

**NATIONAL STUDY ON THE ROLE OF CARE IN THE NUTRITIONAL STATUS OF
CHILDREN UNDER 2 YEARS OLD IN OMAN**

January 2000

Miss Deena Alasfoor

Mrs Sausan Rawas

Miss Yusra Al-Farsi

Dr. Moeness Alshishtawi

Table of Contents

1.0	INTRODUCTION	1
2.0	OBJECTIVES OF THE STUDY:	2
3.0	SAMPLING AND SAMPLE SIZE:	2
4.0	MATERIALS AND METHODS	3
4.1	TRAINING	3
4.2	STUDY INSTRUMENT	3
4.2.1	Questionnaire	3
4.2.2	Weighing scales	4
5.0	FINDINGS	4
5.1	GENERAL CHARACTERISTICS OF THE SAMPLE POPULATION	4
5.2	MATERNAL AGE	4
5.3	MATERNAL PARITY AND BIRTH SPACING	5
5.4	EDUCATION AND WORK OF MOTHERS	5
5.5	NUTRITIONAL STATUS OF THE CHILD	5
5.6	BREASTFEEDING PRACTICES	6
5.6.1	Initiation within first half-hour to hour after birth	6
5.6.2	Breastfeeding on demand	7
5.6.3	Develop skills of breast-milk expression	8
5.6.4	Exclusive breastfeeding for four-six months	9
5.6.5	Protection from commercial pressures on artificial feeding	10
5.7	Complementary foods and sustained breastfeeding	11
5.7.1	Breastfeeding into the second year	12
5.7.2	Frequency of feeding	13
5.8	Active complementary feeding behaviours	14
5.8.1	Method of feeding	14
5.8.2	Adaptation to family diet	15
5.8.3	Feeding responsively	16
5.9	Care factors that are associated with malnutrition	17
5.10	Topics for Health Education	18
5.11	Lessons learned	19
	REFERENCES	20

1. 0 INTRODUCTION

2. Several studies had shown that Protein Energy Malnutrition (PEM) is a widespread problem among Omani children at the age below five years. This problem is thought to be associated with gastrointestinal diseases and ARI in this population. Although Mussaigher (1), Child Health Survey (2), and Oman family

health survey (3) all reported high prevalence of PEM in the range of 23-35 %. The factors associated with child malnutrition are not yet known. According to UNICEF (4), PEM can be predisposed by three etiological factors: Lack of food, care, and/or access to health care.

3.

4. In order to verify the more probable causes of PEM in Oman, the study team reviewed the three factors. Health care is the limiting factor and an essential prerequisite for adequate nutritional status of children. Immunization, as well as timely treatment of childhood illness are the backbones of adequate primary health care. The yearly statistical report of the Ministry of health (1997), shows that 121 health institutions are in service, averaging 516 patients per bed. The average number of hospital visits reported per child up to 12 years old was 6.5 times per year. The rate of low birth weight (Birth weight < 2.5 kg) declined from 87 in 1991, to 82 per 1000 live births in 1997. The rate of PEM detected in MOH institutions was 51/1000 in 1997, out of these 2.8 % were severe cases, and 75.4 % were mild cases. Lack of access to health care is thus an unlikely factor of malnutrition among Omani children (5).

5.

6. Food availability is the other possible cause of PEM. Income levels in Oman are above those expected to limit child's growth through poverty, since the Gross National Product is reported to be \$US 4820 per capita (6). The purchasing power of families, is therefore unlikely to limit food needs of infants and young children. Other aspects of food availability include food in the market of remote areas, etc. These have to be investigated through methodologies that are beyond the scope of this study.

7.

UNICEF grouped care behaviours in the household into five main categories ; Care for pregnant and lactating women, breastfeeding and complementary feeding, food preparation, hygiene, and health seeking behaviours (7). This study aimed at assessing some of these determinants, namely: Breastfeeding and feeding behaviour, and some of the hygiene, and psycho-social behaviours among a group of Omani mothers of infants (Children under the age of 2 years). The sample studied was a national sample, therefore care should be taken not to overestimate the validity of regional data.

There are ten health administration regions in Oman, these are Muscat, North Batina, South Batina, Junubia, North Sharqia, South Sharqia, Wosta, Dhakhilia, Dhahira, and Musendem. A representative national sample has to include subjects

from all the ten regions, with adequate representation from the highly populated ones, therefore equal sample size was drawn from each region, except Wusta where a smaller sample size was selected.

2.0 OBJECTIVES OF THE STUDY:

1. To assess the prevalence and duration of exclusive and predominant breast-feeding in Oman.
2. To assess complementary feeding, hygiene, and psycho-social behaviors towards children feeding in a national sample of Omani mothers.
3. To estimate the association between complementary feeding patterns, hygienic and psycho-social attitudes towards infants and the nutritional status of Omani children at the age of 0-2 years.

3.0 SAMPLING AND SAMPLE SIZE:

A prevalence estimate of 30% was used to calculate the sample size required for this study. The precision and confidence interval were set at 25% and 95% consecutively. The sample size from each region was thus calculated to be 150, at an assumed drop out rate of 10%. Thus, the national sample size was 1500. Multi-stage random sampling was used to get the sample of children aged 0-2 years old (8). All regions were included in the study. The number of children registered in the regional hospitals is the largest, therefore these were purposely selected from each region. In addition another hospital and four health centres were randomly included in the first stage of sampling. Systematic random sampling was used to select 40 children from each regional hospital, 30 from each small hospital, and 20 from each health centre. This randomization process was applied to all infants registered in the Medical Records (MR2) of the named institutions, whom birth dates between April 1996, and April 1998.

