	0	0	0
	Ndebele	0	0	0	0	0	0
GENDER	Boys	10	50.0	3	17.6	13	35.1
	Girls	10	50.0	14	82.4	24	64.9

TABLE 33: ETHNICITY AND GENDER OF CHILDREN (n=25) IN THE AGE GROUP 24.1 - 36 MONTHS

AGE CATEGORY: 24.1-36 MONTHS							
		CLINICS					
		MAKAPANSTAD (n=12)		MATHIBESTAD (n=13)		TOTAL (n=25)	
		n	%	n	%	n	%
ETHNICITY	Tswana	7	58.3	8	61.5	7	60.0
	Northern-Sotho	3	25.0	1	7.7	4	16.0
	Venda	0	0	0	0	0	0
	Southern-Sotho	0	0	0	0	0	0
	Pedi	2	16.7	0	0	2	8.0
	Xhosa	0	0	0	0	0	0
	Shangaan	0	0	4	30.8	4	16.0
	Zulu	0	0	0	0	0	0
	Ndebele	0	0	0	0	0	0
GENDER	Boys	5	41.7	4	30.8	9	36.0
	Girls	7	58.3	9	69.2	16	64.0

7.1.2 ADULT RESPONSIBLE FOR THE CHILD

The children in the study group were most often accompanied by their own mothers (see Table 34).

TABLE 34: COMPARISON OF THE DIFFERENT ESCORTS OF THE CHILDREN IN THE VARIOUS AGE GROUPS (N=174) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		ESCORT OF THE CHILD (N=174)							
		MOTHERS		TOTAL MOTHERS		CAREGIVERS		TOTAL CAREGIVERS	
		n	%	n	%	n	%	n	%
0 - 3	*n=13 #n=17	13 16	100.0 94.1	29	96.7	0 1	0.0 5.9	1	3.3
3.1 - 6	n=13 n=12	13 10	100.0 83.3	23	92.0	0 2	0 16.7	2	8.0
6.1 - 9	n=16 n=14	14 12	87.5 85.7	26	86.7	2 2	12.5 14.3	4	13.3
9.1 - 12	n=11 n=16	9 13	81.8 81.3	22	81.5	2 3	18.2 18.7	5	18.5
12.1 - 24	n=20 n=17	18 12	90.0 70.6	30	81.1	2 5	10.0 29.4	7	18.9
24.1 - 36	n=12 n=13	8 10	66.7 76.9	18	72.0	4 3	33.3 23.1	7	28.0
TOTAL				148	85.1			26	14.9

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD #MATHIBESTAD

The results showed that most mothers (85.1%,n=148) took their own children to the clinic. Most of the children (73.1%, n=19) who went with caregivers were from the older age groups (from nine months to three years), and few of the young babies (26.9%, n=7) (from naught to nine months) went with caregivers.

TABLE 35: COMPARISON OF THE DIFFERENT PERSONS RESPONSIBLE FOR CARING OF THE CHILDREN IN THE VARIOUS AGE GROUPS (N=174) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		PERSONS INVOLVED IN CHILD CARE (N=174)					
		MOTHER	FAMILY MEMBERS				INDEPENDENT CAREGIVERS
			GRANDMOTHER	BROTHER	SISTER	OTHER ADULT	
0 - 3	*n=13 #n=17	11 16	1 0	0 0	0 0	1 0	0 1
3.1 - 6	n=13 n=12	12 9	0 2	0 0	0 1	1 0	0 0
6.1 - 9	n=16 n=14	13 11	2 2	0 0	0 0	1 0	0 1
9.1 - 12	n=11 n=16	10 12	0 1	0 1	0 1	1 1	0 0
12.1 - 24	n=20 n=17	16 11	2 4	0 0	0 0	2 1	0 1
24.1 - 36	n=12 n=13	8 9	3 3	0 0	0 0	0 1	1 0
TOTAL PER CLINIC	n=85 n=89	70 68	8 12	0 1	0 2	6 3	1 3
TOTAL GROUP	N=174 %	138 79.3	20 11.5	1 0.6	2 1.1	9 5.2	4 2.3

DIFFERENTIATED BY CLINIC : *MAKAPANSTAD #MATHIBESTAD

The person responsible for taking care (feeds, dresses, baths, etc.) of the child, is shown in Table 35. Similar to the escort of the children, the persons taking care of the children were mostly their own mothers (79.3%, n=138). No fathers were involved in the caring of children. Caregivers usually were other family members, mostly grandmothers (n=20, 11.5%). Very few independent caregivers (2.3%, n=4) were involved in child care.

7.1.3 FEEDING PRACTICES

The types of feeds that each child received at the time of the research are reported in Table 36.

TABLE 36: COMPARISON OF THE DIFFERENT FEEDS IN THE VARIOUS AGE GROUPS (N=174) IN THE TWO CLINICS

TYPE OF FEED	CLINICS AND AGE CATEGORIES (months)												
	MAKAPANSTAD (n = 85)						MATHIBESTAD (n = 89)						TOT (N = 174)
	0-3 n=13	3.1-6 n=13	6.1-9 n=16	9.1-12 n=11	12.1-24 n=20	24+ n=12	0-3 n=17	3.1-6 n=12	6.1-9 n=14	9.1-12 n=16	12.1-24 n=17	24+ n=13	
EXCLUSIVE BF	7	0	1	0	0	0	10	0	0	0	0	0	18 *10.4%*
BF + BT	2	0	0	0	0	0	0	1	0	0	0	0	3 *1.7%*
EXCLUSIVE BT	0	0	0	0	0	0	0	0	0	0	0	0	0 *0%*
BF + SF	4	5	12	8	13	0	6	8	7	14	5	0	82 *47.1%*
BT + SF	0	1	0	1	4	0	0	1	1	1	5	0	14 *8.1%*
BF + BT+ SF	0	7	3	2	2	0	1	2	6	1	3	0	27 *15.5%*
SF + CM	0	0	0	0	0	9	0	0	0	0	2	0	11 *6.3%*
SF	0	0	0	0	1	3	0	0	0	0	2	13	19 *10.9%*

BF = breast feeding BT = bottle feeding SF = solid food CM = cow's milk in a mug

The type of feed reported most frequently in both clinics was breast feeding with solid food (49.4%, n=42 in Makapanstad and 44.9%, n=40 in Mathibestad). Feeding practices least reported in both clinics was that of exclusive bottle feeding (0%, n=174). In the study as a whole (74.7%, n=130) of all the children were still being breast fed at the time of the research and 25.3% (n=44) received bottle feeding in some form. Exclusive breast feeding was only reported in the 0-3/12 age category and by one group in the 7-9/12 category. If exclusive breast feeding was not practised in the 0-3/12 age group, breast feeding was usually combined with solid food (n=10) and only one group reported combining it with bottle feeding. A combination of breast feeding and bottle feeding was seldomly used (n=3, 1.7%) and only in the 0-3/12 and 4-6/12 age groups. Bottle feeding, combined with solid food, was also not very commonly used, and if at all, only in the children older than three months. The combination of breast feeding, bottle feeding and solid food was the second most popular feeding regime used in these communities, occurring in all the age categories, except the 25-36/12 group who obviously did not need bottle feeding any more. Solid food alone

or combined with cow's milk was only given in the older age groups; mainly in the 25-36/12 groups (n=25).

The types of milk used as part of bottle feeding is presented in Table 37. Formula feeds were most popular among mothers practising bottle feeding (74.4%; n=32).

TABLE 37: COMPARISON OF THE DIFFERENT BOTTLE FEEDING PRACTICES OF THE CHILDREN IN THE VARIOUS AGE GROUPS (N=174) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		TYPE OF BOTTLE MILK		
		FORMULA n=15* n=17#	OTHER POWDER MILK n=6* n=4#	FRESH COW'S MILK n=1* n=0#
0 - 3	*n=13 *#n=17*	2 *1*	0 *0*	0 *0*
3.1 - 6	n=13 *n=12*	8 *4*	0 *0*	0 *0*
6.1 - 9	n=16 *n=14*	2 *6*	1 *1*	0 *0*
9.1 - 12	n=11 *n=16*	2 *1*	1 *0*	0 *0*
12.1 - 24	n=20 *n=17*	1 *5*	4 *3*	1 *0*
24.1 - 36	n=12 *n=13*	0 *0*	0 *0*	0 *0*
TOTAL: %	n=85 *n=89*	68.2 *81.0*	27.3 *19.0*	4.5 *0*

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD *#MATHIBESTAD*

TABLE 38: COMPARISON OF THE DIFFERENT AGES FOR INTRODUCTION OF SOLID FOOD IN THE TWO CLINICS (N=154)

AGE FOR SOLID FOOD INTRODUCTION	CLINICS					
	MAKAPANSTAD (n=76)		MATHIBESTAD (n=78)		BOTH (n=154)	
	n	%	n	%	n	%
1 - 2 months	22	29.0	11	14.1	33	21.4
3 months	41	54.0	60	76.9	101	65.6
4 months	13	17.0	4	5.1	17	11.0
5 months	0	0	1	1.3	1	0.7
6 months	0	0	2	2.6	2	1.3

The introduction of solid food in the diets of the children occurred at a fairly early age (Table 38). Solid foods were introduced to the largest part of the study group (87%, n=134) before the recommended age of four to six months. Only 13% (n=20) started on solid foods at the recommended age. By four months of age most of the children in this study group (98.1%, n=151) were already eating solid food. The reasons mentioned most frequently for the introduction of solid foods were that the mother did not have enough milk to satisfy the baby (45.8%, n=70), that the baby was crying (22.9%, n=35), and that the mother did not cope

well with breast feeding (13.1%, n=20). Crying as such is not a reason for solid food introduction, but it could be interpreted as the mother not having enough milk. When asked to explain the mothers replied that the baby cried a lot when breast fed. They assumed that the breast milk alone appeared not to satisfy the hunger and therefore they introduced solid food into the child's diet to complement the breast feeding. When this was done, the child usually cried less and the problem was solved. If this line of thought is pursued, the number of mothers / caregivers indicating the reason of not having enough milk, increased to 68.6% (n=105). Other reasons mentioned less often included that the child was old enough (2.0%); the child refused the breast (0.7%); the mother had to go back to school (5.9%); a sick mother (5.2%); the mother had to go back to work (5.2%); cultural reasons (0.7%); the mother was working with sick people that contaminated her milk (0.7%); and no specific reason (1.7%).

7.1.4 BIOGRAPHIC PROFILE OF THE MOTHER

The age distribution of the mothers of the children in the study group is presented in Table 39.

TABLE 39: COMPARISON OF THE AGE DISTRIBUTION OF MOTHERS AND THEIR CHILDREN IN THE VARIOUS AGE GROUPS (N=173) IN THE TWO CLINICS

AGE CATEGORIES OF MOTHERS (YEARS)	AGE CATEGORIES OF CHILDREN (MONTHS)													
	0-3		3.1-6		6.1-9		9.1-12		12.1-24		24.1-36		TOTAL	
	n	%	n	%	n	%	n	%	n	%	n	%	N=173	%
< 20	*8 #1	61.5 5.9	5 0	38.4 0	3 3	18.8 21.4	0 2	0 12.5	7 3	35.0 17.6	0 0	0 0	23 9	13.29 5.20
20-24	2 8	15.4 47.1	2 4	15.4 33.3	2 3	12.5 21.4	4 6	36.4 37.5	4 6	20.0 35.3	2 7	16.7 53.8	16 34	9.25 19.65
25-29	1 3	7.7 17.7	3 5	23.1 41.7	5 2	31.2 14.3	4 3	36.4 18.8	4 5	20.0 29.4	2 4	16.7 30.8	19 22	10.98 12.72
30-34	1 1	7.7 5.9	1 2	7.7 16.7	2 1	12.5 7.1	1 2	9.1 12.5	3 0	15.0 0	2 1	16.7 7.7	10 7	5.78 4.05
> 34	1 4	7.7 23.5	2 1	15.4 8.3	4 5	25.0 35.7	2 3	18.2 18.8	2 2	10.0 11.8	6 1	50.0 7.7	17 16	9.83 9.25

DIFFERENTIATED BY CLINIC : * MAKAPANSTAD # *MATHIBESTAD*

Most of the very young mothers (<20 years) were from the Makapanstad area and most of the mothers aged 20-24 years were from the Mathibestad area. If these two age categories are considered together, the number of mothers involved from each of the two clinics were approximately the same (Makapanstad area: 22.54%,n=39 versus Mathibestad area: 24.85%, n=43). In each of the older age categories of mothers (25-29, 30-34, >34 years) an equal number of mothers were involved from each of the two clinics (see Table 39). Most of the mothers of the children in the study group were younger than 30 years (71.1%, n=123). None of the mothers that were younger than 20 years (n=32) had any children in the 24 - 36 month age category. Quite a number of them (31.3%, n=10) though had children between 12 - 24 months, indicating that some were pregnant as young as 18 years of age. The parity of the mothers is compared between clinics in Table 40.

TABLE 40: COMPARISON BETWEEN THE TWO CLINICS OF THE POSITION OF THE STUDIED CHILD (N=174) RELATIVE TO SIBLING AGES

	CLINICS					
	MAKAPAN-STAD		MATHIBE-STAD		TOTAL	
	n	%	n	%	N	%
STUDIED CHILD'S POSITION	**n=85**		**n=89**		**n=174**	
First	36	42.35	38	42.70	74	42.53
Second	22	25.88	31	34.83	53	30.46
Third	11	12.94	8	8.99	19	10.92
Fourth	6	7.06	9	10.11	15	8.62
Fifth	3	3.53	1	1.12	4	2.30
Sixth	7	8.24	2	2.25	9	5.17
THE OLDER CHILD'S AGE	**n=85**		**n=88**		**n=173**	
No older child	36	42.35	39	44.32	75	43.35
9-12 months	3	3.53	1	1.14	4	2.31
12-24 months	1	1.18		0	1	0.58
24-36 months	3	3.53	7	7.95	10	5.78
36-48 months	9	10.59	4	4.55	13	7.51
48-60 months	7	8.24	9	10.23	16	9.25
60+ months	26	30.59	27	30.68	53	30.64
Don't know		0	1	1.14	1	0.58
THE YOUNGER CHILD'S AGE	**n=85**		**n=89**		**n=174**	
No younger child		96.47		97.75	169	97.13
0-6 months		1.18		2.25	3	1.78
6-12 months		2.35		0	2	1.15

The results indicated that most of the children (43.35%, n=75) in the study group were the youngest in the family. Of these only 2.93% (n=5) did have a younger sibling as well. Most of the children (n=146, 83.91%) were the first, second or third child in the family, and only 16.09% (n=28) of the children were the fourth, fifth or sixth child. It can be concluded that in this study group there were fewer large families, with most families having only one (n=74, 42.53%) or two (n=53, 30.46%) children. This might indicate that better child spacing was occurring (with reference to the number of children per mother).

The educational level of the mothers is summarized in Table 41. This research study was conducted before the new grade system was introduced into schools. The results will therefore be presented according to the previous system.

TABLE 41: COMPARISON OF THE QUALIFICATIONS OF THE MOTHERS OF THE CHILDREN IN THE TWO CLINICS (N=174).

HIGHEST QUALIFICATION ACHIEVED	CLINICS					
	MAKAPANSTAD (n=85)		MATHIBESTAD (n=89)		TOTAL (N=174)	
	n	%	n	%	n	%
Post matric qualification	0	0	1	1.12	1	0.6
Standard 10 (matric)	21	24.71	35	39.33	56	32.2
Standard 9	14	16.47	6	6.74	20	11.5
Standard 8	19	22.35	9	10.11	28	16.1
Standard 7	8	9.41	10	11.24	18	10.3
Standard 6	11	12.94	11	12.36	22	12.6
Standard 5	6	7.06	6	6.74	12	6.9
Standard 4	2	2.35	2	2.25	4	2.3
Standard 3	3	3.53	0	0	3	1.7
Standard 2	1	1.18	1	1.12	2	1.2
Standard 1	0	0	1	1.12	1	0.6
Grade 1	0	0	1	1.12	1	0.6
No schooling	0	0	5	5.62	5	2.9
Don't know (unknown)	0	0	1	1.12	1	0.6

Although only one mother had a post matric qualification, a large number of the mothers (32.2%, n=56) had matriculated. The occupations of the mothers according to their own perceptions are summarized in Table 42.

TABLE 42: COMPARISON OF THE OCCUPATIONS OF THE MOTHERS OF THE CHILDREN IN THE TWO CLINICS (N=174).

