

# Diarrhoea and child feeding practices in Saudi Arabia

Ibrahim Ahmed Bani<sup>1,2,\*</sup>, Abdallah Abdul Wahid Saeed<sup>1</sup> and Abdul Aziz Mohammed Al Othman<sup>1</sup>

<sup>1</sup>Department of Community Health Sciences, Applied Medical College, King Saud University, Riyadh, Saudi Arabia:

<sup>2</sup>Present address: UNOHC1–Baghdad, PO Box 5859, New York, NY 10163-5859, USA

Submitted 25 September 2001: Accepted 16 April 2002

## Abstract

**Objective:** The aim of the study was to estimate the prevalence of diarrhoea in children less than two years old and study the relationship between diarrhoeal episodes and action taken for these episodes by their mothers.

**Design:** The prevalence of diarrhoeal episodes among children and its associations with sociodemographic information and anthropometric measurements of the subjects was examined. Predictive factors for morbidity-associated diarrhoeal disease and actions taken for this were explored.

**Setting:** Primary health care centres (PHCCs) in Riyadh, Kingdom of Saudi Arabia.

**Subjects:** Children less than two years of age.

**Results:** Nearly a quarter of the children contracted diarrhoea during the two weeks preceding the data collection point, giving about six episodes of diarrhoea per child per year. Diarrhoea was more common in children over 6 months of age, in children who had no vaccination or follow-up cards, and in those who were taken care of by friends and neighbours if their mothers were working outside the home. The mothers of the affected children were young, married before 25 years of age with 2–6 years of formal schooling. During diarrhoeal episodes, about 25% of mothers stopped or decreased breast-feeding, 11.3% reduced the volume of fluids given to their children, and 22.7% of children were fed less solid/semi-solid foods. Mothers used oral rehydration salt in more than 40% of diarrhoeal episodes and unprescribed antibiotics were used in 17% of cases. The mothers who were not taking appropriate action included young mothers with low education level and those working outside the home.

**Conclusion:** Diarrhoea is common in children less than two years old in Riyadh City, and intervention based in PHCCs needs to be undertaken to correct the faulty practices of mothers during diarrhoeal episodes in their children. Health education messages should emphasise feeding during diarrhoeal episodes.

**Keywords**  
Diarrhoea  
Feeding  
Care seeking  
Saudi Arabia

Diarrhoeal diseases, commonly defined as an increase in the frequency and fluidity of bowel movements relative to the usual pattern of an individual, are major contributors to illness and death among children aged up to 4 years in developing countries. Although practical, inexpensive methods to reduce diarrhoeal mortality are being practised, the results are often disappointing in terms of policy outcomes.

Approximately 12 million children in developing countries die before the age of five years, and 70% of those deaths are due to five health problems including diarrhoea<sup>1,2</sup>. In the Kingdom of Saudi Arabia (KSA), diarrhoeal diseases are rivalled in importance only by acute respiratory infections, with high incidence and prevalence in community surveys<sup>3–5</sup>. The control of diarrhoeal diseases is one of the 'Child Health and Survival Programmes' of the Ministry of Health (MOH), to which the United Nations Children's Fund (UNICEF) made a

significant contribution in the mid-1980s. The major objective of the control programme was to reduce mortality and morbidity rates due to dehydration, including the use of oral rehydration therapy. According to Al Mazrou and Farid<sup>3</sup>, diarrhoeal diseases are one of the leading causes of infant and child mortality and morbidity in Saudi Arabia. The present study was undertaken with the aim of assessing the prevalence of diarrhoea in children under two years of age and to examine the relationship between diarrhoeal episodes and the action taken for these episodes by the mothers.