4.0 MATERIALS AND METHODS:

4.1 TRAINING :

A group of health educators were recruited to draw the sample, contact the mothers and apply the study instrument in their respective regions. One day training workshop was conducted during which objectives of the study as well as the sampling procedures and the study questionnaire were reviewed. Role playing was

used to practice the questionnaire. The questionnaire coding was discussed in a separate session with regional coordinators of the study.

4.2 STUDY INSTRUMENT :

4.2.1 Questionnaire : A questionnaire was modified to assess breastfeeding practices among Omani mothers; the rates of exclusive, predominant, and partial breastfeeding during the first four months were measured using WHO multi-indicators (9). In addition, information about maternal age, education, work, and parity was collected. Feeding behaviours such as feeding on demand, choice of foods, preparation of the breast, dealing with breastfeeding problems, types of formula given to the child were measured through questions asked to the mother as well as observation of these practices during the interview. Psycho-social behaviours were measured through observation of the mother's behaviour with the child during the interview (Appendix). A guide was developed to standardize sampling and data collection methodologies as well as coding.

4.2.2 Weighing scales : The UNICEF digital scales (UNISCALES) were used to weigh the children as a standard procedure, and weight-for-age Z-scores was calculated in EPI6 statistical analysis package (WHO) to obtain the prevalence of underweight among the sampled children. The regions of Musendem, Muscat, and Wusta did not have access to UNISCALES during the study, therefore regular bathroom scales were used to weigh the children in these regions.

5.0 FINDINGS:

5.1 GENERAL CHARACTERISTICS OF THE SAMPLE POPULATION :

The final total sample summed up to 1429 infants, where each region contributed 10.3 - 11.3% of the sample size, except Wusta that was represented by a lower sample size (40) because of logistic reasons. The mean age of infants and children included in the sample was 13.60 months, SD = 6.82, and the range was 0-24 months. This age distribution reflects the sampling scheme of the study, and was not significantly different among regions [appendix 2]. Drop-outs from the sample did not exceed the anticipated 10% except in Wusta, and the overall drop-out rate was 4.7 %. Nonetheless, the sample was not representative of each region, and national, not regional statistics should be considered in drawing inferences to the population.

5.2 MATERNAL AGE :

The mean age of the mothers in the sample selected was 27.68 ± 6.61 years, ranging between 26.9 in South Sharqia, to 28.5 in Muscat. The mother's age ranged between 15-40 years with an almost equal distribution in all regions included in the analysis [Annex 2]. In Wusta, the larger standard deviation (7.82) of the mean age of mother reflected the smaller sample size, although the mean (27.22) was within the range.

5.3 MATERNAL PARITY AND BIRTH SPACING :

Multiple parity and short birth-spacing intervals could compromise the nutritional status of mother and child. In 1992, the Child Health Survey showed that the average number of children ever-born to married women was 4.8. In the current study, the mean number of living children was 5.1, whereas the average reported number of pregnancies was 5.65. These figures were not significantly different among different regions. Maternal parity, thus did not change significantly between the years 1992-1998.

The mean interval between the infant in the sample and the last sibling was found to be 2.99 ± 2.39 years, where this interval was less than two years among 24.2% of the mothers interviewed.

5.4 EDUCATION AND WORK OF MOTHERS :

Only 5.5 % of the mothers in the sample worked outside the house at the time of the survey. The highest percentage of those were in Dhahira (9.4%), and the lowest in North Sharqia (2.0%). Education, was significantly higher among working mothers, where the average number of education years completed was 12.6 years, compared to 4.5 years among non-working mothers.

5.5 NUTRITIONAL STATUS OF THE CHILD :

Sampled infants were weighed using the UNICEF digital scale (UNISCALE) as a standard procedure. However, these were not available in the regions of Musendem, Wusta, and Muscat and regular bathroom scales were used alternatively. Height was not measured as it requires standardization procedures that were not feasible at the time of this study, thus height-for-age, and weight-for-height Z-scores were not estimated.

In this study we attempted to assess Z- scores of the median weight -for-age using

EPI6 statistical package (World Health Organization), where the reference population is (NCHS).

The mean Z-score of weight-for-age was -0.93 ± 1.26 . The prevalence of underweight was 17.6%, and was higher among males where 19.0% of them compared to 15.7% for females had low weight-for-age. These are much lower than the figures reported in Oman Family Health Survey, where the latter indicated that 23.4%, and 24.6% of males, females respectively were underweight. The age range in Oman Family Health Survey was 0-5 years old.

5.6 BREASTFEEDING PRACTICES :

Even when a mother's own supply of nutrients and energy is limited, she is still able to produce breast milk of sufficient quantity and quality to support the growth and health of her infant. Human milk is the best adapted to the nutritional needs of the infant, and the antibodies in it promotes the immune system. Advocacy for breastfeeding took a high priority in the programs of all international Organizations, since the value of breastfeeding was known. The baby friendly hospitals initiative being the official 10 steps program that is adopted by governments, World Health Organization, and UNICEF. The 10 steps are based on creating a hospital environment that will encourage breastfeeding, and support breastfeeding mothers technically and emotionally in the first two years of the infants life.