OCCUPATIONS	CLINICS					
	MAKAPANSTAD (n=85)		MATHIBESTAD (n=89)		TOTAL (N=174)	
	n	%	n	%	n	%
Housewife	69	81.18	1	1.12	70	40.2
Going to school	9	10.59	11	12.36	20	11.5
Teacher	0	0	4	4.49	4	2.3
Shop assistant	0	0	1	1.12	1	0.6
Cashier	1	1.18	1	1.12	2	1.1
Domestic worker	2	2.35	3	3.37	5	2.9
Going to school next year	0	0	1	1.12	1	0.6
Factory worker	2	2.35	5	5.62	7	4
Soldier	0	0	1	1.12	1	0.6
Day care	1	1.18	0	0	1	0.6
Garage - petrol pump assistant	1	1.18	0	0	1	0.6
Looking for work	0	0	11	12.36	11	6.3
Unemployed	0	0	50	56.18	50	28.7

Few of the mothers were working; as a whole only 12.6% (n=22) of the study group was working. Some mothers were still at school (12.1%, n=21) and therefore not able to work.

7.1.5 PROFILE OF THE FAMILY

Mothers who visited the Makapanstad clinic were mostly (87.1%, n=74) living in one area, namely the Makapanstad area. Maseding (3.5%, n=3), Mothlabaneng (2.4%, n=2) and Maropeng (2.4%, n=2) were the other residential areas mentioned most frequently. Mothers who visited the Mathibestad clinic were coming from various areas. The areas mentioned mostly were Machidi (30.3%, n=27), Ramogoga (14.6%, n=13), Lefatlheng (14.6%, n=13), Lesoaneng (9.0%, n=8) and Bochabelo (7.9%, n=7).

The size of the family that lived together is reported in Table 43. The results did not reveal any particular pattern between the ages of the children and the family size.

TABLE 43: COMPARISON OF THE FAMILY SIZE OF THE STUDIED CHILDREN IN THE VARIOUS AGE GROUPS (N=174) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		FAMILY SIZE - NUMBER OF MEMBERS				
		2	3 - 5	6 - 10	11 - 15	>15
0 - 3	*n=13 *#n=17*	0 *1*	6 *5*	6 *10*	1 *1*	0 *0*
3.1 - 6	n=13 *n=12*	0 *0*	3 *1*	10 *11*	0 *0*	0 *0*
6.1 - 9	n=16 *n=14*	0 *0*	4 *4*	11 *10*	1 0	0 *0*
9.1 - 12	n=11 *n=16*	0 *0*	4 *3*	6 *11*	1 *1*	0 *1*
12.1 - 24	n=20 *n=17*	0 *0*	8 *4*	10 *10*	2 *3*	0 *0*
24.1 - 36	n=12 *n=13*	0 *0*	6 *5*	5 *7*	1 *0*	0 *1*
TOTAL / CLINIC	n=85 *n=89*	0 *1*	31 *22*	48 *59*	6 *5*	0 *2*
TOTAL / GROUP	N=174 %	1 0.6	53 30.5	107 61.5	11 6.3	2 1.1

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD *#MATHIBESTAD*

The family size of six to ten people living together was found most commonly in both the clinics: 56.5% (n=48) in Makapanstad, 66.3% (n=59) in Mathibestad, and 61.5% (n=107) in the total study group. The total number of people living together was reported as 1209 people for the 174 households in the study group; an average of 6.9 people per family living together. The composition of the people living together was mostly that of the closest family members, including husbands, own children, parents, grandparents, other siblings and their children. The number of own children of the mothers involved in the study group was 373. This amounted to an average of 2.14 own children per mother.

TABLE 44: COMPARISON OF THE FATHERS' INVOLVEMENT (FINANCIAL CONTRIBUTION) WITH THE CHILDREN IN THE VARIOUS AGE GROUPS (N=173) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		INVOLVEMENT OF FATHERS (N=173)			
		CLINICS		TOTAL	
		CONTRIBUTE (n)	DID NOT CONTRIBUTE (n)	CONTRIBUTE (%)	DID NOT CONTRIBUTE (%)
0 - 3	*n=13 *#n=17*	11 *16*	2 *1*	90.0	10.0
3.1 - 6	n=13 *n=12*	12 *11*	1 *1*	92.0	8.0
6.1 - 9	n=16 *n=14*	13 *12*	3 *2*	83.3	16.7
9.1 - 12	n=11 *n=16*	6 *14*	5 *1*	76.9	23.1
12.1 - 24	n=20 *n=17*	15 *13*	5 *4*	75.7	24.3
24.1 - 36	n=12 *n=13*	9 *9*	3 *4*	72.0	28.0
TOTAL / CLINIC	N=173 (%)	66 (77.7) *75 (85.2)*	19 (22.4) *13 (14.8)*	81.5	18.5

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD *#MATHIBESTAD*

Very few of the fathers of the children were actually living with the family. Only 32.9% (n=28) of the fathers in the Makapanstad group (n=85), and 36.0% (n=32) of the fathers in the Mathibestad group (n=89) were living with their children. For the study group as a whole (N=173) only 34.5% (n=60) of the fathers lived with their families. Although most of the fathers were not living with their children, many of them were contributing financially to the family (see Table 44). Of the total group 81.5% (n=141) of the fathers were contributing money to the family. It is also evident from Table 44 that more fathers were contributing money to the younger children than to the older children.

7.1.6 DESCRIPTION OF THE MICRO ENVIRONMENT OF THE FAMILY

Individual interaction takes place within the family; leading to interrelationships with the various dimensions of the environment, including the micro, meso and macro environments (73, 93). The family exists within the micro environment. The micro environment of the family thus involves regular personal contact, objects available to them to enhance the environment, the living unit and surroundings, and lastly the physical products needed to make a living (73, 93, 94).

The housing of the study group is described in Table 45. In both areas most people (68.4%, n=119) were living in houses with five or more rooms. Bricks (81.6%, n=142) and zinc (12.1%, n=21) were used most often as building material for the houses.

TABLE 45: COMPARISON OF THE NUMBER OF ROOMS AND BUILDING MATERIALS USED FOR HOUSES, THE SOURCES OF DRINKING WATER AND AVAILABILITY OF ELECTRICITY IN THE TWO CLINICS (N=174)

DESCRIPTION OF THE HOUSE	CLINICS					
	MAKAPANSTAD (n=85)		MATHIBESTAD (n=89)		TOTAL (N=174)	
	n	%	n	%	n	%
NUMBER OF ROOMS						
Two	5	5.88	2	2.25	7	4
Three	11	12.94	8	8.99	19	10.9
Four	16	18.82	13	14.61	29	6.7
Five	53	62.35	66	74.16	119	68.4
BUILDING MATERIAL USED						
Bricks	67	78.82	75	84.27	142	81.6
Zinc	13	15.29	8	8.99	21	12.1
Clay	2	2.35	5	5.62	7	4
Mud	3	3.53	0	0	3	1.7
Bricks and clay	0	0	1	1.12	1	0.6
SOURCE OF DRINKING WATER						
Tap in the house	4	4.71	1	1.12	5	2.9
Tap outside	23	27.06	0	0	23	13.2
Borehole and pump	56	65.88	74	83.15	130	74.7
River / stream	2	2.35	2	2.25	4	2.3
Pit	0	0	1	1.12	1	0.6
Buy from tankers	0	0	11	12.36	11	6.3
ELECTRICITY						
Available in the house	29	34.12	22	24.72	51	29.5
Not available	56	65.88	66	74.16	122	70.5

Very few houses had taps available in the house for the water supply (2.9%, n=5). Most people (74.7%, n=130) got their drinking water from a borehole with a pump in close proximity of their houses. If the water source was any other than tap water, as most of the mothers / caregivers indicated, only 5.7% (n=10) said that they boiled it before using it. All the other mothers / caregivers (94.3%, n=164) said that they used the water as such.

The availability of electricity in this area was at the time of the research very low (29.5%, n=51), but during this period electricity and water were installed in the studied communities. Though some people had electricity available to them, not all of them used it for food preparation. Only 21.3% (n=37) used electricity as a fuel. The most frequently used fuel was paraffin (70.1%, n=122), and coal stoves (6.3%, n=11).

TABLE 46: COMPARISON OF THE SOURCES OF FOOD FOR THE CHILDREN IN THE TWO CLINICS (N=174)

DESCRIPTION OF THE FOOD SOURCES	CLINICS					
	MAKAPANSTAD (n=85)		MATHIBESTAD (n=89)		TOTAL (n=174)	
	n	%	n	%	n	%
Plant their own foods	0	0	1	1.12	1	0.6
Buy from a shop	74	87.06	85	95.51	159	91.4
Plant their own foods and buy from a shop	3	3.53	3	3.37	6	3.4
Buy from a shop and from a market (vendor)	8	9.41	0	0	8	4.6

The sources of food that the family used were fairly restricted (see Table 46). Food was mostly bought from the shops nearby (91.4%, n=159). Few people (4.0%, n=7) were producing some of their own food by planting vegetables, and only a few people used the vendors (4.6%, n=8).

The people responsible for the purchasing and the preparation of the food for the family varied between the caregivers and people contributing money to the family (see Table 47).

TABLE 47: COMPARISON OF THE PEOPLE RESPONSIBLE FOR FOOD PURCHASING AND PREPARATION FOR THE FAMILY IN THE TWO CLINICS (N=174).

FOOD PURCHASING AND PREPARATION	CLINICS					
	MAKAPANSTAD (n=85)		MATHIBESTAD (n=89)		TOTAL (n=174)	
	n	%	n	%	n	%
FOOD BUYER Mother	9	10.59	8	8.99	17	9.8
Caregiver	0	0	3	3.37	3	1.7
Father	23	27.06	27	30.34	50	28.7
Family member	53	74.12	50	56.18	103	59.2
Caregiver and family member	0	0	1	1.12	1	0.6
PERSON PREPARING FOOD Mother	71	83.53	68	76.40	139	79.9
Caregiver	0	0	5	5.62	5	2.9
Family member	14	16.47	16	17.98	30	17.2

The person who bought the food was usually not the same person who prepared the food for the family or who was caring for the child (see also Table 35). The mother (79.9%, n=139) was the person who most frequently prepared the food for the family. Usually the mother was also the person who was most frequently taking care of the baby (79.3%, n=138) (see Table 35). If the father was living with the family (32.9% and 36.0% in Makapanstad and Mathibestad respectively) he bought the food for the family (27.1% and 30.3% in Makapanstad and Mathibestad respectively) (see also Table 44). If the father did not buy the food, another family member usually did (29.2%, n=103). This was most likely to be the person bringing the money into the household.

7.1.7 CLINIC INVOLVEMENT

All the children attending the clinic came for a particular reason and all had a "Road to Health" chart. The frequency of visits varied according to the age of the baby/child. Babies just born, visited weekly or every second week until their six-week visit after which they were booked monthly for immunizations or weight checks. Most children attended the clinic once per month (90.6%, n=77) in Makapanstad and (89.9%,n=80) in Mathibestad. However, children additionally came to the clinic when they were sick in Makapanstad (4.7%, n=4) and (7.9%, n=7) in Mathibestad. The reasons for the clinic visit on the day of the research are summarized in Table 48.

TABLE 48: COMPARISON OF THE DIFFERENT REASONS FOR CLINIC ATTENDANCE OF THE CHILDREN IN THE VARIOUS AGE GROUPS (N=173) IN THE TWO CLINICS

AGE CATEGORIES OF CHILDREN (MONTHS)		REASONS FOR ATTENDANCE								
		IMMUNI-ZATION	SIX-WEEK VISIT	WEIGH	ADVICE	SICK CHILD	SEVEN DAY VISIT	WEIGH + ADVICE	WITH OTHER CHILD	IMMUNIZATIO N + WEIGH
0 - 3	*n=13	2	5	3	1	0	-	0	0	2
	#n=17	*4*	*3*	*5*	-	*0*	*1*	*0*	*0*	*4*
3.1 - 6	n=13	2	0	7	0	1	-	0	0	3
	n=12	*3*	*0*	*7*	-	*1*	*0*	*0*	*0*	*1*
6.1 - 9	n=16	1	0	8	0	1	-	1	0	5
	n=14	*0*	*0*	*8*	-	*2*	*0*	*1*	*0*	*3*
9.1 - 12	n=11	0	0	8	0	0	-	1	0	1
	n=16	*0*	*0*	*11*	-	*1*	*0*	*0*	*0*	*4*
12.1 - 24	n=20	3	0	10	1	3	-	2	0	1
	=17	*0*	*0*	*15*	-	*2*	*0*	*0*	*0*	*0*
24.1 - 36	n=12	2	1	0	0	3	-	0	6	0
	n=13	*0*	*0*	*0*	-	*5*	*0*	*0*	*4*	*4*
TOTAL/ GROUP	n	17	9	82	2	19	1	5	10	28
	%	9.8	5.2	47.4	1.2	11.0	0.6	2.9	5.8	16.2

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD *#MATHIBESTAD*

The children were brought to the clinic mainly to be weighed (47.4%, n=82). The second most frequent reason for clinic visits was a combination of immunization and weighing (16.2%, n=28). The third most frequent reason for visits was bringing sick children for medical advice (11.0%, n=19), and fourthly for immunization only (9.8%, n=17).

7.2 ANTHROPOMETRIC EVALUATION

Standardized anthropometric techniques (see Chapter 5) were used for determining the weight, recumbent length (height) and head circumference of the children in the study group. The three most frequently used anthropometric indices were weight-for-height, height-for-age and weight-for-age (95, 96).

Gorstein et al (1994:281)(95) recommend that when the anthropometric status of a population is described, the results should always be given by age group (if the age information is accurate). Children under the age of five years are considered to be a homogenous group and generally referred to as preschool children. This may lead to major errors in the interpretation of results because the pattern of malnutrition changes as children grow older. A deficit in weight-for-height usually occurs in one to two year old children. However by the age of three to four years this deficit has often been made up but the child may remain with a deficit in height-for-age and weight-for-age (96). Also at ages less than one year, at a given height, the older child tends to be heavier (95, 96). This source of error is minimized if children are classified in fairly narrow age ranges in the first year of life (96). It is therefore recommended that data be presented in the age groups shown in Table 49.

TABLE 49: RECOMMENDED AGE GROUPS FOR THE PRESENTATION OF ANTHROPOMETRIC DATA (96)

A Highly recommended	B Recommended	C Permissible
0 - 2.99 months		
3.0 - 5.99 months	0 - 5.99 months	
6.0 - 8.99 months		
9.0 - 11.99 months	6.0 - 11.99 months	0 - 11.99 months
1.0 - 1.99 years	1.0 - 1.99 years	1.0 - 1.99 years
2.0 - 2.99 years		
3.0 - 3.99 years	2.0 - 3.99 years	
4.0 - 4.99 years		
5.0 - 5.99 years	4.0 - 5.99years	2.0 - 5.99 years
6.0 - 6.99 years		
7.0 - 7.99 years	6.0 - 7.99 years	
8.0 - 8.99 years		
9.0 - 9.99 years	8.0 - 9.99 years	6.0 - 9.99 years

The categories in column A are recommended for large groups of children (>100), but the categories in column B will be the most useful in many circumstances and the categories in column C should only be used with very small groups (96).

In this research study the age information could be regarded as accurate as the birth data was extracted from the child's "Road to Health" chart and confirmed by the mother/caregiver. The children were grouped according to a combined approach referring to the age categories mentioned in column A and B for the

assessment as such, as well as for the presentation of the results. These age groups were chosen according to the recommendations of Waterlow (1977)(96). The age categories used, with the number of children from each clinic, are shown in Table 50.

TABLE 50: AGE GROUPS FOR THE PRESENTATION OF ANTHROPOMETRIC RESEARCH RESULTS

GROUP	AGE GROUP	NUMBER OF CHILDREN INVOLVED		TOTAL
		Makapanstad area	Mathibestad area	
Group 1	0.0 - 2.99 months	13	16	29
Group 2	3.0 - 5.99 months	13	10	23
Group 3	6.0 - 11.99 months	26	27	53
Group 4	12.0 - 23.99 months	14	17	31
Group 5	24.0 - 36.00 months	10	11	21

Gorstein et al (1994:281)(95) indicate that "for the purpose of comparing the prevalence of low anthropometry data (such as "mild", "moderate", or "severe" malnutrition; "wasted" or "stunted") between different geographical areas, it is sometimes preferable to have a summary measure. One way to address this issue would be to standardize the age-specific information using a standard age distribution, which would permit reasonable comparisons to be made between populations". The anthropometric results will therefore be presented according to a "summary birth measure" which will be compared with a "summary measurement value" in the different age categories as indicated in Table 50. In order to determine a "summary birth measure" all the birth data from all the children were used. However, only children with all the birth measurements including birth age, birth weight, length and head circumference (n=157) were included in the determination of the summary measures. The reason being to include as many anthropometric measurements (length, weight and head circumference) as possible in order to characterize an infant's current status and to make inferences regarding previous and future states of wellbeing (97). Variability in the initial size of the child (e.g. birth weight) strongly affects the interpretation of attained status (97). In order to minimize the effects of different initial sizes it was statistically determined whether the initial sizes (birth data) of all the children in both clinics were similar by means of the General Linear Models Procedure. No significant difference ($P<0.05$) was found between the birth measurements of the children from the two clinics for all the age groups. Therefore the birth data were considered to be comparable for all the children in all of the age groups in both areas and subsequently their growth velocity could be expected to be on a similar growth curve. The "summary birth measure" or mean was determined separately for girls and boys for each of the clinics (see Tables 52 and 53).