## Methods

The subjects included all children aged 24 months or less at the time of the study, as certified from their records, identified because their mothers visited primary health care centres (PHCCs) in Riyadh, KSA. The subjects (50

\*Corresponding author: Email banii@un.org

from each health centre) were chosen by systematic random sampling of patients attending during the one-month study period. The PHCCs were selected by simple random sampling of the five regional zones in Riyadh City (one from each zone). The number of PHCCs and subjects selected were determined primarily by the limited resources that were available to the authors. The selected PHCCs appear to be representative of all PHCCs in the city, as the five zones of the city were included when drawing the sample. The mothers selected appear to represent all of the attending mothers with children under two years of age, as randomisation was used.

Trained applied medical students collected data by interviewing mothers using a pilot-tested and validated questionnaire. In addition to universal background variables, the questionnaire elicited information on other items such as diarrhoeal episodes in their children over the previous two weeks and actions taken for them. The validity of the questionnaire was assessed independently by faculty members (Nursing, Public Health and Nutrition), who were asked to assess the face and content validity of each of specific question on diarrhoea and actions taken for it. The assessed validity ranged from 75 to 95% for the different questions, with an overall validity of 85%. Reliability was assessed by test–retest on 20 women not participating in the study. The calculated reliability was 89%. The interview included anthropometric measurements (weight and height) of the children.

Collected data were checked for completeness before entry into a personal computer. Data analysis was carried out using the Statistical Package for the Social Sciences (SPSS) program. In addition to descriptive statistics (mean, standard error of the mean and range), chi-square was used to study the associations of diarrhoeal episodes with sociodemographic and anthropometric measurements of the subjects. One-way analysis of variance (ANOVA) was performed to study whether there were any significant differences in the feeding practices of mothers during the diarrhoeal episode in the past two weeks, according to sociodemographic characteristics of mothers and children.

Multiple regression analysis was also performed to identify variables predicting diarrhoeal episodes in children and actions taken by mothers. Results of all statistical tests performed were considered significant if the *P*-value was less than 0.05.

## Results

Of the 250 study subjects, 13 (5.2%) were excluded from final analysis due to incomplete information. Twenty-four per cent of the children experienced at least one diarrhoeal episode during the past two weeks, as reported by their mothers. Table 1 shows the profile of diarrhoeal episodes during the past two weeks and whether mothers usually consulted the health care facility about them, according to mothers' characteristics studied. Diarrhoeal

**Table 1** Diarrhoeal episodes in children during the past two weeks and whether mothers usually consult someone about diarrhoeal disease in their children, according to mother's characteristics (*n* = 237)

Mother's characteristics	<i>n</i>	%	Diarrhoeal episode during past two weeks				<i>P</i> -value	Mother usually consults somebody about child's diarrhoea				<i>P</i> -value
			Yes		No			Yes		No		
			<i>n</i>	%	<i>n</i>	%		<i>n</i>	%	<i>n</i>	%	
Age (years)												
18–24	84	35.40	23	27.40	61	72.60	0.15	54	64.40	30	35.60	0.79
25–34	117	49.40	26	22.20	91	77.80		80	68.40	37	31.60	
35+	36	15.20	4	11.10	32	88.90		25	69.40	11	30.60	
Age at marriage (years)												
12–18	81	34.20	25	30.90	56	69.10	0.00	59	72.80	22	27.20	0.38
19–24	119	50.20	26	21.80	93	78.20		74	62.20	45	37.80	
25+	37	15.60	2	5.40	35	94.60		25	71.40	10	28.60	
Literacy												
Illiterate	20	8.40	4	20	16	80		14	70.0	6	30	
Literate	217	91.60	49	22.60	168	77.40	0.79	145	66.80	72	33.20	0.77
Years of schooling												
0	20	8.40	4	20	16	80	0.00	14	70.0	6	30	0.49
1–6	43	18.10	17	39.50	26	60.50		25	58.1	18	41.90	
7–12	119	50.20	26	21.80	93	78.20		80	67.2	39	32.80	
13+	55	23.20	6	10.9	49	89.10		40	72.7	15	27.30	
Employment outside the home												
Employed	64	27	12	18.80	52	81.20	0.42	48	75	16	25	0.15
Not employed	173	73	41	23.70	132	76.30		111	64.20	62	35.80	
If employed outside the home, who cares for child												
Relatives/friends	19	29.70	6	31.60	13	68.40	0.22	16	84.20	3	15.80	0.11
Housemaid	35	54.70	5	14.30	30	85.70		27	77.10	8	22.90	
Nursery	10	15.60	1	10	9	90		5	50	5	50	

Chi-square was used to calculate *P*-values.