Early initiation, exclusive breastfeeding for 4-6 months and maintenance of breastfeeding for two years together with appropriate weaning practices are also important care factors and a natural right of the newborn.

5.6.1 Initiation within first half-hour to hour after birth :

One of the ten steps in the baby friendly hospitals is early initiation of breastfeeding, as it is most likely to be sustained if the mother starts within the hour after birth. Colostrum, the milk secreted during the first three days postpartum contains high levels of carotenoids and immunoglobulins, but their concentration of these change rapidly in the 4th to 7th days (11). In addition to the changes in the nutrient contents of the human milk, the soluble antigens and anti-infective agents changes with the functional development of the infant. Therefore, it was necessary that the infant benefits from the mother's milk in all stages of growth, starting from the hour after birth (12).

We found in the study that 87.1 % of the mothers started breastfeeding within one hour, and an additional 7% started within two hours after birth. In 1992, Mussaigher found that only 36.8 % of mothers initiated breastfeeding immediately after birth, 46.1% started between 1-3 hours, and 6.1% started 4-6 hours after birth. In 1995, Oman family health survey showed that 83% of mothers initiated breastfeeding immediately after birth, compared to 89% in the Child Health Survey (1992). The increase in early initiation of breastfeeding reflects the success of the baby friendly hospital initiative.

Initiated breastfeeding	N	percentage
In one hour	1244	87.1
Within 2 hours	100	7
In 6 hours	23	1.4
> 6 hours	62	4.4

Table (1) Time of breastfeeding initiation in a National Sample of mothers.

5.6.2 Breastfeeding on demand :

Breastmilk is more easily digested than bottle milk, therefore breastfed infants need more frequent meals which stimulates milk secretion and child-mother bonding. When asked about breastfeeding, 82.0% of the mothers said that they breastfed on demand. In Oman Family Health Survey (1995), the percentage of breastfeeding on demand was 41% at night, and 57% during the day. The percentage of mothers who breastfed on demand in this study was highest in Wusta (92.0 %), followed by North Sharqia (91.3%), compared to the lowest percentages in South and North Batina where the prevalence estimates were 72.3 %, and 72.7% respectively.

Region	N	Percentage breastfed on demand
Muscat	148	85.1
Dhakhilia	162	86.4
Junubia	150	88.7
North Sharqia	150	91.3
South Sharqia	149	73.8
North Batina	150	72.7
South Batina	159	72.3
Dhahira	160	77.5
Wosta	40	92.5
Musendem	161	90.1
Total	1429	82.0

Table (2) Percentage of mothers who breastfed on demand in different regions in a National sample of Omani mothers to infants of age 0-2 years.

5.6.3 Develop skills of breast-milk expression :

It is of utmost importance that the mother starts preparing for breast feeding starting in the third trimester. Knowledge of this fact, as well as how to deal with breastfeeding problems helps the mother to initiate and sustain breastfeeding. Some of the possible problems are: sore, cracked nipples, engorged breasts, or clogged milk ducts; the latter might lead to mastitis. Some of these require medical care, and the others can be treated by traditional methods. We tried to assess mother's behaviours before and during the breastfeeding period. These behaviours reflect the level of knowledge the mother has, and indicates whether the message and the breastfeeding support a pregnant woman receives is coherent with the breastfeeding policy of the Ministry of Health.

The results in this study indicate that only 16.2 % of the mothers prepare the breast prior to the delivery. This is a sign of lack of awareness among mothers, which reflects a gap between antenatal and paediatric health education messages. We have not seen in any of the previous studies comparable question, therefore it is not possible to interpret a trend in this factor.

It was observed that 20 % of the mothers had problems that are related to breastfeeding, out of whom 94.8 % continued to breastfeed and 4.8 % started using a bottle while having the problem. This reflects the commitment of Omani mothers to breastfeed.

5.6.4 Exclusive breastfeeding for four-six months :

Oman Family Health Survey (1995), showed that 78% of infants 0-4 months old were exclusively or predominantly breastfed, and 26.2 % were bottle fed. It was not mentioned, however, the percentage of mothers who practised partial breastfeeding. In this study, we found that 30.8% of Omani mothers had, or are currently exclusively breastfeeding at the infant's age of 0-4 months. In addition, 40.5% of infants were/or are predominantly breastfed, whereas 27.8% are partially breastfeeding. These results are indicative of mothers willingness to breastfeed, however, more education should target "elimination of the bottle" from the feeding habits of Omani mothers. The age of the infants in the study was scattered over 0-24 months range, however this question was posed about the first four months.

	Never breastfed		Partially breastfed		Predominant-ly breastfed		Exclusively Breastfed		Total	
	No	%	No	%	No	%	No	%	No	%
Males	9	1.2	221	29.5	300	40	219	29	749	52
Females	4	0.6	176	25.9	279	41	221	33	680	48
Total	13	0.9	397	27.8	579	40.5	440	31	1429	100

Table (3) Rates of exclusive, predominant, and partial breastfeeding in the first four months in a sample of Omani mothers.