In order to determine the growth curve of the children the "summary measurement value" was determined and then compared to the "summary birth measure". The "summary measurement value" or mean was determined according to the actual "current age " measurements (weight, length and head circumference) done during the data collection stage of the research. These values were used to calculate the average measurement values for each of the age groups (see Tables 52 and 53). Both the "summary birth measure" and the "summary measurement value" were used to determine the percentiles on which the

children were at birth and at the subsequent ages of growth up to 36 months of age. The height, weight and head circumference values, as well as the weight-for-height values are presented according to the percentiles of the NCHS (98), as well as the Reference data for the weight and height of children (WHO)(99). The smoothed percentile tables and the percentile graphs were used to present the data graphically. The following average ages were used to plot the data on the graph to ensure a summary value (see Table 51).

TABLE 51: AVERAGE AGES USED FOR PERCENTILE GRAPHS

GROUP	AGE GROUP	NCHS-PERCENTILE	WHO-PERCENTILE
Group 1	0.0 - 2.99 months	1.5 months	2 months
Group 2	3.0 - 5.99 months	4.5 months	4 months
Group 3	6.0 - 11.99 months	9 months	9 months
Group 4	12.0 - 23.99 months	18 months	18 months
Group 5	24.0 - 36.00 months	30 months	30 months

The results are shown in Table 52 and 53 and in Figures 38-41 for girls and boys respectively.

TABLE 52: ANTHROPOMETRIC RESULTS AND INDICATORS: GIRLS

GIRLS AGE CATEGORIES	ANTHROPOMETRIC MEASUREMENTS							
	LENGTH-Recumbent (cm) [Height-for-age]		WEIGHT (kg) [Weight-for-age]		HEAD-CIRCUMFERENCE (cm) [Head-circumference-for-age]		HEIGHT-FOR-WEIGHT	
	Makapanstad	Mathibestad	Makapanstad	Mathibestad	Makapanstad	Mathibestad	Makapanstad	Mathibestad
AGE GROUP 0: BIRTH **MEAN**	47.83	47.72	3.06	2.88	33.56	33.98	-	-
NCHS-PERCENTILE (0/12)	25	25	25	25	25	50	50	25
WHO-PERCENTILE (0/12)	20	20	40	20	-	-	30	20
AGE GROUP 1: 0-2.99 MONTHS MEAN	56.25	55.61	4.60	5.77	37.55	39.28	-	-
NCHS - PERCENTILE (graph - 1½ /12)	75	75	75	95	50	95	50	95
WHO - PERCENTILE (2/12)	40	30	50	95	-	-	50	97
AGE GROUP 2: 3.0-5.99 MONTHS MEAN	64.19	62.02	6.78	7.24	41.76	42.83	-	-
NCHS - PERCENTILE (graph - 4½ / 12)	75	50	75	90	75	90	50	90
WHO - PERCENTILE (4/12)	80	50	80	90	-	-	50	95
AGE GROUP 3: 6.0-11.99 MONTHS MEAN	70.71	62.74	8.88	8.42	45.05	42.65	-	-
NCHS - PERCENTILE (9/12)	50	<5	50	50	75	10	50	>95
WHO - PERCENTILE (9/12)	50	<3	60	40	-	-	60	>97
AGE GROUP 4: 12.0-23.99 MONTHS MEAN	73.71	70.86	9.60	10.22	46.31	44.50	-	-
NCHS - PERCENTILE (18/12)	<5	<<5	10	25	25	5	75	95
WHO - PERCENTILE (18/12)	<3	<<3	20	30	-	-	70	97
AGE GROUP 5: 24.0-36.00 MONTHS MEAN	89.63	87.56	12.92	12.10	48.88	45.63	-	-
NCHS - PERCENTILE (30/12)	25	10	50	25	50	<5	75	50
WHO - PERCENTILE (30/12)	30	10	50	30	-	-	70	50

- = no percentiles available
< = below the percentile
<< = far below the percentile

TABLE 53: ANTHROPOMETRIC RESULTS AND INDICATORS: BOYS

BOYS AGE CATEGORIES	ANTHROPOMETRIC MEASUREMENTS							
	LENGTH-Recumbent (cm) [Height-for-age]		WEIGHT (kg) [Weight-for-age]		HEAD-CIRCUMFERENCE (cm) [Head-circumference-for-age]		HEIGHT-FOR-WEIGHT	
	Makapanstad	Mathibestad	Makapanstad	Mathibestad	Makapanstad	Mathibestad	Makapanstad	Mathibestad
AGE GROUP 0: BIRTH								
MEAN	**48.20**	**47.57**	**2.99**	**2.89**	**34.30**	**34.57**	-	-
NCHS-PERCENTILE (0/12)	**25**	**10**	**25**	**25**	**25**	**50**	**25**	**50**
WHO-PERCENTILE (0/12)	**20**	**10**	**20**	**20**	-	-	**30**	**20**
AGE GROUP 1: 0-2.99 MONTHS								
MEAN	54.75	51.57	4.17	5.17	38.23	37.79	-	-
NCHS - PERCENTILE (graph - 1½ /12)	25	5	25	75	50	50	50	>95
WHO - PERCENTILE (2/12)	10	<3	10	50	-	-	50	>97
AGE GROUP 2: 3.0-5.99 MONTHS								
MEAN	66.60	57.13	7.39	7.56	42.70	42.75	-	-
NCHS - PERCENTILE (graph - 4½ / 12)	75	<5	75	75	50	50	25	>95
WHO - PERCENTILE (4/12)	90	<3	80	80	-	-	30	>97
AGE GROUP 3: 6.0-11.99 MONTHS								
MEAN	70.04	66.85	7.92	9.29	45.01	43.15	-	-
NCHS - PERCENTILE (9/12)	25	5	10	50	25	5	25	95
WHO - PERCENTILE (9/12)	20	<3	10	50	-	-	20	97
AGE GROUP 4: 12.0-23.99 MONTHS								
MEAN	75.71	65.33	8.74	10.40	46.40	43.17	-	-
NCHS - PERCENTILE (18/12)	5	<<5	<<5	25	5	<<5	10	>>95
WHO - PERCENTILE (18/12)	<3	<<3	<3	20	-	-	5	97
AGE GROUP 5: 24.0-36.0 MONTHS								
MEAN	87.20	85.67	12.42	13.00	52.00	49.33	-	-
NCHS - PERCENTILE (30/12)	5	5	25	25	95	25	50	90
WHO - PERCENTILE (30/12)	5	3	20	30	-	-	50	80

- = no percentiles available
< = below the percentile
<< = far below the percentile

GIRLS: BIRTH TO 36 MONTHS
PHYSICAL GROWTH
NCHS PERCENTILES

NAME _____ RECORD # _____

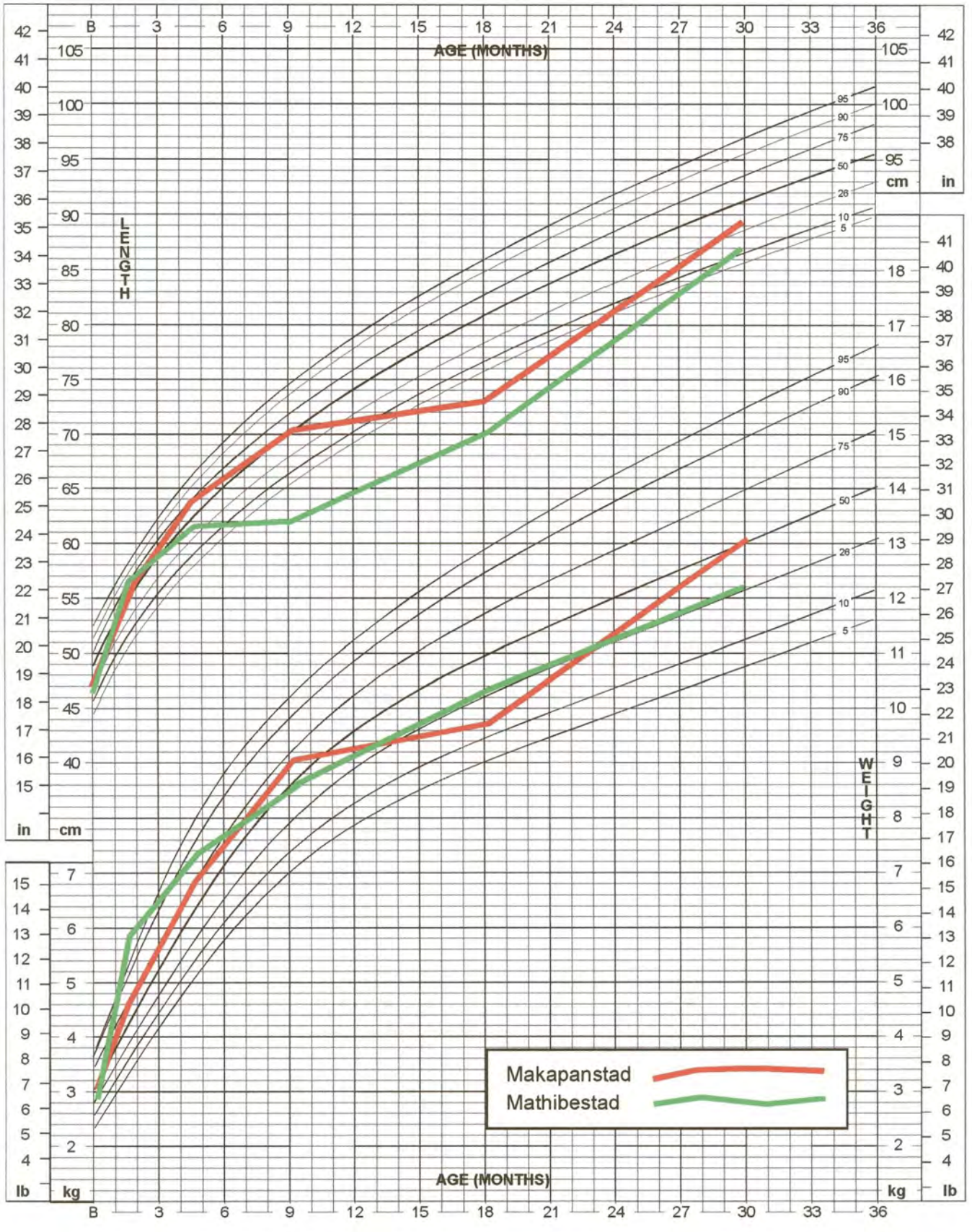

FIGURE 11: ANTHROPOMETRIC RESULTS - NCHS PERCENTILE GRAPHS FOR GIRLS BIRTH TO 36 MONTHS FOR HEIGHT-FOR-AGE AND WEIGHT-FOR-AGE

GIRLS: BIRTH TO 36 MONTHS
PHYSICAL GROWTH
NCHS PERCENTILES

NAME _____ RECORD # _____

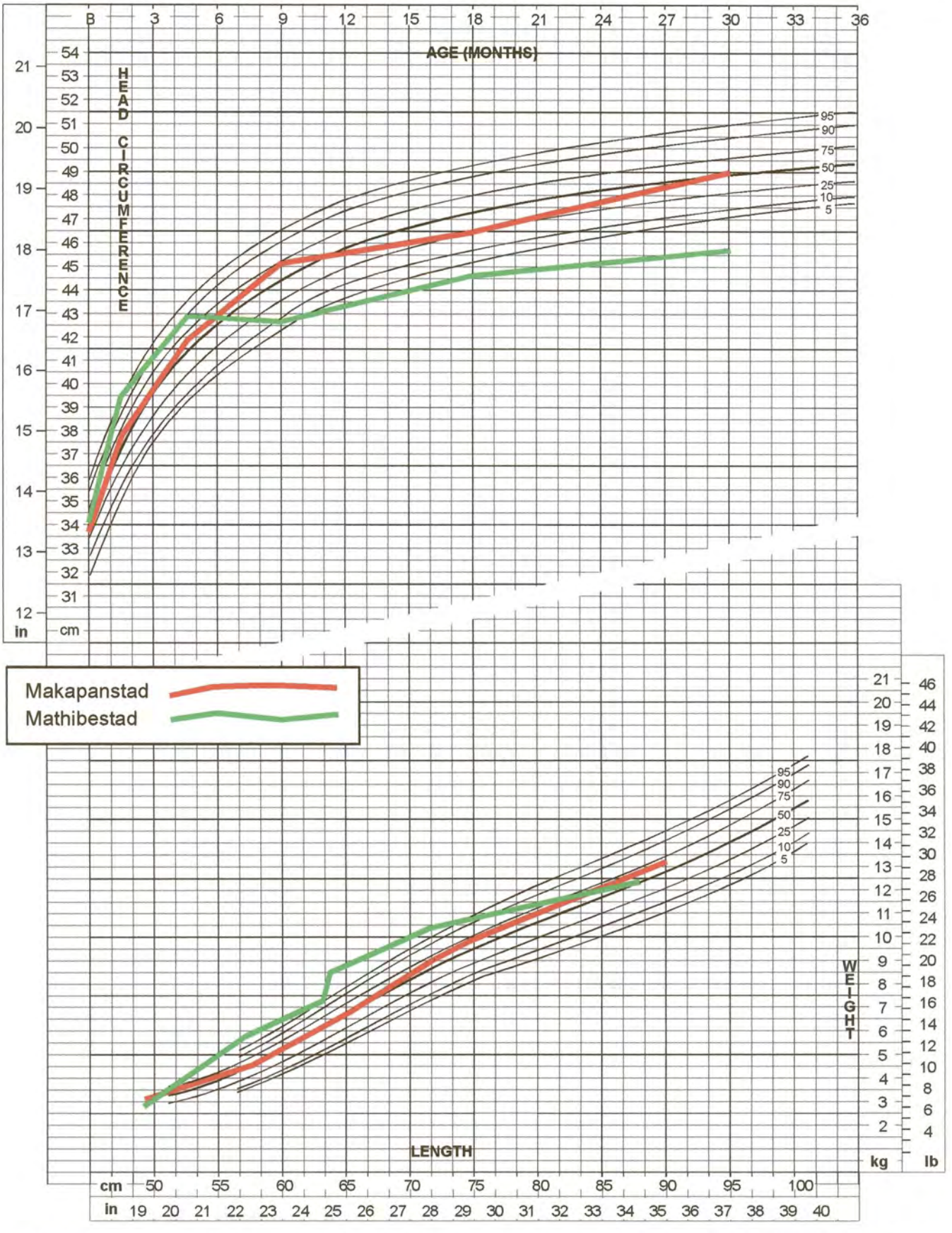

FIGURE 12: ANTHROPOMETRIC RESULTS - NCHS PERCENTILE GRAPHS FOR GIRLS BIRTH TO 36 MONTHS FOR HEAD CIRCUMFERENCE AND WEIGHT-FOR-HEIGHT