**Table 2** Diarrhoeal episodes in children during the past two weeks, according to child's characteristics (*n* = 237)

Child's characteristics	<i>n</i>	%	Diarrhoeal episodes				<i>P</i> -value
			Yes		No		
			<i>n</i>	%	<i>n</i>	%	
<b>Age (months)</b>							
1–6	58	24.50	12	20.70	46	79.30	0.59
7–12	63	26.60	17	27.00	46	73.00	
13–24	116	48.90	24	20.70	92	79.30	
<b>Currently breast-fed</b>							0.06
Yes	90	38	26	28.90	64	71.10	
No	147	62	27	18.40	120	81.60	
<b>Weight (kg)</b>							0.17
< 6	36	15.20	11	30.60	25	69.40	
6–11	124	52.30	25	20.20	99	79.80	
> 11	77	32.50	17	22.10	60	77.90	
<b>Height (cm)</b>							0.00
< 60	93	39.20	11	11.8	82	88.20	
60–79	85	35.90	25	29.40	60	70.60	
80+	59	24.90	17	28.80	42	71.20	
<b>Has follow-up card</b>							0.09
Yes	215	90.70	45	20.90	170	79.10	
No	22	9.30	8	36.40	14	63.60	
<b>Vaccinated</b>							0.63
Yes	225	94.90	51	22.70	174	77.30	
No	12	5.10	2	16.70	10	83.30	
<b>Weighed during past 4 months</b>							0.27
Yes	175	73.80	36	20.60	139	79.40	
No	62	26.20	17	27.40	45	72.60	

episodes in the past two weeks were more common in children whose mothers were younger, married at a younger age, with less or no education and not employed outside the home, and for children who were taken care of by relatives and friends if the mother was employed outside the home. The differences, however, were significant only for age at marriage and years of schooling. About two-thirds of the mothers usually consulted a healthcare professional if their child had a diarrhoeal episode and there were no significant differences in this respect according to mothers' characteristics. Analysis of mothers' responses showed that government health facilities are the most important facilities consulted, with 55% of the mothers consulting PHCCs, 36.1% consulting government hospitals and only 5.5% consulting private health facilities. Relatives and friends were consulted by less than 4% of the mothers.

Table 2 shows diarrhoeal episodes during the past two weeks according to children's characteristics. Diarrhoea was more common in children aged 7–12 months, weighing less than 6 kg and height less than 60 cm, with no follow-up card, not weighed during the past four months and not vaccinated against childhood diseases. The differences, however, were only significant in shorter and breast-fed children.

The actions taken by the mothers during their children's diarrhoeal episode in the past two weeks are depicted in Table 3. In general, about 25% of mothers stopped or substantially decreased breast-feeding their children

during the diarrhoeal episode, compared with about 11% who similarly reduced fluid administration. The mothers who were not taking appropriate action as shown in Table 3 included young mothers, those of low education level and those employed outside the home ( $P < 0.05$ ). The symptoms that resulted in mothers consulting a healthcare professional about diarrhoea were loss of fluids (64.9%), fever (33.2%), anorexia (33.2%), vomiting (23.7%), bloody stools (40.4%) and other symptoms (5.2%), with no significant differences according to subject characteristics studied. When mothers were asked what they would do if their child contracted diarrhoea in the future, the majority (62.1%) said they would give more fluids but 22.1% said they would not know what to do. The rest reported that they would give more of the usual food and more high-calorie food items. No significant differences were detected concerning these aspects by subject characteristics.