5.6.5 Protection from commercial pressures on artificial feeding :

The International code of breast milk substitutes was formalized in 1981, by the World Health Organization (WHO) and the United Nations Children Fund (UNICEF), as the commercial pressure of companies that produced breast-milk

substitutes started to affect the rates of breast-feeding especially in developing countries. Idealization of the bottle, as well as associating the tin with the image of a white well fed baby are the industry's effective tools to promote their products. In the few years after the adoption of the code by WHO and UNICEF many countries legislated it. In 1990, Innocenti declaration that sets a number of operational targets was adopted by policy makers of UN member states in Florence, Italy (14).

In Oman (1998), the Minister of commerce issued a decree adopting the international code of marketing breastmilk substitutes. This decree banned any advertisements for baby formula or breastmilk substitutes without prior permission of the Ministry of Health, and restricted the type of promotion materials on the packaging in order to illustrate the superiority of breastfeeding. It also banned free and reduced cost provision of utensils used in artificial feeding (16).

When the mothers were asked about the exposure they had to baby formula advertisements, it was found that 55.7% of mothers were exposed to promotions of breastmilk substitutes, out of these 53.5% watched the advertisements on Oman TV, and another 18.7% said they watched them on other channels. Only 3.2% of the mothers saw promotion materials of breastmilk substitutes in magazines, whereas 9.8%, and 5.2% saw promotion materials in stores, and hospitals respectively. The effect of this exposure is highlighted by the finding that 18.4% of the mothers exposed to promotion materials felt that they were encouraged by the advertisements to use breastmilk substitutes.

At the time of the survey, 364 mothers (26.2%) would have used at least one type of breast-milk substitutes. The majority of these mothers were copying relatives, or following their advise (59.9%). The percentage of all mothers advised a certain type of bottle milk by physicians is 6.6%, considering that the primary motive for this would be medical or clinical conditions. Only 15 mothers said they are using the type of formula because of seeing a promotion of one type or another.

	Number	%
Doctor	69	18.9
Private clinic	26	7.1
Advertisements	15	4.1
Neighbours, relatives	254	59.9
Total	364	26.2

Table (4) Main sources of promotion for breastmilk substitutes in a sample of Omani mothers to infants at the age of 0-2 years.

5.7 Complementary foods and sustained breastfeeding :

Timely introduction of complementary foods is an essential factor in maintaining the nutritional adequacy of the infant's child intake. Adequate habits in complementary feeding, can prevent stunting in children of the age 0-2 years old. Breastfeeding should be sustained during that period, as semi-solid, and solid food should complement and not replace breastfeeding (17).

Complementary foods were introduced earlier than 4 months to 17.6% of all children in this study, whereas 14.6% of the mothers introduced complementary foods later than six months. It was also found that 10.6%, and 8.1% of Omani mothers gave their children only breast-milk during the age groups of [6-8], and [9-11] months, respectively. The age of 812 infants in the sample ranged between 12-24 months, out of those 66.9% were still being breastfed while given complementary foods.

Age in months	6-8		9-11		12-24		Total	
	No.	%	No.	%	No.	%	No.	%
Gave food only	1	0.6	7	3.8	236	29.1	244	20.8
Gave milk only	19	10.6	15	8.1	32	3.9	66	5.6
Gave milk and food	160	88.9	164	88.2	544	66.9	868	73.5
Total	180	15.3	186	15.8	812	68.9	1178	81.9

Table (5) The pattern of feeding Omani children at the age of 0-2 years old.

5.7.1 Breastfeeding into the second year :

Increasing the duration of breastfeeding was found to be associated with small, but consistent and significant association with cognitive ability and school performance (16). Mother's milk after the first year of the child's age still contains a lot of the nutrients that the child needs. Also, mothers should practice gradual introduction of complementary food to protect the psychological development of the child.

The percentage of mothers who breastfed beyond 12 months was 81.5% of those

who stopped breastfeeding, with no significant difference between mothers of males and females. Comparatively, the Family Health Survey (1995) showed that 85.7 % of the mothers breastfed beyond 12 months.

The total number of mothers who stopped breastfeeding at the time of the survey was 244 (17%). The mean duration of breastfeeding among those mothers was found to be 15.7 months, and was not significantly different between males and females, where the mean duration of breastfeeding males and females was 16.14 months, SD=6.8, and 15.34 months, SD= 7.17 respectively. The mean duration of breastfeeding in 1995 was 19.1 months according to Oman Family Health Survey.

	Percentage breastfed into the second year		Duration of Breastfeeding (months)	
	N	%	Mean	SD
Males	323	82	16.1	6.8
Females	281	80.8	15.3	7.2
Total	604	81.5	15.7	6.9

Table (6) Percentage of Omani mothers who breastfed into the second year and the mean duration of breastfeeding.

5.7.2 Frequency of feeding :

UNICEF recommends that at the age of 6-8 months children should be fed complementary foods 2-3 times daily, whereas at the age of 9-11 they should be fed 3-4 times daily, and 4-5 times daily at the age of 12-24 months (17).

Analysis of current data shows that 53.5% of all mothers feed their children three times daily. Although we did not collect data on the quality or the energy density of the weaning food, it was noticeable that older children are fed less often than recommended as 53.7% of infants in the age of 12-24 months were fed less than three times daily.