BOYS: BIRTH TO 36 MONTHS
PHYSICAL GROWTH
NCHS PERCENTILES

NAME _____ RECORD # _____

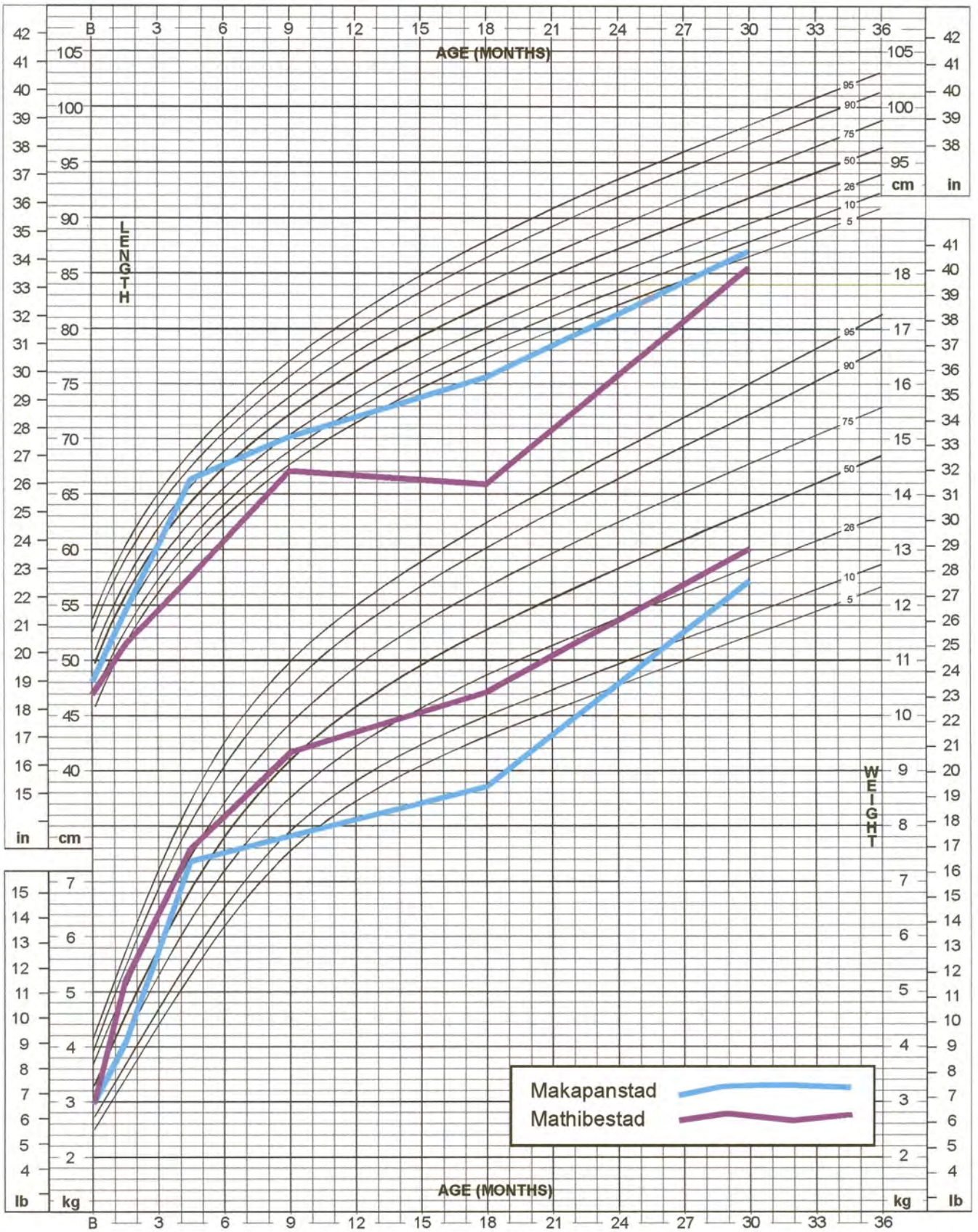

FIGURE 13: ANTHROPOMETRIC RESULTS - NCHS PERCENTILE GRAPHS FOR BOYS BIRTH TO 36 MONTHS FOR HEIGHT-FOR-AGE AND WEIGHT-FOR-AGE

BOYS: BIRTH TO 36 MONTHS
PHYSICAL GROWTH
NCHS PERCENTILES

NAME _____ RECORD # _____

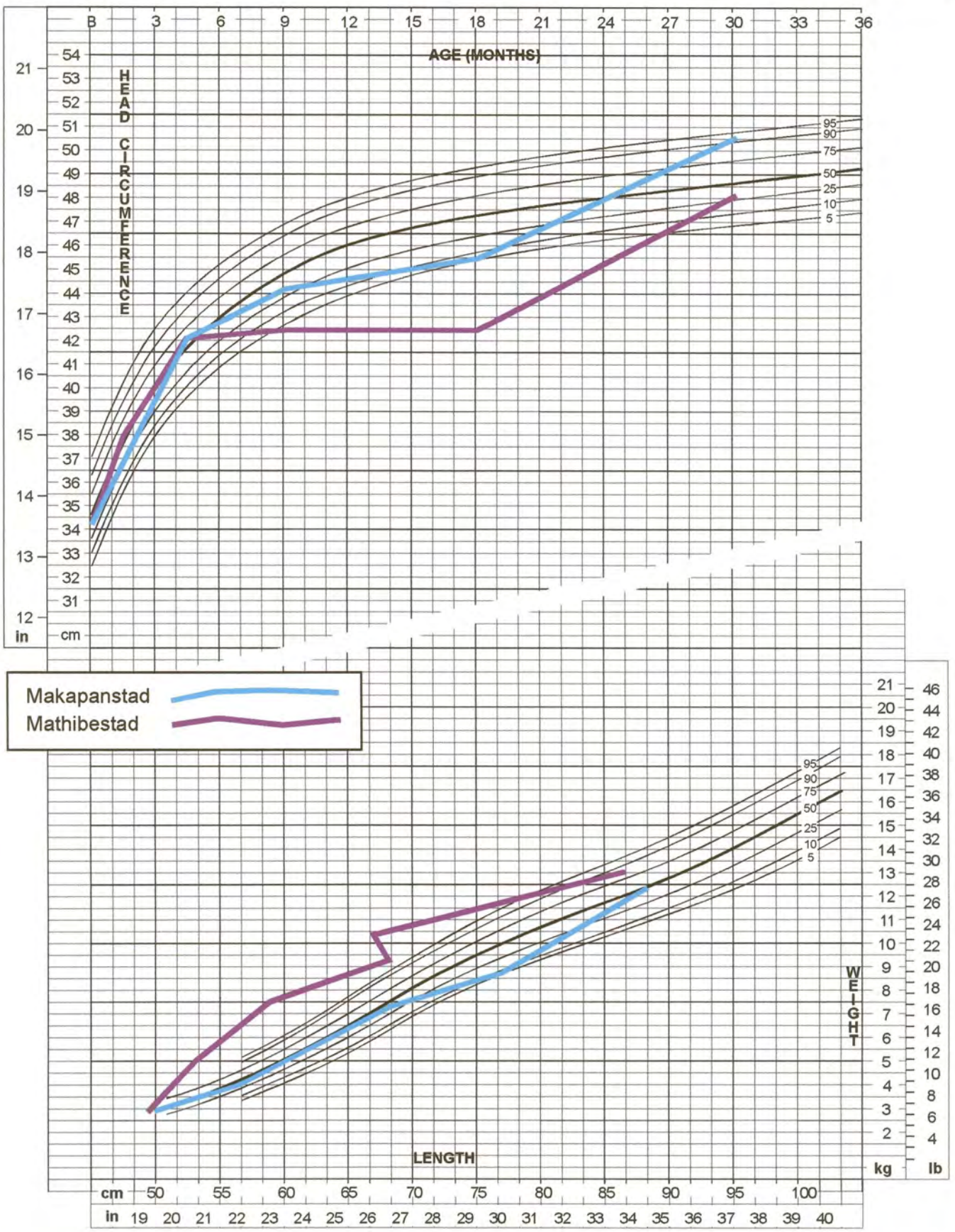

FIGURE 14: ANTHROPOMETRIC RESULTS - NCHS PERCENTILE GRAPHS FOR BOYS BIRTH TO 36 MONTHS FOR HEAD CIRCUMFERENCE AND WEIGHT-FOR-HEIGHT

7.2.1 RECUMBENT LENGTH

The length or height measurement is important to be used in accordance with age and weight. For the girls the mean birth length was very similar in both clinic areas, namely 47.83cm in the Makapanstad area versus 47.72cm in the Mathibestad area. The mean values were found to correspond with the 25th NCHS percentile and the 20th WHO percentile. For the boys similar results were found, namely a mean birth length of 48.20cm in the Makapanstad area versus 47.57cm in the Mathibestad area. The boys from the Mathibestad area however tended to be shorter than their Makapanstad area counterparts, indicating the 10th percentile versus the 25th NCHS and 20th WHO percentiles. This showed that these children were actually relatively short at birth, with the boys being a little shorter than the girls, and the Mathibestad area children being shorter than the Makapanstad area children.

Height-for-age deviations become obvious more slowly than that of weight. Reduced values indicate a chronic or longstanding problem such as malnutrition, other chronic diseases, as well as chronic growth faltering, also known as stunting, short stature or linear growth retardation (1, 6, 95). Failure to thrive can also be identified with height-for-age values < 5th percentile (1). In situations where wasting is not a big problem, a high prevalence of low height-for-age is frequently associated with poor overall economic conditions or repeated exposure to adverse conditions (95). From the results it was clear that the children grew well in the first few months of life. The percentiles increased rapidly up to the age of six months whereafter a significant decrease in growth became evident. This growth pattern was lower in the boys than in the girls. The children from the Mathibestad area clearly grew at a much slower rate than those in the Makapanstad area. The most prominent dip in the growth curve occurred at the age of 18/12. For both the girls and the boys in both areas the average measurement values indicated to be below the fifth NCHS-percentile and to be below the third WHO-percentile which indicated failure to thrive. At the age of 30/12 however, the growth curve recovered to the fifth percentile for boys and to the 25th or 10th percentile for girls (NCHS). This was thus not an indication of stunting, but rather of failure to thrive at a specific age. The girls from the Makapanstad area were the only children who ended on the same percentile as their birth percentile. All the others were fairly close to their birth percentile, except for the boys from the Makapanstad area who ended up two curve lines lower than their birth percentile.

7.2.2 WEIGHT

The measurement of weight is important for use with age and height. All the average birth measurement values were very similar for both the girls (3.06kg and 2.88kg for the Makapanstad and Mathibestad areas respectively) and the boys (2.99kg and 2.89kg for the Makapanstad and Mathibestad areas respectively). For all four groups the "summary measurement values" indicated the 25th NCHS percentile. For three of the groups the "summary measurement value" indicated the 20th WHO percentile and for the girls of the Makapanstad area the 40th WHO percentile; the Makapanstad area girls were the heavier of all the children. These results also showed that the weight of these children was in line with their length: approximately on the 20-25th percentile. These children were lighter in weight at birth than the expected 50th NCHS percentile of approximately 3.2kg; with the children from the Mathibestad area being lighter than the children from the Makapanstad area.

Weight per se is the most sensitive indicator of nutritional status and thus reflects acute and chronic changes (6). Weight-for-age however has the disadvantage that it does not distinguish between acute and chronic malnutrition (96). Weight-for-age reflects the immediate nutritional status of the infant / small child (under one year of age), but is a poor indicator of general growth in the older child. The reason being that increased weight may reflect the amount of body fat present rather than any increase in lean body mass or physical size (6, 96). For the girls the "summary measurement value" increased from birth to six months, after which it started to decline although it was still higher than the average birth measurement value. In the 12-24 month age group the percentiles levelled off to the 25th NCHS percentile for the Mathibestad area and to the tenth NCHS percentile and the 20th WHO percentile for the children from the Makapanstad area, which can be regarded close to the 25th percentile indicated by the "summary birth measure". For the Mathibestad area children the "summary measurement value" indicated to the same percentile, but for the Makapanstad area children it increased again to the 50th percentile by the age of 24-36 months. It was thus clear that the weight of the girls in this group did not go below the "summary birth measure" of the group. A very similar pattern was found in the weight of the boys from the Mathibestad area. The boys from the Makapanstad area however showed an initial increase in weight up to the age of six months, whereafter their weight went rapidly down to where the "summary measurement value" indicated the tenth percentile and then to below the fifth (NCHS) and the third (WHO) percentiles. Their weight however picked up again at the age of 24-36 months to the initial "summary birth measure" which indicated the 25th NCHS and the 20th WHO percentiles. The pattern of decrease was the same for both sexes and happened at exactly the same age.

A single weight value will only indicate whether a child's weight fall within the normal range, but with regular weighing and charting the trend can be assessed (6, 96). The third percentile is used as a cut-off point below which under nutrition is diagnosed (6). Only the Makapanstad area boys were at one stage below the fifth centile, indicating towards a period of possible poor food intake occurring at the age of total weaning from the breast.

7.2.2.1 Body Mass Index

The body mass index (BMI) of the children was evaluated with reference to the three age groups (0-6, 7-12 and 13-36 months) that were formed in order to correspond with the age groups used in the standard values (see Table 54).

TABLE 54: COMPARISON OF THE BODY MASS INDEX OF CHILDREN IN THREE AGE GROUPS IN THE TWO CLINICS

AGE CATEGORIES	BODY MASS INDEX				
	REFERENCE VALUE	MEAN	SD	RANGE	
				MIN	MAX
AGE 1: 0-6/12 *MP: n=26 # *MT: n=29*	19-24	15.20 *20.15*	2.80 *4.67*	9.45 *9.92*	19.61 *30.56*
AGE 2: 7-12/12 MP: n=27 *MT: n=30*	19-24	16.97 *22.21*	2.65 *5.71*	12.24 *14.68*	23.42 *38.83*
AGE 3: 13-36/12 MP: n=32 *MT: n=28*	19-24	16.13 *19.66*	1.84 *4.65*	13.14 *11.9*	21.97 *33.82*

DIFFERENTIATED BY CLINIC: *MAKAPANSTAD *#MATHIBESTAD*

TABLE 55: NUTRITIONAL STATUS INDICATED BY BODY MASS INDEX (BMI)(35)

BMI	NUTRITIONAL STATUS
<16	Undernourished
16-18.5	Possibly undernourished
18.5-25	Probably well-nourished
25-30	Possibly obese
>30	Obese

For the interpretation of the BMI, the levels summarized in Table 55 were used. The children from the Makapanstad area seemed to be possibly undernourished (BMI 16-18.5), while those from the Mathibestad area were probably well-nourished (BMI 18.5-25). Statistically the BMI of the children from the two clinics were significantly different from each other ($P<0.0001$).

7.2.3 HEAD-CIRCUMFERENCE

Head circumference measurements are important to detect abnormalities in head and brain growth. Brain growth peaks during the first year of life, but is completed after 36 months of age. Head circumference is thus only measured up to the age of 36 months (6, 29). The "summary birth measure" indicated a percentile which was very similar for both sexes. The average birth measurement value for the girls was 33.56cm and 33.98cm for the Makapanstad and Mathibestad areas respectively, which was lower than the measurement of the boys at 34.30cm and 34.57cm for the Makapanstad and Mathibestad areas respectively. For both sexes the children from the Mathibestad area had a slightly larger average head circumference measurement. The "summary birth measure" of the children from the Makapanstad area indicated towards the 25th percentile for head circumference and that of the children from the Makapanstad area towards the 50th percentile. (Only the NCHS percentiles were used for the evaluation of the head circumference as the WHO percentile tables do not provide head circumference values.)

The initial growth spurt of the girls from both areas were higher than the average birth measurement value,

but the girls from the Mathibestad area had a quicker and higher increase in head circumference in the early months, increasing until the measurement indicated the 95th percentile. From the age of 6-12 months however the head circumference values of the Mathibestad area girls decreased dramatically to indicate the 10th percentile, and thereafter decreased even further to the fifth percentile at 12-24 months and then to below the fifth percentile in the 24-36 month group. In contrast, the girls from the Makapanstad area had a less dramatic initial increase in head circumference; only indicating up to the 75th percentile in the 3-6 and 6-12 month age groups. Their measurements also decreased at the weaning age (12.00-23.99 months) in a similar pattern to the previous mentioned results. However, the measurements only corresponded with the 25th percentile at the age of 12-24 months, which was the same as their "summary birth measure", whereafter it again increased to correspond with the 50th percentile at the age of 24-36 months.

A very similar pattern was apparent for the boys between the two clinics. Their initial average measurement increase was even less dramatic and went up to correspond with the 50th percentile in both clinics. At the age of 6-12 months the same decrease started to happen, but more pronounced in the Mathibestad area, where the measurement values went down to correspond with levels below the fifth percentile. The Mathibestad area boys recovered to the 25th percentile, but the head circumference average measurements of the boys from the Makapanstad area increased to correspond with the 95th percentile. Head circumference measurements corresponding to values below the fifth percentile (microcephaly) often reflects a cerebral insult that occurred prenatally or in infancy. However, none of these children initially showed such a low percentile for head growth. The lower percentiles for average summary measurement values only appeared at the age of twelve months or more and may thus be due to general growth failure in the weaning period; more so since the other parameters also showed a decline in this age group. The opposite is a large head circumference above the 95th percentile (macrocephaly) which usually occurs due to abnormal accumulation of cerebrospinal fluid and not to growth abnormalities. In this research study macrocephaly seemed not to occur at birth but only in the older children. This would indicate that 'macrocephaly' might have occurred as a result of macrosomia or excessive physical growth of the body as a whole (6). This might have been the case with the Makapanstad area boys who achieved a value on the 95th percentile in the 24-36 month age group, which could be attributed to excessive growth in that phase.

7.2.4 WEIGHT-FOR-HEIGHT

Kibel & Wagstaff (1995:98)(6) state that weight-for-height indicates whether the body is proportional and that it may confirm thinness or fatness. Waterlow et al (96) state that, at a given height, both median weight and range of weight are independent of the age of the children concerned. Weight-for-height is also relatively independent of ethnicity, particularly in the age groups between one and five years. Weight-for-height values will indicate that the growth is either "normal" or stunted. If the child is stunted, it indicates chronic growth failure. A low weight-for-height indicates wasting (6).

The summary birth measures for height and for weight were used for the height-for-weight percentiles at birth. The girls from the Makapanstad area had a NCHS percentile of 50 and a WHO percentile of 30, and the girls from the Mathibestad area had a NCHS percentile of 25 and a WHO percentile of 20. For the boys

from the Makapanstad area the measures indicated towards the 25th NCHS percentile and the 30th WHO percentile, and for the boys from the Mathibestad area it indicated towards the 50th NCHS percentile and the 20th WHO percentile. These percentiles were in line with the previous anthropometric indicators (i.e. showed a similar tendency).