## Discussion

Diarrhoeal disease in children in the present study was estimated by interviewing the mothers and not examining children directly. This was because the children were less than two years old. In many developing countries, maternal health interview surveys are widely used to estimate the prevalence of different morbidity patterns for young children<sup>6</sup>. Studies have shown a highly significant association between maternal reports of illness in their

**Table 3** Changes in mothers' feeding practices during diarrhoeal episodes in children, according to mother's and child's characteristics

	Frequency of breast-feeding			Amount of fluids given			Solids/semi-solids given		
	More <i>n</i> (%)	Usual <i>n</i> (%)	Less <i>n</i> (%)	More <i>n</i> (%)	Usual <i>n</i> (%)	Less <i>n</i> (%)	More <i>n</i> (%)	Usual <i>n</i> (%)	Less <i>n</i> (%)
<i>Mother's characteristics</i>									
<i>Age (years)</i>									
18–24	4 (17.4)	9 (39.1)	10 (43.5)*	17 (73.9)	2 (8.7)	4 (17.6)*	0 (43.5)	6 (26.1)	7 (30.4)
25–34	15 (57.7)	8 (30.8)	3 (11.5)	22 (84.6)	2 (7.7)	2 (7.7)	16 (61.5)	5 (19.2)	5 (19.2)
35+	1 (25.0)	3 (75.0)	0 (0)	1 (25.0)	3 (75.0)	0 (0)	3 (75.0)	1 (25.0)	0 (0)
<i>Age at marriage (years)</i>									
12–18	12 (50.0)	6 (25.0)	6 (25.0)	17 (70.8)	5 (20.8)	2 (8.3)	16 (66.7)	4 (16.7)	4 (16.7)
19–24	6 (22.2)	14 (51.9)	7 (25.9)	21 (77.8)	2 (7.4)	4 (14.8)	11 (40.7)	8 (29.6)	8 (29.6)
25+	2 (100)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)
<i>Years of schooling</i>									
0	0 (0)	2 (50.0)	2 (50.0)*	1 (25.0)	2 (50.0)	1 (25.0)	1 (25.0)	2 (50.0)	1 (25.0)*
1–6	3 (16.7)	13 (76.5)	1 (5.9)	11 (64.7)	4 (23.5)	2 (11.8)	11 (64.7)	5 (29.4)	1 (25.0)
7–12	15 (57.7)	2 (7.6)	9 (34.6)	23 (88.5)	1 (3.8)	2 (7.7)	16 (61.5)	4 (15.4)	1 (5.9)
13+	2 (33.3)	3 (50.0)	1 (10.7)	5 (83.3)	0 (0)	1 (16.7)	1 (16.7)	1 (16.7)	6 (23.1)
<i>Employment outside the home</i>									
Employed	4 (33.3)	5 (41.7)	3 (25.0)	10 (83.3)	1 (8.3)	1 (8.3)*	4 (33.3)	2 (16.7)	6 (50.0)
Not employed	16 (39.0)	15 (36.6)	10 (34.4)	30 (73.2)	6 (14.1)	5 (12.2)	25 (61.0)	10 (24.4)	6 (14.6)
<i>Child's characteristics</i>									
<i>Age (months)</i>									
1–6	4 (36.4)	5 (45.1)	2 (18.2)	8 (72.7)	1 (9.1)	2 (18.2)	6 (54.5)	2 (18.0)	3 (27.3)
7–12	7 (38.9)	5 (27.8)	6 (33.3)	16 (88.9)	0 (0)	2 (11.1)	11 (61.1)	2 (11.1)	5 (27.8)
13–24	9 (37.5)	10 (41.7)	5 (20.8)	16 (66.7)	6 (25.0)	2 (8.3)	12 (50.0)	8 (33.3)	4 (16.7)
Overall	37.7%	37.7%	24.6%	75.5%	13.2%	11.3%	54.7%	22.6%	22.7%

ANOVA was used to calculate *P*-values.\**P* < 0.05.

children and biochemical profiles of the children's health. This appears to suggest the validity of such interviews<sup>7</sup>, although there is room for improvement and modifications to make them most useful in providing accurate data at low cost<sup>8</sup>. The World Summit for Children<sup>2</sup>, more than a decade ago, set the goal of a 50% reduction in childhood mortality by the year 2000. This objective seems far from being achieved.