Age in months	6-8		9-11		12-24		Total	
	No.	%	No.	%	No.	%	No.	%

Fed < 3 times daily	80	49.7	102	59.6	419	53.7	601	54.0
Fed 3 times daily	47	29.2	27	15.8	95	12.2	169	15.2
Fed > 3 times daily	34	21.1	41	24.0	265	34.0	340	30.6
Total	161	14.5	171	15.4	780	70.1	1112	100

Table (7) Frequency of complementary feeding to children at the age of 0-2 years

5.8 Active complementary feeding behaviours :

5.8.1 Method of feeding :

Among children older than 4 months, we found that 32.1 % of males, and 31.4% of males were fed by hand, which warrants attention of the health educators to personal hygiene of the mother before, and during child feeding. The caregiver in 92.3% of the cases was the mother, with no significant difference between males and females.

	Males		Female		Total	
Regularly fed by spoon	408	62.4	378	61.8	786	62.1
Regularly fed by hand	210	32.1	192	31.4	402	31.8
Others	36	5.5	42	6.9	78	6.2
Total	654	100	612	100	1266	100

Table (8) Feeding methods of a sample of complementary fed Omani children.

5.8.2 Adaptation to family diet :

The transition from sustained breastfeeding and complementary foods to the family diet and complete cessation of breastfeeding should be gradual, allowing the child to return to the breast occasionally. Caregivers may expect that the child can feed himself at this stage, but if this expectation is too great, the child may not get enough food. Mother, should continue to be aware of what the child eats, when and how much. Also, in traditional settings, individualised access to food such as giving each child a plate of his own will encourage his autonomy. This way the mother should be able to assess the quantity and quality of the child's intake. Junk, and

spicy foods should be discouraged at this age. Also, male and female children should gain equal access to food.

Analysis of variance was carried out to assess the difference between males and females in terms of access to food. Although families regularly ate from the same dish, it was found that 17.6% of the male children were given a separate dish compared to 13.6% of female children. This difference was statistically significant (p -value=0.05). However, when looking at all the other variables considered, it was evident that there are no differences in breastfeeding, or weaning behaviours based on gender. Therefore, the difference found here could be largely attributed to chance, especially that p -value is not very low.

The mother was the main caregiver in 92.3 % of the families, which was not significantly different between males and female children.

About 29.8 % of the children in the study consumed food from a supermarket if between meals, which can be interpreted as junk food, whereas 16.5% of the mothers said they gave the child a specially prepared snack or meal. The gender differences found here were not significant.

5.8.3 Feeding responsively

The amount the child eats may depend on the caregivers' active encouragement and the amount offered. Children should be encouraged to ask for more, and if hungry between meals, nutritious foods should be offered. Also, the person who feeds the child may have an effect on the quantity he eats, e.g. if a preferred or a devoted person such as the mother is not present the child may eat less. Forcing the child to eat might discourage him, and turn the dining place into a battle field, however if the caregiver is a passive eater or does not respond to the child's demand for a certain food the child may also eat less.

Mothers of boys started giving food to the child in his hand at the same time as mothers of girls. i.e. after the child had completed the sixth month of age (p -value=0.351).

When mothers were asked about their attitudes when the child refused to eat, only 34.4% of them expressed positive attitudes such as playing, offering variety of food, etc, whereas a staggering 53.3% said they left their child without food, and 4.3% said they forced the child to eat. These percentages call for intense education to mothers

about positive attitudes towards the child's eating habits.

	Males		Female		Total	
	N	%	N	%	N	%
Child encouraged to eat through play or offering variety of food	235	35.9	200	32.7	435	34.4
Child left with no food.	345	52.8	330	53.9	675	53.3
Child forced	24	3.7	30	4.9	54	4.3
Others	50	7.6	52	8.5	102	8.1
Total	654	100	612	100	1266	100

Table (9) Mother's attitudes towards child feeding in a national sample of weaning children.

5.9 Care factors that are associated with malnutrition :

The contribution of some behavioural care factors to underweight was assessed through appropriate statistical analysis. We could not elucidate a significant association, probably because these factors are subjective, and situational, and can not be measured precisely, therefore they have high variability. However, it was obvious that underweight had increased with child's age, which can be explained by poor feeding habits, and lack of responsive feeding. The table below shows that at the age group below 5 months, in which children are mostly breastfed, 10.6 % of them were underweight, compared to 20.0 % among children over 12 months of age, a percentage that increases gradually with age (p-value=0.001).

	Not underweight		Underweight		Total	
	N	%	N	%	N	%
0-4 months	126	89.4	15	10.6	141	9.9
5-8 months	286	88.5	37	11.5	323	22.6
9-12 months	200	80.3	49	19.7	249	17.4
>12 months	573	80	143	20	716	50.1
Total	1185	82.9	244	17.1	1429	100

Table (10) The trend in underweight in different categories of age in a national sample of Omani infants and young children.

The average years of education for mothers of well nourished children was found to

be 5.05 ± 4.76 , compared to 3.93 ± 4.29 among mothers of underweight infants. This difference was significantly different (p -value= 0.001). On the other hand birth intervals if the child was underweight was lesser ; i.e. 2.77 ± 1.27 , compared to 3.04 ± 2.57 if the child was well nourished (p -value=0.03).

5.10 Topics for Health Education :

This study highlights some of the factors that could contribute to child malnutrition in Oman and one of its main outcomes is that mothers are not practising appropriate complementary feeding habits. Those could be offering a variety of foods to the child, frequently enough, and encouraging the infant to eat, even if he refused the first time food is offered. Time allocation, and stimulation of psycho-social adequate behaviours are essential components that need to be studied.