The summary measurement values for height and weight were used to determine the height-for-weight percentiles for the different age groups. The girls from the Mathibestad area showed a dramatic increase in weight-for-height already in the first 0-3 months of life, increasing from the 25th/20th percentile to the 95th and 97th percentile for the NCHS and the WHO standards respectively. The values stayed at this high level until the age of 24 months whereafter it fell to the 50th percentile for both the NCHS and the WHO standards. The Makapanstad area girls showed a similar pattern for weight-for-height, but less extreme. Initially the girls stayed on the 50th percentile up to the age of 12 months whereafter their summary measurement values indicated an increase to the 75th and 70th percentiles respectively for the NCHS and the WHO standards. This might indicate that the girls from the Makapanstad area were actually increasing both their weight and height simultaneously and were thus growing in a "more balanced" manner. It seemed that wasting was not a problem in the girls in these communities as no low weight-for-height percentile values were seen. The boys from the Mathibestad area showed the same pattern as the girls with an immediate increase in the summary measurement values indicating towards a height-for-weight percentile above the 95th and 97th percentiles for the NCHS and WHO standards respectively. The percentiles also fell in the last age category of 24-36 months to the 90th and 80th percentiles for the NCHS and WHO standards respectively. The summary measurement values for height and weight of the Makapanstad area boys indicated to an initial increase from the 25th/30th birth percentiles to the 50th percentile for the first 0-3 month age period. Thereafter the percentiles normalized to the 25th and 30th percentile similar to their birth percentiles. In the 12-24 month age period the percentile dipped to the 10th and the 5th for the NCHS and WHO standards respectively. They recovered well however and ended on the 50th percentile. Like their female counterparts, the boys from the Makapanstad area increased their birth value. However, the reported tendency showed that their growth was affected in some manner, especially at the age of 12-24 months.

7.3 DIETARY ADEQUACY

Food consumption was measured by means of a 24h-recall of usual food intake (see 5.2.2.2 in Chapter 5). The food intake data were evaluated by means of nutrient analysis in order to achieve a more detailed and accurate calculation of nutrient intake. For this purpose computer software with a nutrient data basis (the Foodfinder nutritional analysis computer program)(129) was used. As the ages of the children in the study group varied between naught and 36 months, breast feeding appeared frequently on the 24-hour recalls. For a complete analysis of food intake, it was therefore necessary to consider the breast milk intake as well. In each 24h-recall interview the mother / caregiver had to indicate the number of times the baby was breast fed during the day, referring to exclusive breast feeding or to breast feeding additional to the food intake. Breast milk values for the different feeding regimes were then added to the food intake data to complete the nutrient intake data set. The nutrient analysis for breast milk did not show all the nutrients that appeared on the RDA and WHO dietary standards. The data without any breast milk nutrient values added to it were

described as unadapted intake values, and the data with breast milk values added to it were described as adapted intake values (see Tables 56 and 57).

TABLE 56: ESTIMATES OF ENERGY CONSUMPTION FROM BREAST MILK (100)

NURSING FREQUENCY	kcal Contribution/day	kJ Contribution/day
Child nurses 6-8 times in 24 hours	400 kcal	1680 kJ
Child nurses 4-6 times in 24 hours	300 kcal	1260 kJ
Child nurses 3-4 times in 24 hours	200 kcal	840 kJ
Child nurses 1-3 times in 24 hours	100 kcal	420 kJ

TABLE 57: ESTIMATES OF NUTRIENTS PROVIDED WITH REGARD TO ENERGY CONTRIBUTION FROM BREAST MILK

NUTRIENTS	NUTRIENTS PROVIDED BY BREAST MILK			
	6-8+ feeds/day 400 kcal/day	5 feeds/day 300 kcal/day	3-4 feeds/day 200 kcal/day	1-2 feeds/day 100 kcal/day
Energy (kJ)	1680.00	1260.00	840.00	420.00
Protein (g)	5.60	4.20	2.80	1.40
Fat (g)	23.13	17.35	11.58	5.77
Carbohydrate (Lactose)(g)	45.00	33.77	22.54	11.23
Vitamin A (μg)	481.25	361.10	241.00	120.12
Vitamin D (μg)	0.78	0.59	0.39	0.195
Vitamin E (mg)	2.50	1.88	1.25	0.62
Vitamin C (mg)	37.50	28.10	18.78	9.36
Thiamin (mg)	0.13	0.098	0.065	0.03
Riboflavin (mg)	0.36	0.27	0.18	0.09
Niacin (mg)	1.25	0.94	0.63	0.31
Pyridoxine (Vitamin B_6)(mg)	0.125	0.094	0.063	0.03
Folate (μg)	62.5	46.90	31.30	15.60
Pantothenic acid (mg)	1.63	1.22	0.81	0.41
Calcium (mg)	187.5	140.70	93.90	46.80
Phosphorus(mg)	93.75	70.35	46.95	23.40
Magnesium (mg)	18.75	14.07	9.39	4.68
Iron (mg)	0.19	0.14	0.09	0.05
Zinc (mg)	1.0	0.75	0.50	0.25
Manganese (mg)	0.003	0.002	0.001	0.0006
Copper (mg)	0.15	0.11	0.08	0.04
Sodium (mg)	75.00	56.28	37.56	18.72
Potassium (mg)	281.25	211.05	140.85	70.20

(Adapted from 14 and 100)

The nutrient calculations were compared to both the RDA and WHO dietary standards for the reference persons of the same age and sex category (14, 83, 100). The suggested fixed cutoff point of two-thirds (67%) for the RDA's (1989) was applied in determining inadequate nutrient intake for specific nutrients (14, 29, 83)(see mean intake as a percentage of the reference value in Tables 58-60). The cutoff value was only calculated for those nutrients that appear on both the RDA(1989) and WHO dietary reference standards as well as for specific nutrients identified as being important in infant nutrition (see Chapters 2 and 3) as they may impact on the growth and health of the child. The results are presented in Tables 58-60, and 62-65. The mean intake for specific nutrients was also compared between the two clinics. The Student's t-test was used for the comparison. To improve the reliability of the results the Mann-Whitney u-test was also performed. The Mann-Whitney u-test is an alternative to the Student t-ratio when the measurements fail to achieve interval scaling (130). The Mann-Whitney P-value was reported and accepted when the conclusion differed from that of the Student's t-test.

TABLE 58: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 0-6 MONTHS(n=55) IN THE TWO CLINICS (RDA AS REFERENCE VALUE)

AGE 0-6 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=26)					MATHIBESTAD (n=29)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. UNADAPTED INTAKE VALUES (WITHOUT BREAST MILK VALUES ADDED)													
PLANT PROTEIN (g)	-	4.77	5.14	0	19.20		4.38	5.04	0	19.20		0.78	
ANIMAL PROTEIN(g)	-	2.99	3.82	0	17.30		2.17	3.07	0	10.00		0.38	
CHOLES-TEROL(mg)	-	1.69	4.81	0	23.00		8.17	39.89	0	215.00		0.41	
FAT RATIO	-	0.43	0.83	0	3.20		0.52	0.98	0	3.20		0.70	
FIBRE(g)	-	2.08	2.10	0	7.70		2.34	2.56	0	8.40		0.68	
VITAMIN B12 (μg)	0.3μg	0.47	0.55	0	2.20	156.41	0.35	0.53	0	2.00	116.09	0.41	
BIOTIN(μg)	10μg	11.37	17.61	0	73.60		7.88	13.31	0	62.50		0.41	
B. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	2730kJ (kgx453.6)	2274.46	863.22	420.00	4327.00	88.85	2638.97	1142.97	1529.00	5215.00	90.83	0.19	
PROTEIN (g)	13g (kgx2.2g)	10.89	6.19	1.40	24.7	84.14	12.15	8.16	5.60	41.60	84.34	0.53	
TOTAL FAT(g)	30% of kJ	19.97	4.79	5.77	30.68		23.92	5.59	13.88	37.08		0.01*	
CARBOHY-DRATE(g)	50% of kJ	82.32	43.03	11.23	190.04		94.41	55.14	45.00	244.74		0.37	
VITAMIN A (μg RE)	375μg	420.89	116.85	120.12	754.00	112.24	471.86	146.50	241.00	991.00	125.83	0.16	
VITAMIN D(μg)	7.5μg	3.45	3.38	0.19	14.19	46.05	2.72	3.07	0.39	12.89	36.33	0.41	
VITAMIN E (mg =-TE)	3mg	3.27	1.59	0.62	8.62	109.01	3.34	1.42	1.92	7.05	111.38	0.86	

AGE 0-6 MONTHS		NUTRIENT INTAKES										
		MAKAPANSTAD (n=26)					MATHIBESTAD (n=29)					COMPARISON OF CLINICS (MP versus MT)
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	P-VALUE*
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
VITAMIN C(mg)	30mg	44.77	29.30	9.36	153.78	149.23	53.88	37.86	18.78	172.78	179.61	0.33	
THIAMIN(mg)	0.3mg	0.35	0.27	0.03	1.19	116.29	0.41	0.41	0.13	2.07	137.55	0.50	
RIBOFLAVIN(mg)	0.4mg	0.39	0.12	0.09	0.70	96.44	0.48	0.22	0.26	1.17	121.20	0.05	0.10**
NIACIN (mg NE)	5mg	3.48	3.73	0.31	16.93	69.60	2.87	2.51	1.24	10.63	57.38	0.48	
PYRIDOXINE (mg)	0.3mg	0.28	0.21	0.03	0.94	94.78	0.31	0.30	0.12	1.26	104.45	0.68	
FOLATE (μg)	25μg	54.26	11.85	15.60	78.30	217.05	72.17	26.24	38.60	150.30	288.69	0.002*	
PANTOTHENIC ACID (mg)	2mg	1.95	0.87	0.41	4.85		2.07	0.84	1.26	4.56		0.60	
CALCIUM (mg)	400mg	211.05	138.46	46.80	662.8	52.77	175.31	114.88	87.50	459.90	43.83	0.30	
PHOSPHORUS (mg)	300mg	195.74	122.76	23.40	591.4	65.25	226.74	183.48	93.75	981.95	75.58	0.47	
MAGNESIUM (mg)	40mg	61.73	44.90	4.68	180.39	154.33	60.55	48.07	9.39	169.39	151.37	0.93	
IRON(mg)	6mg	5.01	7.22	0.05	30.39	83.46	3.29	4.83	0.19	18.89	54.91	0.30	
ZINC(mg)	5mg	2.25	1.49	0.25	6.65	45.02	1.97	1.26	0.50	5.56	39.45	0.46	
MANGANESE (mg)	0.3-0.6mg	0.42	0.70	0.0006	2.93		0.22	0.29	0.001	1.14		0.15	
COPPER (mg)	0.4-0.6mg	0.31	0.24	0.04	1.13		0.27	0.18	0.08	0.79		0.43	
POTASSIUM (mg)	500mg(min)	440.98	200.12	70.20	951.20		130.54	150.87	37.56	675.56		0.13	
SODIUM(mg)	120mg(min)	110.58	80.30	18.72	401.56		564.57	360.74	281.25	1383.85		0.55	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test
MP = Makapanstad area
MT =Mathibestad area

TABLE 59: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 7-12 MONTHS(n=57) IN THE TWO CLINICS (RDA AS REFERENCE VALUE)

AGE 7-12 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=27)					MATHIBESTAD (n=30)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. UNADAPTED INTAKE VALUES (WITHOUT BREAST MILK VALUES ADDED)													
PLANT PROTEIN g)	-	13.99	9.42	5.4	46		14.91	10.42	5.4	59.5		0.73	
ANIMAL PROTEIN(g)	-	5.84	5.31	0	22.3		5.48	3.69	0	19.6		0.76	
CHOLES-TEROL(mg)	-	24.81	43.59	0	210		15.63	41.1	0	216		0.42	
FAT RATIO	-	0.68	0.69	0.07	3.16		0.79	0.98	0.12	4.18		0.64	
FIBRE(g)	-	6.62	4.65	2.3	20.2		7.84	5.95	1.2	33.1		0.4	
VITAMIN B12 (µg)	0.5µg	0.59	0.6	0	2.5	119.23	0.57	0.39	0	1.5	113.33	0.83	
BIOTIN(µg)	15µg	11.61	10.42	0	53.4		11.45	6.09	3.8	31.8		0.94	
B. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	3570kJ (kgx411.6Kj)	3876.7	1612.8	1951	8182	114.75	4084.8	1127	2333	7882	113.67	0.57	
PROTEIN (g)	14g (kgx1.6g)	22.18	10.38	8.8	47.9	169.57	22.79	10.68	11.8	65.9	165.09	0.83	
TOTAL FAT(g)	-	25.69	15.57	9.37	93.97		28.92	8.76	13.88	46.43		0.33	0.03
CARBOHY-DRATE(g)	-	155.86	68.91	83.63	391.3		180.96	93.72	84.5	596.34		0.27	
VITAMIN A (µg RE)	375µg	440.02	273.79	129.12	1108	117.34	483.08	355.4	241	2305	128.82	0.62	
VITAMIN D(µg)	10µg	3.29	2.64	0.19	10.59	32.96	3.66	1.69	0.39	7.79	36.59	0.54	
VITAMIN E (mg α-TE)	4mg	3.26	1.55	1.2	6.61	81.38	4.68	2.35	1.89	13.73	117.03	0.01	
VITAMINC(mg)	35mg	53.04	60.45	9.36	288.4	151.54	79.29	41.28	18.78	180.78	226.53	0.06	0.003

AGE 7-12 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=27)					MATHIBESTAD (n=30)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
THIAMIN(mg)	0.4mg	0.64	0.33	0.33	1.63	159.9	0.74	0.43	0.37	2.79	185.04	0.34	
RIBOFLAVIN (mg)	0.5mg	0.55	0.22	0.21	1.06	110	0.99	0.74	0.26	2.74	198.27	0.01	
NIACIN (mg NE)	6mg	4.38	3.35	1.21	12.71	72.94	4.47	1.93	1.43	10.43	74.51	0.90	
PYRIDOXINE (mg)	0.6mg	0.48	0.35	0.12	1.72	80.79	0.77	0.36	0.12	1.63	128.45	0.004	
FOLATE (μg)	35μg	77.28	38.05	34.6	183.6	220.81	107.95	41.15	27	226.3	308.44	0.01	
PANTOTHENIC ACID (mg)	3mg	2.14	0.74	1.12	3.78		2.54	0.84	1.26	4.76		0.06	0.04
CALCIUM (mg)	600mg	270.78	154.98	76.8	615.8	45.13	304.23	128	93.9	808.8	50.7	0.38	
PHOSPHORUS (mg)	500mg	440.98	194.62	140.4	904.4	88.19	448.18	237.5	227	1406	89.64	0.90	
MAGNESIUM (mg)	60mg	143.94	75.02	69.39	382.7	239.91	162.88	101.9	71.39	626.39	271.46	0.44	
IRON(mg)	10mg	4.66	4.24	0.79	21.95	46.59	5.34	2.32	0.99	10.75	53.42	0.45	0.04
ZINC(mg)	5mg	3.13	1.52	1.29	7.76	62.56	3.69	1.54	1.48	10.71	73.74	0.18	
MANGANESE (mg)	0.6-1.0mg	0.72	0.64	0.2	2.3		0.72	0.56	0.02	2.67		0.99	
COPPER (mg)	0.6-0.7mg	0.42	0.23	0.15	0.94		0.49	0.22	0.17	1.15		0.22	
POTASSIUM (mg)	700mg(min)	1001.7	493.66	403.85	2555		1175.7	511.5	405.9	2762.9		0.20	
SODIUM(mg)	200mg(min)	313.5	342.89	37.56	1569		273.24	179.6	38.56	690.72		0.58	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test.
MP = Makapanstad area
MT =Mathibestad area

TABLE 60: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 13-36 MONTHS(n=60) IN THE TWO CLINICS (RDA AS REFERENCE VALUE)