1. Although rates of breastfeeding on demand are encouraging, this aspect should be emphasized, together with bed sharing to maintain the frequency of breastfeeding at night.
2. Education for breastfeeding should start during pregnancy. Several mothers in this study were not informed about possible problems, or what to expect. This is especially true for first time mothers.
3. Policies, guidelines, and step by step instructions on how to re-enforce breastfeeding and overcome problems that are associated with it through proper training of personnel.
4. "The bottle" and pacifiers interfere with breastfeeding, therefore, they are recommended against in the ten steps of the Baby Friendly Hospitals Initiative. It was found also, that part time users of pacifiers, breastfeed less often and for shorter periods of time (19). Therefore, intensive health education should be targeted towards elimination of pacifiers, and bottle feeding from infants feeding.
5. Community support group members should be encouraged to take these messages, as it was found that women got their advise mostly from relatives.
6. Proper weaning policy that explains the frequency, energy density, and active feeding should be reviewed and promoted.
7. Stress should be made on encouraging the autonomy and self reliance of the child through access to food, providing a separate plate for infants and children, etc. together with breastfeeding into the second year.

5.11 Lessons learned:

In this study we attempted to assess the hygienic practices of mothers, and some of their attitudes towards the psycho social development of their children, however we found that this was very difficult, and needed anthropologist expertise that would observe and document patterns in social behaviours. Therefore we

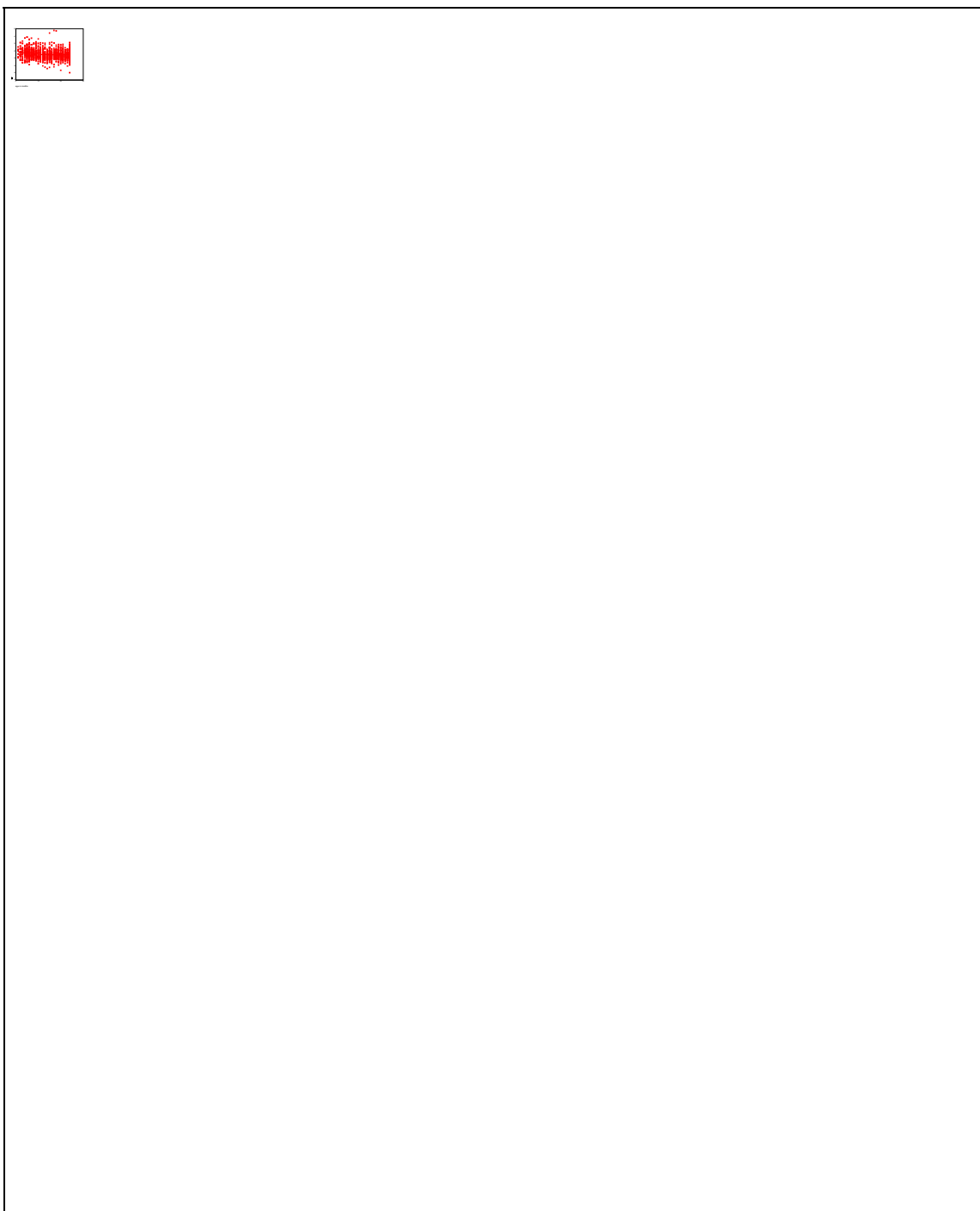
recommend that a detailed study that addresses behavioural patterns of mothers and the psycho-social development of their off-springs is to be conducted.

REFERENCES:

- 1) Abdulrahman O. Mussaigher. 1992. Health and Nutritional Status of Omani families. UNICEF. UNICEF, Muscat.
- 2) Murtadha J. Suleiman, Ahmed G. , Samir F. 1992. Oman Child Health Survey. Ministry of Health, Oman. 109-140.
- 3) Ali J. M. Suleiman. Asya Al-riyami. Samir F. 1995. Oman Family Health Survey. Ministry of Health, Oman. 55-59.
- 4) UNICEF. Food, Health and Care. The UNICEF vision and strategy for a world free from hunger and malnutrition. UNICEF. 11-18.
- 5) Directorate General of Planning, Ministry of Health. 1997. Annual statistical report. Ministry of Health, Oman.
- 6) Carol Bellamy, UNICEF. 1998. The state of the world's children. Oxford University Press. New York, NY.
- 7) UNICEF. 1997. The care initiative, Assessment, analysis and Action to improve Care for Nutrition. Nutrition Section: UNICEF, New York.
- 8) Richard L. Scheaffer, William Mendenhall, Lyman Ott. Elementary Survey Sampling. PWS Publishers. 1986. Boston, Massachusetts.
- 9) Nutrition unit, World Health Organization. WHO Global Data Bank on Breastfeeding. Breastfeeding indicators derived from households.
- 10) World Health Organization. Physical status: the use and interpretation of anthropometry. Report of a WHO expert committee. 1995. WHO, Geneva. WHO technical report series (854).
- 11) Subcommittee on nutrition during lactation, National Academy of science. 1991. Nutrition During Lactation. National Academy Press. Washington, D.C. USA. 113-152.
- 12) Rebecca Williams. 1995. Breastfeeding Best Bet for babies. United States Department of Agriculture, Food and Drug Administration.
- 13) Margit Hamosh. 1996. Breast-feeding: Unravelling the mysteries of mother's milk. Medscape women's health. 1:9, 1996.
- 14) WHO. The Innocenti declaration: Progress and achievements: Weekly epidemiological record. World Health Organization, Geneva. 73: 25-32, 1998.
- 15) WHO. Protecting, promoting, and supporting breast-feeding: The special role of maternity services. A joint WHO/UNICEF statement. Geneva, World Health Organization. 1989.
- 16) Harwood, L.J., Fergusson, D. M. Breastfeeding and later cognitive and academic outcome. Pediatrics, 1998; 101(1): 01-07
- 17) Minister of Commerce decree NO 55/98. Official Gazette, Ministry of Legal Affairs, Oman.

- 18) LINKAGES. Facts for feeding: Guidelines for appropriate complementary feeding of breastfed children 6-24 months of age. Academy for educational development, 1997.
- 19) World Health Organization. International Code of Breastmilk substitutes. 1981. WHO, Geneva.
- 20) Victora, C.G., Behague, D. P. Barros, F. C., Olinto, M.T.A., Weiderpass, E. Pacifier use and short breastfeeding duration: Cause, Consequence, or coincidence?. Pediatrics, 1997; 99(3): 445-453.

Annex (1)



The weight-for-age Z-scores according to age in a national sample of Omani infants and children in the age of 0-2 years.

Annex (2)

Annex (1)

	N	Mean age of child in months	SD	Range
--	---	-----------------------------	----	-------

Muscat	148	14.71	6.45	2-24
Dhakhilia	162	13.73	7.11	2-24
Junubia	150	13.07	7.19	2-24
North Sharqia	150	12.18	6.57	1-24
South Sharqia	149	11.69	6.38	0-24
North Batina	150	12.79	6.51	2-24
South Batina	158	15.86	6.28	2-24
Dhahira	160	14.06	6.36	2-24
Wusta	40	14.35	6.43	4-24
Musendem	161	15.24	6.62	2-24
Total	1429	13.6	6.82	0-24

Table (1) The mean age, range and standard deviation of a sample of Omani children enrolled in the study on role of care in the nutritional status of Omani Children aged 0-2 years old in different regions of Oman.

Region	Prevalence of underweight	Mean Z-score of weight-for-age	SD
Muscat	16.3	-0.76	1.3
Dhakhilia	29.6	-1.26	1.21
Junubia	10.1	-0.35	1.35
North Sharqia	16.8	-1.13	0.94
South Sharqia	20.3	-1.09	1.17
North Batina	15.9	-0.65	1.64
South Batina	23.6	-1.24	1.27
Dhahira	12.7	-0.77	1.2
Wusta	23.1	-1.29	0.85
Musendem	11.3	-0.98	0.95
Total	17.6	-0.93	1.26

Table (2) Prevalence of underweight, and means of weight-for-age Z-scores in different regions of Oman in a sample of Omani mothers to children at the ages of 0-2 years.