AGE 13-36 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=32)					MATHIBESTAD (n=28)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS %OF RDA VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. UNADAPTED INTAKE VALUES (WITHOUT BREAST MILK VALUES ADDED)													
PLANT PROTEIN g)	-	31.96	14.41	6.8	62.5		31.78	15.46	5.4	61.9		0.96	
ANIMAL PROTEIN(g)	-	10.69	8.98	0.2	34.6		9.41	6.56	0	23.3		0.54	
CHOLES-TEROL(mg)	-	38.72	35.48	0	127		36.39	48.09	0	236		0.83	
FAT RATIO	-	0.79	0.46	0.2	1.89		1.18	0.89	0.07	3.2		0.03	0.24
FIBRE(g)	-	14.55	6.29	3.7	28.4		16	6.72	2.3	32.3		0.39	
VITAMIN B12 (μg)	0.7μg	0.78	0.72	0	3.3	111.61	0.92	1.35	0	6.1	131.63	0.61	
BIOTIN(μg)	20μg	15.59	7.24	5	31.8		16.42	11.27	6	64.1		0.73	
B. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	5460kJ(kgx428 .4KJ)	6466.8	2100	2434	9917	145.62	5931.4	1995	1047	10544	127.57	0.32	
PROTEIN (g)	16g (kgx1.2g)	43.39	17.21	13.7	81.3	346.69	41.68	15.47	14.4	74.6	316.25	0.69	
TOTAL FAT(g)	-	36.41	18.45	15.7	88.1		35.51	17.09	3.6	86.38		0.85	
CARBOHY-DRATE(g)	-	289.17	103.71	101.84	510.3		260.58	86.21	108.8	497.8		0.25	
VITAMIN A (μg RE)	400μg	315.78	201.11	44	840	78.94	427.16	391.1	0	1499	106.79	0.16	
VITAMIN D(μg)	10μg	3.52	2.78	0.04	11.1	35.17	3.41	3.48	0	11.15	34.13	0.90	
VITAMIN E (mg α-TE)	6mg	4.26	2.85	1.69	13.54	70.95	6.15	5.19	0.69	19.95	102.49	0.08	
VITAMIN C(mg)	40mg	65.17	79.17	3	413	162.92	80.35	60.41	0	202	200.87	0.41	

AGE 13-36 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=32)					MATHIBESTAD (n=28)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	RDA VALUE (1989)(14)	MEAN	SD	RANGE		MEAN INTAKE AS % OF RDA VALUE	MEAN	SD	RANGE		MEAN INTAKE AS %OF RDA VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
THIAMIN(mg)	0.7mg	1.21	0.47	0.35	2.17	172.52	1.1	0.37	0.43	2.13	157.42	0.34	
RIBOFLAVIN(mg)	0.8mg	0.83	0.41	0.21	1.86	103.83	1.11	0.76	0.12	3.13	138.75	0.08	
NIACIN (mg NE)	9mg	5.71	2.45	1.63	12.1	63.48	6.23	3.42	1.2	15.5	69.18	0.50	
PYRIDOXINE (mg)	1.0mg	0.83	0.42	0.19	2.13	82.67	1.04	0.48	0.09	2.58	103.90	0.07	0.05
FOLATE (µg)	50µg	126.43	48.1	52	259	252.86	161.4	90.56	24	429	322.81	0.06	
PANTOTHENIC ACID (mg)	3mg	2.68	0.91	1.2	4.6		2.98	1.63	0.72	9.44		0.38	
CALCIUM (mg)	800mg	355.19	213.46	3	899	44.40	400.78	254.1	0	856	50.09	0.45	
PHOSPHORUS (mg)	800mg	903.42	361.01	302.95	1652	112.93	817.41	248.8	288	1213	102.18	0.29	
MAGNESIUM (mg)	80mg	310.58	119.43	95.39	548	388.23	299.17	106.6	85.68	523	373.97	0.70	
IRON(mg)	10mg	6.97	3.29	1.79	13.1	69.72	8.56	4.83	1.3	26.5	85.56	0.14	
ZINC(mg)	10mg	5.21	1.92	1.7	8.99	52.07	4.88	1.64	1.56	8.54	48.82	0.49	
MANGANESE (mg)	1.0-1.5mg	1.7	1.01	0.31	5.01		1.89	1.12	0.22	4.93		0.52	
COPPER (mg)	0.7-1.0mg	0.73	0.28	0.25	1.24		0.79	0.29	0.13	1.36		0.43	
POTASSIUM (mg)	1000-1400 mg(min)	1855.8	699.88	606.2	3766		1885.9	572.7	422	3172		0.86	
SODIUM(mg)	225-300 mg (min)	634.03	491.84	95.56	2036		439.38	322.6	1	1358		0.08	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test
MP = Makapanstad area
MT =Mathibestad area

In Table 58-60 the RDA(1989) values were used as the standard reference values. Three age groups had to be formed (0-6, 7-12 and 13-36 month old children) to correspond with the RDA age grouping.

The 0-6 month old babies in both groups had a higher plant protein intake than animal protein intake (without the contribution of breast milk intake). As expected, the cholesterol intakes were far below the recommended minimum intake. This might be due to the fact that not much additional food to the milk feeds were given to babies of this age. Although none of these values showed a significant difference between the clinics, it was clear from the results that more cholesterol-rich foods were consumed in the Mathibestad area. Even with the limited additional animal food intake, the babies from both groups had an adequate intake of both vitamin B_{12} (156.41%) and biotin. For all the other nutrients, the contribution of breast milk intake was included. The energy intake of both groups of children were just inadequate. As no safety margin has been included in the energy recommendations, the children should consume 100% of the energy reference value (14, 29, 83). In both the Makapanstad and Mathibestad areas the energy intake varied between 88-90% of the recommended value (there was no significant difference between the clinics, P=0.19). This is also similar to reports from a study in Cape Town where between 6-9% of the children had energy intakes <67%RDA (101). The total protein intake (84.14-84.34% of the reference value) compared well between the clinics; thus still considered to be adequate. In both clinics the total protein intake contributed only about 8% of the total energy consumed (calculated from the mean intake values). This was below the dietary recommendations of 12-15% (Dietary Goals and Diet and Health, NRC)(see Table 61)(14, 29).

TABLE 61: SUMMARY OF DIETARY RECOMMENDATIONS BY AMERICANS

NUTRIENT	U.S.DIETARY GOALS, 1977	DIET AND HEALTH (NRC) 1989
Protein	12%	12-15%
Carbohydrate	58%	≥ 55%
Fat	≤ 30%	≤ 30%

(Compiled from 14, 29)

Research reported indicated intakes of 13% of protein for both a reference group (RefG) and a failure to thrive group (FTTG) in Cape Town(101) and 10-14% of protein intakes for Africans generally(17). When considering the fat intake, there was a significant difference (P=0.01) in the mean fat intakes between the two clinics. The children from the Mathibestad area were consuming more fat. The fat intake contributed between 33-34% of the total energy intake. This was higher than the recommended intake of 30% and also higher than reported intakes of 10-25% for Africans generally (17). It was a little lower than the 39% reported for the RefG and 35% for the FTTG in Cape Town (101). The carbohydrate intake was 60% in both areas which compared well with the recommendations of 55-58% (see Table 61). It was however lower than intakes (65-80%) reported for Africans generally (17), and higher than the intakes reported in Cape Town where the RefG had intakes of 50% and the FTTG 54% (101).

Nutrients that should be of concern due to a low intake, were vitamin D, niacin, calcium and phosphorus.

The vitamin D intake seemed low at only 46.05% in the Makapanstad area and 36.33% in the Mathibestad area. It should however be taken into consideration that vitamin D is also produced from the UV-rays from sunlight, which is abundant in South Africa. Children may survive in good health even on a diet almost completely devoid of vitamin D (14, 35). In this study nearly half of the reference value was consumed via the diet. Therefore it seemed unlikely that the children in these communities would have a problem with vitamin D deficiency. The niacin intake of both groups was also on the borderline of a deficient intake. Although niacin is converted from tryptophan in the body, diets high in maize may not aid in this relationship due to the fact that the maize protein, zein, is deficient in tryptophan (35). The calcium and phosphorus intakes were very low. The calcium intake was 52.77% and 43.83% in the Makapanstad and Mathibestad areas respectively, and the phosphorus intake was 62.25% and 75.58% respectively. These values were below the 67% level of intake (except for the phosphorus intake in the Mathibestad area) and could thus be considered inadequate and of concern. The zinc intakes in both areas were quite low. Intakes varied between 45.02% in the Makapanstad area and 39.45% in the Mathibestad area. There is little evidence to suggest that zinc deficiency is an important public health problem (14, 35). However, Latham (1997:108)(35) suggests that current research may indicate that poor zinc status is responsible among others for poor growth and reduced appetite and would thus contribute to PEM. Young people during periods of active growth are at greatest risk of impaired body function and growth because growing tissues with their need for rapid cell division requires zinc (14). The role of mild zinc deficiency in growth and development still needs to be clarified (102). The anthropometrical results showed that the children in this study group showed a decreased growth from the age of six months (see 7.2). As height deviations manifest more slowly, the impact of low nutrient intakes might have started in the first few months after birth already. The vitamin A status of children's diets is almost always of concern when PEM is mentioned. In this study however, the vitamin A intake was adequate with intakes of 112.24% and 125.83% in the Makapanstad and Mathibestad areas respectively. All the other nutrients were consumed adequately. The only vitamin that showed an "excessive" intake, was folate, which was consumed up to 217.05% and 288.69% of the recommended intake (54.26μg and 72.17μg in the Makapanstad and Mathibestad areas respectively, versus 25μg recommended). There was a significant difference between the intakes of the children in the Makapanstad area and Mathibestad areas. The Mathibestad area children had a significantly higher intake of folate (P=0.002). This might be due to the high intake of milk (providing 6μg/100mL; thus an intake of 48μg if 800mL of milk was consumed) at this stage of their lives, as well as a high intake of orange juice, green leafy vegetables like merogo, legumes (soya products) and peanut butter (14, 35). According to Guthrie (1995:454)(14) most diets will provide 200-400μg of folate which would stabilize red cell folate levels for over 90% of the population.

The 7-12 month age group the older children had a higher energy intake of 113.67-114.75% which indicated an overconsumption of energy-rich food sources, which was also apparent in the anthropometric evaluation of this age group. These results differ from the research findings from a food consumption study done in Zambia where infants (aged 6-9 months) had median energy intakes ranged from 57-80% (103). The total protein intake was high, 169.57 versus 165.09% in the Makapanstad area and Mathibestad area respectively; it also compared well between the clinics. The infants in Zambia however had median protein intakes of 57-80%(103). In both clinics the total protein intake contributed only about 9% of the total energy intake (see Table 61)(14, 29), which was lower than the previously reported protein intakes of 10-14% for

Africans generally(17), 13% for both a reference group(RefG) and a failure to thrive group(FTTG) in Cape Town (101) and 11% for the infant group in Zambia (103). There was a significant difference (P=0.03) between the mean fat intakes of the two clinics (25.69g versus 28.92g in the Makapanstad and Mathibestad areas respectively). About 25% of the total energy intake was contributed by fat, which was below the recommended intake of 30%, but similar to previous research results where fat intakes varied between 10-25% for Africans generally (17), 12% for the infant group in Zambia (103) and a little lower than the 39% reported for the RefG and 35% for the FTTG in Cape Town (101). The carbohydrate content of the diet was high; 67% of the total energy intake in the Makapanstad area and 74% in the Mathibestad area, which also compared well with results on carbohydrate intakes that varied between 65-80% for Africans generally (17), 70% for the infant group in Zambia (103) and higher than the intakes reported in Cape Town where the RefG had intakes of 50% and the FTTG 54% (101). Biotin intakes were less than the reference values. Similar to the 0-6 month age group, the vitamin D levels were low; 32.96 versus 36.59% in the Makapanstad area and Mathibestad area respectively, but the niacin intakes were adequate. The calcium intake however was even lower than in the previous age group; 45.13% and 50.70% in the Makapanstad area and Mathibestad areas respectively. This is similar to the infant group in Zambia where the median calcium intakes was even lower at only 26%(103). In this age group the iron intake was lower than in the previous group. There was a significant difference (P=0.04) between the mean iron intakes of the two clinics (4.66mg in the Makapanstad area and 5.34mg in the Mathibestad area). The reference value is 10mg/day indicating that intakes varied between 47-53% compared to 10% median iron intake in the infant group in Zambia (103). Zinc intakes were also below the recommended levels, but to a lesser extent than in the previous group (62.56 and 73.74% in the Makapanstad area and Mathibestad areas respectively). All the other nutrients were consumed in adequate quantities in this age category. There were significant differences in the intakes of vitamins E (P=0.01), vitamin C (P=0.06), riboflavin (P=0.01), pyridoxine (P=0.00), folate (P=0.01) and pantothenic acid (P=0.06) between the two clinics. Intakes of all these nutrients, except pantothenic acid, were well above the reference values. The pantothenic acid intake (71% and 85% in the Makapanstad and Mathibestad areas respectively) was adequate (above the 67% cut-off point) even though it was below the reference intake value.

For the third age group (children between the ages of 13-36 months of age) similar results were found. With the increase in age, the quantity of food intake increased and thus the energy intake. These children had high energy intakes of 146-127% (mean energy intakes varied between 5931-6466kJ) which indicated a probable overconsumption of energy of up to 50%. This result compared well with findings reported in Cape Town where the RefG had a mean energy intake of 6646kJ and the FTTG had a mean intake of 5979kJ (101). The energy intake of the toddler group (14-20 months of age) in Zambia were much lower at 4850kJ or 70% of the recommended value (103). The total protein intake was above the reference value, varying between 346.69 versus 316.25% in the Makapanstad and Mathibestad areas respectively. The mean protein contribution to the diet in both clinics were equal, contributing about 10-11% of the total energy intake (43.39-41.68g/day) which was similar to the lower range of reported intakes of 10-14% in Africans generally (17), and less than the 13% for both a reference group(RefG) and a failure to thrive group(FTTG) in Cape Town (101) or the 15% (24g) intake of the toddler group in Zambia (103). The mean fat intake in the two clinics contributed about 20-22% of the total energy intake (35,51-36,41g/day), which was below the recommended fat intake of 30% and similar to the previously reported intakes of 10-25% for

Africans generally (17) or 13% (26g) for the toddler group in Zambia (103), and much lower than the 39% (68,6g) reported for the RefG and 35% (55,6g) for the FTTG in Cape Town (101). The mean carbohydrate content of the diet contributed 74-75% of the total energy intake (260-289g/day) which was also similar to the previous reports of 65-80% of intake for Africans generally (17), but lower than the 69% (114g) mean intakes of toddlers in Zambia (103), and higher than the intakes reported in Cape Town where the RefG had intakes of 50% (186g) and the FTTG 54% (182g)(101). Although the children in both groups had higher plant protein than animal protein intakes(31.96g plant and 10.69g animal proteins in the Makapanstad area versus 31.78g plant and 9.41g animal proteins in the Mathibestad area), the fibre content of their diets was still far below the acceptable level of more than 20g/day (14.55 and 16.00g/day in the Makapanstad and Mathibestad areas respectively). The Cape Town study reported intakes of 10.2g/day for the FTTG and 11.7g/day for the RefG (101). This compared well with the intakes reported for South African preschool children where it was found that the rural black children had the lowest fibre intake (12%) of all population groups(104). For the micronutrient intakes similar results occurred in this age group than in the younger age groups. The biotin intake was below the reference value but above the fixed cut-off point. The vitamin D intake levels were low; 35.17% versus 34.13% in the Makapanstad and Mathibestad areas respectively. The niacin intakes were bordering on low, with intakes of 63% and 69% respectively in the Makapanstad and Mathibestad areas. The Cape Town study also reported low niacin intakes where 13% of the RefG and 39% of the FTTG had intakes <67%RDA (101). The calcium intake was on the same low level than that of the previous age groups; 44.40% and 50.09% in the Makapanstad area and Mathibestad areas respectively. This compared well with the 40% intake in the toddler group in Zambia (103). The Cape Town study reported much higher mean calcium intakes of 777-836mg, but 48% of the RefG and 39% of the FTTG still had intakes <67%RDA (101). The iron intake improved from the previous low levels to safe intake levels above the fixed cutoff-point, namely 70-85% (6.97-8.56mg). The Cape Town study reported much lower iron intakes of 5.4-6.1mg/day where 71% of the RefG and 81% of the FTTG had intakes <67%RDA (101) and the toddler group in Zambia had intakes of 42%(103). Zinc intakes remained below the recommended levels; 52.07% and 48.82% in the Makapanstad and Mathibestad areas respectively. The Cape Town study also reported low zinc intakes where 58% of the RefG and 55% of the FTTG had intakes <67%RDA (101). All the other nutrients were consumed in adequate quantities. This could probably be explained in terms of the children eating a more varied diet than the babies and children in the weaning stage. There was for one nutrient only (pyridoxine) a significant difference (P=0.05) in the intakes between the two clinics. The intake of pyridoxine was however within the acceptable range varying between 82.67% and 103.90% in the Makapanstad and the Mathibestad areas respectively.

TABLE 62: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 0-6 MONTHS(n=55) IN THE TWO CLINICS (WHO AS REFERENCE VALUE)

AGE 0-6 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=26)					MATHIBESTAD (n=29)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	WHO VALUE (1996)(97)	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	1995kJ	2274.46	863.22	420.00	4327.00	114.01	2638.97	1142.97	1529.00	5215.00	132.28	0.19	
PROTEIN(g)	9.1g	10.89	6.19	1.40	24.70	119.69	12.15	8.16	5.60	41.60	133.49	0.53	
VITAMIN A (μg RE)	350μg	420.89	116.85	120.12	754.00	120.25	471.86	146.50	241.00	991.00	134.82	0.16	
IRON (low bio-available)(mg)	21mg	-	-	-	-	23.85	-	-	-	-	15.69	-	
IRON (medium bio-available) (mg)	11mg	-	-	-	-	45.52	-	-	-	-	29.95	-	
IRON (high bio-available) (mg)	7mg	5.01	7.22	0.05	30.39	71.53	3.29	4.83	0.19	18.89	47.06	0.30	
ZINC(mg)	4mg	2.25	1.49	0.25	6.65	56.27	1.97	1.26	0.50	5.56	49.31	0.46	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test.
MP = Makapanstad area
MT =Mathibestad area

TABLE 63: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 7-9 MONTHS(n=29) IN THE TWO CLINICS (WHO AS REFERENCE VALUE)

AGE 7-9 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=15)					MATHIBESTAD (n=14)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	WHO VALUE (1996)(97)	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	2856kJ	3177.93	645.49	1951.00	4547.00	111.27	4007.07	1303.40	2738.00	7882.00	140.30	0.04*	
PROTEIN (g)	9.1g	17.89	4.44	8 .80	25.30	196.63	19.69	6.92	11.80	35.40	216.33	0.41	
VITAMIN A (μg RE)	350μg	431.91	233.99	228.12	1089.00	123.40	439.63	98.36	241.00	597.25	125.61	0.91	
IRON (low bio-available)(mg)	21mg	-	-	-	-	22.35	-	-	-	-	25.94	-	
IRON (medium bio-available) (mg)	11mg	-	-	-	-	42.67	-	-	-	-	49.53	-	
IRON (high bio-available) (mg)	7mg	4.69	5.12	0.89	21.95	67.06	5.45	2.57	0.99	10.75	77.83	0.62	
ZINC(mg)	5mg	2.63	1.05	1.48	5.82	52.61	3.44	0.86	1.48	4.16	68.73	0.03*	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test.
MP = Makapanstad area
MT =Mathibestad area

TABLE 64: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 10-12 MONTHS(n=27) IN THE TWO CLINICS (WHO AS REFERENCE VALUE)

AGE 10-12 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=11)					MATHIBESTAD (n=16)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	WHO VALUE (1996)(97)	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	3486kJ	4892.64	2046.48	2465.00	8182.00	138.54	4152.75	987.08	2333.00	6023.00	119.13	0.26	
PROTEIN (g)	9.6g	28.04	13.28	9.30	47.90	292.04	25.51	12.73	14.10	65.90	265.69	0.62	
VITAMIN A (μg RE)	350μg	451.08	332.45	129.12	1108.12	128.88	521.09	482.19	252.12	2305.00	148.88	0.68	
IRON (low bio-available) (Mg)	21mg	-	-	-	-	21.96	-	-	-	-	24.99	-	
IRON (medium bio-available) (mg)	11mg	-	-	-	-	41.92	-	-	-	-	47.72	-	
IRON (high bio-available (mg)	7mg	4.61	2.86	0.79	11.10	65.87	5.25	2.15	2.59	10.09	74.98	0.51	
ZINC(mg)	5mg	3.81	1.83	1.29	7.76	76.13	3.91	1.95	2.23	10.71	78.14	0.89	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test.
MP = Makapanstad area
MT =Mathibestad area

TABLE 65: COMPARISON OF THE MEAN NUTRIENT INTAKES OF CHILDREN AGED 13-36 MONTHS(n=60) IN THE TWO CLINICS (WHO AS REFERENCE VALUE)

AGE 13-36 MONTHS		NUTRIENT INTAKES											
		MAKAPANSTAD (n=32)					MATHIBESTAD (n=28)					COMPARISON OF CLINICS (MP versus MT)	
NUTRIENT	WHO VALUE (1996)(97)	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	MEAN	SD	RANGE		MEAN INTAKE AS % OF WHO VALUE	P-VALUE*	
				MIN	MAX				MIN	MAX		t-TEST	MANN-WHITNEY**
A. ADAPTED INTAKE VALUES (WITH BREAST MILK VALUES ADDED)													
ENERGY (kJ)	4620kJ	6466.81	2099.98	2432.00	9917.00	139.97	5931.36	1995.09	1047.00	10544.00	128.38	0.32	
PROTEIN (g)	10.9g	43.93	17.21	13.70	81.30	398.11	41.68	15.47	14.40	74.60	382.41	0.69	
VITAMIN A (μg RE)	400μg	315.77	201.11	44.00	840.00	78.94	427.16	391.11	0	1499.00	106.79	0.16	
IRON (low bio-available) (mg)	12mg	-	-	-	-	58.09	-	-	-	-	71.30	-	
IRON (medium bio-available) (Mg)	6mg	-	-	-	-	116.19	-	-	-	-	142.60	-	
IRON (high bio-available) (mg)	4mg	6.97	3.29	1.79	13.10	174.29	8.56	4.83	1.30	26.50	213.90	0.14	
ZINC(mg)	6.5mg	5.21	1.92	1.7	8.99	80.11	4.88	1.64	1.56	8.54	75.11	0.49	

- = no RDA value available
* P-values (significant when <0.05) are reported for Student's t-test
** Mann-Whitney p-value reported and accepted when conclusion differs from that of Student's t-test.
MP = Makapanstad area
MT =Mathibestad area

In Table 62-65 the WHO values were used as the standard reference for energy, protein, vitamin A, iron and zinc. These values allow for three groups of iron reference values. The nutrient analysis programme used does not differentiate between the different levels of iron bioavailability in foods. Only the high bioavailable iron as analyzed in the food composition tables were therefore compared to the reference values. For the purpose of this evaluation, four age groups were formed in order to correspond with the age groups used in the standard reference values. These age groups were 0-6, 7-9, 10-12 and 13-36 month old children. The results of each age group are presented separately, and compared between clinics.

In the first age group almost all the nutrients were consumed in adequate quantities, and most were consumed in excess of the reference values. The iron intake varied between 5.01mg (71.53%) in the Makapanstad area and 3.29mg (47.06%) in the Mathibestad area. The differences between the intakes were however not significant. The zinc intake was inadequate at levels of 56.27% and 49.31% of the reference value in the Makapanstad area and Mathibestad area respectively.

The pattern of nutrient intake was very similar for the second age group as well, with higher intakes of energy, protein and vitamin A. The intakes of iron and zinc were also higher than for the younger age group, but still below 100% of the reference value. The iron intakes varied between 67% and 78%. The zinc intakes were even lower and varied between 52% to 68%, which might be considered inadequate.

With the progressing age of the groups of children, the intakes also increased and the levels for energy, protein and vitamin A were above the reference intake values for both the third and fourth age groups. The vitamin A intake however decreased in the last age group to 78-106% of the reference intake. This may indicate a lower intake of fruit and vegetables as the child became fully weaned onto the family diet where a vitamin A rich food might not have been consumed on a daily basis. This compared well with the Cape Town study where vitamin A intakes were also high and only 10% of children in the FTTG and none of the children in the RefG had intakes <67%RDA. In contrast, the toddler group in Zambia had low intakes of vitamin A of only 70% of the reference value (103). In the 10 to 12 month age group, the iron intakes were questionable since the intakes ranged between 65% and 74%. This level of intake was inadequate in terms of the reference value. At this age the children still mainly consumed milk with very little solid food intake, thus contributing to the low iron value. For the 13 to 36 month age group however, the iron intake was above the probable 100% level of intake. This may be attributed to the fact that the children in this age group were consuming a full family diet with a bigger variety of foods that might have contributed to their iron intake. This result differed from the Cape Town study where 71-81% of children showed intakes <67%RDA (101). The zinc intakes of the last two groups were quite similar. The 10 to 12 month old children consumed approximately 76% and 78% of the reference value and the 13 to 36 month old children 80% and 75% in the Makapanstad and Mathibestad areas respectively. These intakes indicated an inadequate intake of zinc. None of the intakes differed significantly between the two clinics. This also compared well with the Cape Town study where 55-58% of the children showed intakes <67%RDA (101).

To summarize the results on the nutritional evaluation, it could be concluded that the children in these two communities consumed adequate quantities of energy and all the macronutrients compared to the dietary

recommendations. The protein intake (10-11% of total energy intake) compared well with the standard recommendation of 12-15% of total energy intake, the carbohydrates (67-75% of total energy intake) to the ≥55% recommendation, and the fat (21-25% of total energy intake) to the ≤30% recommendation (14, 29). It could be recommended to decrease the intake of starch rich foods to 60-65% and to increase the animal/ plant protein intake to 12-15%. The vitamin A intakes were adequate except for the 13-36 month age groups who had an intake lower than 100% of the reference values. The intake of iron-rich foods was fairly low, but still adequate if fixed cut-off points were implemented in the RDA-analysis. It may however be of value to consider the sources of iron (high bioavailable iron in animal sources and low bioavailable iron in plant sources) consumed in these communities as it may influence the iron availability and absorption (7, 14). The intake of zinc was also low in all the age groups according to both sets of standards. Zinc is an important nutrient involved in growth and a deficiency is associated with low protein and energy intakes leading to PEM (14, 35). The intakes of the other micronutrients were adequate (in terms of both sets of standards) except for vitamin B_3, vitamin D and calcium. Niacin intakes were either low or just above the fixed cut-off point of the reference standards. Niacin is essential in energy metabolism and is required in the synthesis of protein, fat and carbohydrates. Niacin intake is linked to the energy intake of the individual due to its role in energy release (14, 35). A minimum of 4.4mg NE of niacin is needed to prevent pellagra. This level was not achieved by the youngest two age groups (mean intakes of 3.48mg NE and 4.38mg NE for children aged 0-6/12 and 7-12/12 respectively), but was adequately achieved by the 13-36/12 age group (5.71mg NE). Niacin intakes should therefore receive attention in order to prevent pellagra. Vitamin D was consumed only to a level of about 35% of the reference value, which indicated a very low food intake. As both food and sunlight (which is abundant is SA) contribute to vitamin D status, it is generally not considered a problem (14). For infants and children vitamin D is an essential vitamin that ought to be present in the body to absorb and use calcium effectively (14). If both calcium and vitamin D are continuously deficient, rickets (reduced bone quality and normal bone quantity), reduced growth or osteomalacia may develop. In conjunction with the low vitamin D intakes, the calcium intakes hardly reached a level of 50% of the reference values in all age groups. It might therefore be of value to investigate both the vitamin D and calcium status of these children more closely to determine future problems like osteomalacia or rickets. In conclusion, dietary deficiencies in vitamin A, vitamin C, iodine, iron, zinc and calcium may lead to stunted growth, blindness, mental and physical handicaps, reduced immunity to infections, anaemia, apathy, anorexia, poor absorption and decreased total food intake and should be prevented (12, 64, 65). In these communities iron, calcium (and vitamin D) and zinc should be taken into consideration as critical nutrients when evaluating the growth of the children as they are all involved in/essential for growth and would thus affect the growth curves of children if all were inadequate in the diet.

In can be concluded that the nutritional evaluation revealed a tendency of low intakes of both the macro and micronutrients associated with growth and development especially during the weaning phase in the first two years of life; an increase in intakes of these nutrients seemed to occur with an increase in age.

The 24h-recall of dietary intake was used to determine the foods that were eaten most frequently in the three age groups (0-6, 7-12 and 13-36 month old children). Only 19 different food items were mentioned by all mothers / caregivers of the children in the 0-6/12 age group, 40 different food items were mentioned in the 7-12/12 age group, and 58 different food items were mentioned in the 13-36/12 age group. Some

of these were mentioned only once or twice. In the 0-6/12 age group the four most frequently mentioned foods comprised 63.5% of the total number of foods mentioned: soft maize meal porridge (26.9%), Nestum (13.9%), Purity: fruit/vegetables (11.3%) and Nan powder stirred into the soft porridge (11.3%). In the 7-12/12 age group the five most frequently mentioned foods comprised 47.3% of the total number of foods mentioned: soft maize meal porridge (18.6%), banana (11.1%), juice - commercial, sweetened (6.09%), Nan powder stirred into the soft porridge (5.7%) and orange (5.7%). In the 13-36/12 age group the five most frequently mentioned foods comprised 39.9% of the total number of foods mentioned: stiff maize meal porridge (9.5%), soft maize meal porridge (8.2%), sugar (7.9%), brown bread (7.3%) and Nespray powder stirred into the soft porridge or drunk as milk (11.3%). The ten most frequently mentioned foods consumed by the children in each of the three mentioned age groups, ranked from the most frequently mentioned to least frequently mentioned, are:

0 - 6 MONTHS	7 - 12 MONTHS	13 - 36 MONTHS
Soft maize meal porridge	Soft maize meal porridge	Stiff maize meal porridge
Nestum	Banana	Soft maize meal porridge
Purity - fruit / vegetables	Juice - artificial, sweetened	Sugar
Nan powder stirred into soft porridge	Nan powder stirred into soft porridge	Brown bread
Banana	Orange	Nespray - in food / as a drink
Lactogen powder stirred into soft porridge	Sugar	Banana
Orange	Nespray - in food / as a drink	Soya mince
S_{26} powder stirred into soft porridge	Brown bread	Juice - artificial, sweetened
Marie biscuits	Chips / cheese curls	Rooibos tea
Juice - artificial, sweetened	Stiff maize meal porridge	Margarine

All the other foods mentioned were consumed very infrequently, including fruits like apples, oranges; vegetables like spinach, tomato and onion, potato and cabbage; margarine, oil, peanut butter, soya mince, commercial instant soups, artificial fruit juice and tea. It can be concluded that the variety of food consumed was limited and that protein-rich food, vegetables and fruits were consumed very infrequently.

7.4 FOOD SECURITY

The measurement of the phenomena of hunger and food security was done by means of the the Radimer/Cornell Hunger Scale (42)(see Chapter 5). Each mother / caregiver completed a hunger scale questionnaire individually by means of a structured interview. The results are presented in Table 66 according to the different sections of the hunger scale.

TABLE 66: RESULTS FROM THE HUNGER SCALE (N=174)

CLINIC	TYPE OF RESPONSE	RESPONSES (%)						CLINIC COMPARISON FOR INDIVIDUALS CHI-SQUARE (P-VALUE*)
		NEVER		SOMETIMES		MOST TIMES		
HOUSEHOLD HUNGER								
1. Do you worry that your food will run out before you get money to buy more?								
MAKAPANSTAD	INDIVIDUAL (n=85)	24	(28.24)	21	(24.71)	40	(47.06)	
MATHIBESTAD	INDIVIDUAL (n=89)	28	(31.46)	56	(62.92)	5	(5.62)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	52	(29.89)	77	(44.25)	45	(25.86)	43.37 (0.001)*
2. Does the food that you buy last until you get money to buy more?								
MAKAPANSTAD	INDIVIDUAL (n=85)	45	(52.94)	18	(21.18)	22	(25.88)	
MATHIBESTAD	INDIVIDUAL (n=89)	25	(28.09)	50	(56.18)	14	(15.73)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	70	(40.23)	68	(39.08)	36	(20.69)	22.47 (0.001)*
3. Do you run out of foods to prepare a meal with, without having any money to buy more?								
MAKAPANSTAD	INDIVIDUAL (n=85)	19	(22.35)	39	(45.88)	27	(31.76)	
MATHIBESTAD	INDIVIDUAL (n=89)	55	(61.80)	29	(32.58)	5	(5.62)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	74	(42.53)	68	(39.08)	32	(18.39)	34.04 (0.001)*
4. Do you worry that you will have food to eat tomorrow?								
MAKAPANSTAD	INDIVIDUAL (n=85)	24	(28.24)	24	(28.24)	37	(43.53)	
MATHIBESTAD	INDIVIDUAL (n=89)	29	(32.58)	55	(61.80)	5	(5.62)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	53	(30.46)	79	(45.40)	42	(24.14)	36.95 (0.001)*
5. Can you afford to buy the kind of foods that you think your family should eat?								
MAKAPANSTAD	INDIVIDUAL (n=85)	49	(57.65)	23	(27.06)	13	(15.29)	
MATHIBESTAD	INDIVIDUAL (n=89)	31	(34.83)	51	(57.30)	7	(7.87)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	80	(45.98)	74	(42.53)	20	(11.49)	16.36 (0.001)*
WOMEN'S HUNGER								
6. Do you have enough money to eat the way you should?								
MAKAPANSTAD	INDIVIDUAL (n=85)	71	(83.53)	8	(9.414)	6	(7.06)	
MATHIBESTAD	INDIVIDUAL (n=89)	56	(62.92)	27	(30.34)	6	(6.74)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	127	(72.99)	35	(20.11)	12	(6.90)	12.00 (0.002)*
7. Are your money enough to buy enough food to keep you from getting hungry?								
MAKAPANSTAD	INDIVIDUAL (n=85)	60	(72.29)	15	(18.07)	8	(9.64)	
MATHIBESTAD	INDIVIDUAL (n=89)	22	(24.72)	62	(69.66)	5	(5.62)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	82	(47.67)	77	(44.77)	13	(7.56)	46.84 (0.001)*
8. Are you most of the times hungry, but you don't eat because you can't afford enough food?								
MAKAPANSTAD	INDIVIDUAL (n=85)	19	(22.62)	29	(34.52)	36	(42.86)	
MATHIBESTAD	INDIVIDUAL (n=89)	59	(66.29)	26	(29.21)	4	(4.49)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	78	(45.09)	55	(31.79)	40	(23.12)	46.17 (0.001)*