Region	N	Average number of children	SD	Average number of pregnancies	SD
Muscat	148	4.68	3.24	5.21	3.6
Dhakhilia	162	5.46	3.45	6.11	3.97
Junubia	150	5.11	2.99	5.69	3.39
North Sharqia	150	5.63	3.09	6.25	3.57
South Sharqia	149	4.58	2.95	5.14	3.35
North Batina	150	5.09	3.16	5.52	3.48
South Batina	158	5.29	3.27	5.9	3.74
Dhahira	160	4.83	3.04	5.29	3.28
Wusta	40	4.12	2.84	4.6	3.32
Musendem	161	4.99	2.96	5.75	3.39
Total	1429	5.05	3.13	5.61	3.56

Table (3) Average number of children and pregnancies, among a sample of Omani mothers enrolled in the study on role of care in the nutritional status of Omani Children age 0-2 years old in different regions of Oman.

Region	N	Average number of children	SD	Average number of pregnancies	SD
Muscat	148	4.68	3.24	5.21	3.6
Dhakhilia	162	5.46	3.45	6.11	3.97
Junubia	150	5.11	2.99	5.69	3.39
North Sharqia	150	5.63	3.09	6.25	3.57
South Sharqia	149	4.58	2.95	5.14	3.35
North Batina	150	5.09	3.16	5.52	3.48
South Batina	158	5.29	3.27	5.9	3.74
Dhahira	160	4.83	3.04	5.29	3.28
Musendem	161	4.99	2.96	5.75	3.39
Total	1388	5.07	3.14	5.65	3.54

Table (4) Average number of children and pregnancies in a national sample of Omani mothers to children at the age of 0-2years old according to region.

Region	Mean age of the mother	SD	Average completed years of education	SD	Percentage of mothers working
Muscat	28.53	6.46	6.16	5	7.4
Dhakhilia	27.93	6.69	7.76	3.4	3.7
Junubia	27.48	5.99	7.05	3.9	4
North Sharqia	28.62	6.44	3.27	4	2
South Sharqia	26.89	5.89	5.41	4.4	4.7
North Batina	28.04	6.67	7.68	3.9	9.3
South Batina	27.52	6.49	5.47	4.4	6.3
Dhahira	27.52	6.13	5.68	5.2	9.4
Wusta	27.22	7.82	0.6	1.7	5
Musendem	27.63	6.57	4.92	4.5	2.5
Total	27.68	6.61	4.86	4.7	5

Table (5) Mean age of mothers, average completed years of education, and percentage of working women in a national sample of Omani mothers to children at the age of 0-2 years old according to region.

Region	N	percentage never breastfed	Breastfed partially	Breastfed predominantly	Breastfed Exclusively
Muscat	148	0.7	42.6	43.2	13.5
Dhakhilia	162	0.6	14.8	39.5	45.1
Junubia	150	1.4	52.7	23.3	22.7
North Sharqia	150	0	25.3	49.3	25.3
South Sharqia	149	0	32.2	46.9	20.8
North Batina	150	2.7	19.3	55.3	22.7
South Batina	159	1.9	16.9	38.4	42.8
Dhahira	160	0	32.5	40	27.5
Wusta	40	2.5	50	45	2.5
Musendem	161	0.6	14.3	32.9	52.2
Total	1389	0.9	27.6	40.9	30.7

Table (6) Percentage of exclusive, predominant, and partial breastfeeding in a national sample of Omani mothers to children at the age of 0-2 years old according to region.

Region	N	Percentage Breastfed beyond 12 months.	Mean Duration	SD	Mean age of children	SD
Muscat	129	87.2	5.4	5.3	14.84	6.36
Dhakhilia	104	82.5	5.43	5.7	14.03	6.54
Junubia	46	30.7	7.54	4.6	17.11	6.44
North Sharqia	27	18	11.78	5.5	17.41	5.91
South Sharqia	27	18.1	8.74	4.6	16.04	5.44
North Batina	39	26	10.41	6.8	14.64	6.94
South Batina	133	83.6	5.09	5.8	13.92	7.13
Dhahira	152	95	4.81	4.3	14.19	6.24
Musendem	33	20.5	11.12	5.9	18.85	5.85
Total	690	49.7	6.29	5.7	14.88	6.85

Table (7) Percentage breastfed beyond 12 months, mean duration of breastfeeding, and the mean age of children in a national sample of Omani mothers to children at the age of 0-2 years old according to region.

Region	Number of mothers given	Percentage of mothers given	Most common method	Percentage of mothers used the most common method
Water	715	51.5	bottle	52.3
Grape water	236	17	Spoon	68.2
Sugar water	96	6.9	Spoon	56.2
Tea	82	5.9	bottle	41.5
Honey	112	8.1	hand	44.6
Dates	66	4.8	hand	
Habba Hamra	64	4.6	Spoon	81.2
Habba Sauda	26	1.9	Spoon	92.3
Murr	26	1.9	Spoon	84.6
Khushkhash	32	2.3	Spoon	68.8
Other liquids not mentioned	37	2.7	Spoon	67.6
foods : Cerelac, biscuits, cream, etc	229	16.5	Spoon	77.3
Orange juice	118	8.5	Spoon	43.2

Table (8) Most commonly given drinks and foods in the age of 0-4 months in a national sample of Omani mothers to children at the age of 0-2 years old.

	Number	%
Oman TV	414	53.5
Other TV channels	145	18.7
Magazines and newspapers	25	3.2
Hospitals	40	5.2
Stores	76	9.8
Others	74	9.6
Total	774	55.7

Table (9) The places most commonly quoted for being sources of promotion materials of breastmilk substitutes in Oman.