CLINIC	TYPE OF RESPONSE	RESPONSES (%)						CLINIC COMPARISON FOR INDIVIDUALS CHI-SQUARE (P-VALUE*)
		NEVER		SOMETIMES		MOST TIMES		
9. Do you eat less than you think you should, because you don't have enough money for food?								
MAKAPANSTAD	INDIVIDUAL (n=85)	21	(25.00)	26	(30.95)	37	(44.05)	
MATHIBESTAD	INDIVIDUAL (n=89)	37	(41.57)	46	(51.69)	6	(6.74)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	58	(33.53)	72	(41.62)	43	(24.86)	32.20 (0.001)*
CHILDREN'S HUNGER								
10. Do you have enough money to give your child(ren) a good meal?								
MAKAPANSTAD	INDIVIDUAL (n=85)	57	(67.86)	16	(19.05)	11	(13.10)	
MATHIBESTAD	INDIVIDUAL (n=89)	39	(43.82)	46	(51.69)	4	(4.49)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	96	(55.49)	62	(35.84)	15	(8.67)	21.03 (0.001)*
11. Do you have enough money to feed your child(ren) the way you think is right?								
MAKAPANSTAD	INDIVIDUAL (n=85)	64	(75.29)	11	(12.94)	10	(11.76)	
MATHIBESTAD	INDIVIDUAL (n=89)	38	(42.70)	45	(50.56)	6	(6.74)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	102	(58.62)	56	(32.18)	16	(9.20)	28.19 (0.001)*
12. Do you have enough money to give your child(ren) enough food?								
MAKAPANSTAD	INDIVIDUAL (n=85)	64	(75.29)	11	(12.94)	10	(11.76)	
MATHIBESTAD	INDIVIDUAL (n=89)	39	(43.82)	43	(48.31)	7	(7.87)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	103	(59.20)	54	(31.03)	17	(9.77)	25.48 (0.001)*
13. Is/are your child(ren) sometimes hungry because you don't have enough money to buy food?								
MAKAPANSTAD	INDIVIDUAL (n=85)	25	(29.41)	22	(25.88)	38	(44.71)	
MATHIBESTAD	INDIVIDUAL (n=89)	68	(76.40)	18	(20.22)	3	(3.37)	
TOTAL (BOTH CLINICS)	INDIVIDUAL (n=174)	93	(53.45)	40	(22.99)	41	(23.56)	50.09 (0.001)*

* P<0.05

7.4.1 HOUSEHOLD HUNGER

The items (five questions) directed at the household hunger included questions about food depletion, food unsuitability, food anxiety and food acquisition.

First the mother's worry concerning the fact that the food would run out before she had any more money to buy food again was evaluated. There was a significant difference (P=0.001) between the responses from the two clinics, especially concerning the positive and intermediate responses. However, the number of mothers / caregivers indicating that they were **never** concerned about not having any money to buy food, was the same in both clinics. The mothers / caregivers (n=77, 44.25%) indicated that they worried only **sometimes** about food running out without having any money to buy more food.

In the second question it was asked directly if the food ran out before the mother got money to buy food again. The majority of mothers / caregivers from the Makapanstad area (n=45, 52.94%) indicated that their food never lasted until they got more money, versus the Mathibestad area (n=25, 28.09%). There was a significant difference (P=0.001) between the responses from the two clinics. For the whole group the results were almost the same for the food **never** lasting (n=70, 40.23%) and the food **sometimes** lasting (n=68, 39.08%) and the least for food lasting **most times** (n=3, 11.54%).

Question three could be regarded as a cross-control question for question two where it was asked whether they ran out of foods to prepare a meal with. Most of the mothers / caregivers from the Makapanstad area (n=39, 45.88%) indicated that they only **sometimes** ran out of foods to prepare a meal with without having any money to buy more while the majority of the mothers / caregivers from the Mathibestad area (n=55, 61.80%) **never** ran out of food. There was a significant difference in the responses between the two clinics (P=0.001). For the total group of mothers / caregivers most of the responses showed that they **never** (n=74, 42.53%) or **sometimes** (n=68, 39.08%) ran out of food, with the least number of responses (n=32, 18.39%) indicating that they ran out of food **most times**.

The next question (fourth) was more specific and asked about worrying if they would have food to eat the next day (tomorrow). These results compared well with those of the previous question. The mothers / caregivers from the Makapanstad area gave most responses for worrying **most times** (n=37, 43.53%), and the mothers / caregivers from the Mathibestad area gave most responses for worrying **sometimes** (n=55, 61.80%). The totals for the individual responses tended to be towards the intermediate (n=79, 45.40%) and negative responses (n=53, 30.46%).

The last question in this category was about the buying power of the household. Most of the mothers / caregivers from the Makapanstad area (n=49, 57.65%) and some mothers / caregivers from the Mathibestad area (n=31, 34.83%) said that they **never** could afford to buy the kind of foods that they thought their family should eat. There was a significant difference (P=0.001) between the responses from the two clinics. The majority of the mothers / caregivers from the Mathibestad area (n=51, 57.30%) indicated that they **sometimes** could afford to buy the kinds of foods that they thought their family should eat. Only 27.06% (n=23) of the mothers / caregivers from the Makapanstad area responded in this way. Only about 11% of the total group of mothers / caregivers said that they could buy the foods that they thought was necessary for the family.

From these questions asked on household hunger, it could be concluded that about 30% of the answers indicated no worry about not being able to buy foods, and 21% of the responses indicated that the foods mostly lasted until they were able to buy more food. Only 18% of the mothers / caregivers actually ran out of food and 40% **never** ran out of food. Almost 60-70% (sum of scores for never and sometimes or for sometimes and most times) of the people perceived they were not food secure in their households. The mothers / caregivers **never** (n=53, 30.46%) or only **sometimes** (n=79, 45.40%) worried about the food for tomorrow. Only 12% of the mothers / caregivers indicated that they had enough money to buy what they thought was necessary, thus suggesting that at least 88% of the people had the perception that they could

not afford the kind of foods that the family should eat.

In conclusion: referring to the significant differences ($P<0.05$) between the responses of the two clinics, it could be concluded that there was a difference in their experience of household food security. The mothers / caregivers from the Makapanstad area responded to four out of the five questions mainly to the worst scenario offered. The mothers / caregivers from the Makapanstad area could therefore be classified as food insecure in terms of household hunger, as all their responses indicated towards always worrying about the availability of money and food, and actually running out of food to prepare meals with. The mothers / caregivers from the Mathibestad area on the other hand, responded to four out of the five questions mainly with the intermediate response indicating that running out of foods was not a real problem. This might indicate that the Mathibestad area could be classified as having only moderate food insecurity as most of their responses pointed towards the middle or least serious responses.

7.4.2 INDIVIDUAL HUNGER: WOMEN'S HUNGER

The items directed at individual hunger of both the mother and the mothers' perception of her child's hunger included questions about intake insufficiency, diet inadequacy, disrupted eating patterns and feeling deprived. This section was divided in that of women's hunger and children's hunger, with four questions each.

The first question on women's hunger dealt with the issue of having enough money to eat the way that the mothers / caregivers thought that they should. The majority of the mothers / caregivers from the Makapanstad area (n=71, 83.53%) indicated that they **never** had enough money. The majority of the responses from the Mathibestad area (n=56, 62.92%) were following the same trend, although less pronounced. The responses from the Mathibestad area were significantly different ($P=0.002$) to that of the Makapanstad area. The total responses from the mothers / caregivers followed the same pattern with the majority of responses (n=127, 72.99%) indicating that they **never** had enough money to eat the way they thought they should. Only 6.90% of the mothers / caregivers indicated that they had enough money to eat the way they should **most times**.

The second question focused more on the availability of money to obtain enough food to prevent hunger. Most of the mothers / caregivers from the Makapanstad area (n=60, 72.29%) again indicated that they **never** had enough money for food in order to prevent hunger. The mothers / caregivers from the Mathibestad area had a significantly different ($P=0.001$) response to this. They mostly chose the moderate answer of **sometimes** (n=62, 69.66%), with only a few indicating a high need (n=22, 24.72%). The total response rate for the mothers / caregivers favoured the negative answer more (n=82, 47.67%) with only 7.56% indicating that they mostly had enough money to prevent hunger.

The third question focused on the mothers / caregivers being hungry most of the time without being able to relieve this hunger due to little money available. The majority of the Makapanstad area mothers / caregivers (n=36, 42.86) reacted in the worst way by responding to being hungry **most times**. Fewer

mothers / caregivers reacted to the intermediate response of **sometimes** (n=29, 34.52%) and less to the positive response of **never** being hungry most of the time without being able to afford food (n=19, 22.62%). There was a significant difference (P=0.001) in the responses between the two clinics. The mothers / caregivers from the Mathibestad area reacted in the opposite way. Most of the mothers / caregivers (n=59, 66.29%) said that they **never** were hungry most of the time and least of the mothers / caregivers (n=4, 4.49%) said that they were hungry **most times**. Considering the total number of responses, the lack of money seemed less a problem with the majority of the mothers / caregivers indicating that they were **never** hungry (n=78, 45.09%) and only a few mothers / caregivers being hungry **most times** (n=40, 23.12%).

In conclusion: these responses were clearly showing that the mothers / caregivers from the Mathibestad area were less influenced by the lack of money and perceived themselves less food insecure than in the Makapanstad area. It seemed that hunger and a lack of money was apparent in both areas, but that the perception existed that not all the people were hungry and lacking money to buy food constantly. Most of the mothers / caregivers could afford food to prevent extreme hunger; more so in the Mathibestad area.

The last question was about the volume of food consumed with direct relation to the amount of money available to buy the food. The majority of the mothers / caregivers from the Makapanstad area (n=37, 44.05%) indicated an intake less than what they thought they should have. There was a significant difference (P=0.001) in the responses between the two clinics. The majority of the mothers / caregivers from the Mathibestad area perceived their situation more positively indicating that they **sometimes** (n=46, 51.69%) or **never** (n=37, 41.57%) ate less than they thought they should. The total responses of the group of mothers / caregivers pointed towards the intermediate response of **sometimes** (n=72, 41.62%) and **never** (n=58, 33.53%).

From these questions asked about women's hunger, it could be concluded that only about 7% of the responses showed that enough money was **most times** available to the mothers / caregivers to eat the way that they thought they should. Most of the mothers / caregivers considered themselves as **never** (73%) or only **sometimes** (20%) having enough money to buy the foods they wanted. Approximately 92%(sum of scores for never and sometimes) of all the mothers / caregivers indicated that they **never** or only **sometimes** had enough money to buy enough food to prevent hunger. Only 23% of the mothers / caregivers were hungry **most times**, and not able to eat enough due to a lack of money to buy food with. If the intermediate response was also taken into account almost 55% of these two communities were food insecure. About 25% of the group of mothers / caregivers said that they **most times** ate less than they thought they should due to a lack of money. If the intermediate responses were also taken into account, about 65% of all the mothers / caregivers were not taking in enough food. This however should be regarded as a perception only and not indicative of food insecurity.

In conclusion: referring to the significant differences (P<0.05) between the responses of the two clinics, women's hunger was experienced differently. For all the questions asked the majority of mothers / caregivers from the Makapanstad area always responded to the worst scenario offered. The mothers / caregivers from the Makapanstad area could therefore be classified as hungry / food insecure in terms of

women's hunger. The mothers / caregivers from the Mathibestad area on the other hand, responded only to the money-related question as **never** having enough money. For the other questions the majority of responses were for the intermediate response (**sometimes**) or the positive response (**most times**). This showed that the people probably had enough food for the prevention of hunger, but perceived not to have access to the high quality nutritious foods / luxury food items as they would have liked to buy and therefore considered themselves as not having enough money.

7.4.3 INDIVIDUAL HUNGER: CHILDREN'S HUNGER

This section on individual hunger (children's hunger) consisted of four items about intake insufficiency, diet inadequacy, disrupted eating patterns and feeling deprived.

The first question asked if the mothers / caregivers thought that they had enough money to give their children a good meal. The majority of the mothers / caregivers from the Makapanstad area (n=57, 67.86%) responded to the worst scenario of **never** having enough money to provide a good meal. The Mathibestad area mothers / caregivers (n=46, 51.69%) mostly responded to **sometimes** having enough money for a good meal. The least responses were constantly given for having enough money to give children a good meal **most times** (Makapanstad area: n=11, 13.10% and Mathibestad area: n=4, 4.49%). However, there still was a significant difference (P=0.001) in the responses between the two clinics. The total number of responses from all the mothers / caregivers in these communities showed the high value they put on having enough money to give children a good meal as they mostly felt that they **never** (n=96, 55.49%) had enough money for a good meal and hardly ever had enough money **most times** (n=15, 8.67%).

The second question asked if enough money was available to feed the children the way that the mothers / caregivers thought was right. The majority of the mothers / caregivers from the Makapanstad area (n=64, 75.29%) said that they **never** had enough money to feed the children the way that they thought was right. The most popular response in the Mathibestad area (n=45, 50.56%) was **sometimes** and then **never** (n=38, 42.70%). There was a significant difference (P=0.001) in the responses between the two clinics. The total responses of the mothers / caregivers for this question favoured the negative response (**never**) (n=102, 58.62%) with **most times** almost unmentioned (n=16, 9.20%).

The third question was about money and food on a different level. Where the first question queried if money was enough for a good meal, and the second question asked if the money was enough to feed the way they thought was right, the third question addressed the actual hunger issue and asked if the money was enough to give enough food to the child. The majority of the mothers / caregivers from the Makapanstad area (n=64, 75.29%) indicated the worst scenario where they **never** had enough money to give the children enough food. There again was a significant difference (P=0.001) in the responses between the two clinics. The majority of the mothers / caregivers from the Mathibestad area (n=43, 48.31%) perceived that they only **sometimes** did not have enough money to give their children enough food. The total of the individual responses showed that these mothers / caregivers clearly perceived that they **never** had enough money to buy enough food (n=103, 59.20%), or only had enough **sometimes**

(n=54, 31.03%) with only a few people (n=17, 9.77%) saying that they had enough food for their children **most times**.

The last question focused on the actual hunger felt by children. The mother / caregiver was asked whether her child / children was sometimes hungry because she did not have enough money to buy food. This thus focused directly on the availability of food in the household to fill the stomach and to prevent hunger. The majority of the mothers / caregivers from the Makapanstad area (n=38, 44.71%) responded to the worst answer, but to a much lesser degree than with the previous questions. Again there was a significant difference (P=0.001) in the responses between the two clinics. The mothers / caregivers from the Mathibestad responded in totally the opposite manner, indicating that most (n=68, 76.40%) of the children **never**went hungry and that very few (n=3, 3.37%) were **most times** hungry. The total responses indicated that the majority of the mothers / caregivers from both clinics (n=93, 53.45%) felt that their children were **never** hungry due to a lack of money to buy food with. Only 23.56% indicated that their children were hungry **most times** due to a lack of money.

To conclude: 91.33% (sum of scores for never and sometimes) of the mothers / caregivers from these two communities perceived that they did not have enough money to give a good meal to their children. Approximately 91% of all the mothers / caregivers felt that they did not have enough money to feed their children the way that they thought was right. Likewise 90% of the total number of mothers / caregivers felt that they **never** had enough money to give their children what they considered being enough food. These results therefore revealed a perception of food insecurity concerning their children. However, only 23.56% of all the mothers / caregivers indicated actual hunger in their children; 47% of all the mothers / caregivers perceived the children as being hungry **most times** or **sometimes** and could thus probably be regarded as food insecure.

In conclusion: referring to the significant differences (P<0.05) in the responses between the two clinics, there seemed to be a difference in their experience of children's hunger or food insecurity. The majority of the mothers / caregivers from the Makapanstad area responded to all four questions in terms of the worst picture of child feeding. The mothers / caregivers from the Makapanstad area could probably be classified as food insecure in terms of children's hunger, as all their responses indicated towards **never** having enough money to give their children a good meal, or enough food or to feed them the way that they thought was right, and the children being hungry due to a lack of money. The majority of the mothers / caregivers from the Mathibestad area responded to three out of the four questions in terms of the worst scenario, followed by the intermediate response and lastly the worst response. This might indicate that the mothers / caregivers from the Mathibestad area could probably be classified as only having moderate food insecurity since most of their responses were in terms of the middle or least serious scenarios, and as being less food insecure than the mothers / caregivers from the Makapanstad area. The results from the hunger scale should however be interpreted with caution due to the restrictions concerning the cultural and lingual differences between the standardization and research groups.