The setting for this study was PHCCs in Riyadh City, KSA. We think this an appropriate setting. The Primary Health Care Programme through PHCCs covers the whole city, and almost all Saudi citizens are registered in the PHCC near their residence and expected to contact these PHCCs for all of their health service needs. If deemed necessary, then referral to other levels of health care is readily granted. All services are totally free. Mother and child care is an important component of the Primary Health Care Programme. Hence studies based in PHCCs are expected to reflect fairly the expected prevalence of disease, with the limitation of biased recall. This approach was used extensively to study morbidity and mortality patterns, as well as for surveying smoking and nutritional habits, all over the kingdom.

About a quarter of the children in the present study suffered at least one episode of diarrhoea in the two weeks before their mother's interview about this morbidity. This is equivalent to about six diarrhoeal episodes per child per year. Previous studies in Saudi Arabia reported a diarrhoeal prevalence of 7.5–15% during a two-week

period, with 2–3.8 diarrhoeal episodes per child per year<sup>4,5,9</sup>. These studies were conducted in children less than five years of age, the same age group as reported in this study. Studies in Peru reported that children contracted between 1.2 and 4.6 episodes of diarrhoea per year<sup>10</sup>.

Episodes of diarrhoea in our study were more common in children older than 6 months of age, with no vaccination card and in children who had not been weighed during the last four months. In addition, episodes of diarrhoea were more common in children whose mothers were younger and in children who were taken care of by neighbours and friends when their mother went to work outside the home. The differences, however, were significant for children with vaccination cards, who tend to have significantly fewer episodes of diarrhoea than the rest. This is not unexpected, as such children tended to visit health facilities more frequently and hence were more likely to be given the necessary support and advice. Previous community-based studies in the country reported that diarrhoea was associated with children aged 6–17 months, with mothers of the youngest age group<sup>3</sup>. Hospital-based studies showed that diarrhoea was more common among children whose mothers were housewives of low educational level<sup>11</sup>.

There are international studies where it has been reported that higher episodes of child diarrhoea are related to poor sanitary conditions and low socio-economic status of the household and community

environment<sup>12,13</sup>. The differences in child morbidity between these studies may be real or may be due to differences in methodologies, sampling, settings, populations and health systems.

Among children having diarrhoea in the present study, 37.0% of mothers do not change their breast-feeding practice, only 37.7% increase it, but 24.6% decrease the frequency of breast-feeding (Table 3). Among all children with diarrhoea, 75.5% of mothers increase the volume of fluids given during the episode, 13.2% give the usual amount and 11.3% reduce the volume of fluids. These findings suggest that mothers either do not have the knowledge about how to care for a child with diarrhoea or they are not using this knowledge; of particular concern is that feeding is withheld from a quarter of children with diarrhoea. Keith points out that among the Hausa tribe in Niger, sick children – like healthy children – are believed to know when they are hungry or full; if they refuse food, or show no interest in food, they are not compelled to eat<sup>14</sup>.

It is clear from the present study that effective messages about feeding during diarrhoea must target low educated mothers as well as mothers working outside the home. Furthermore, these messages must contain specific dietary recommendations based on nutritional and local considerations. All educational efforts regarding feeding and diarrhoea should urge mothers to continue breast-feeding and other feeding during and after their child's episode of diarrhoea. The present study provides public health planners with crucial knowledge by stressing simple messages for mothers, such as 'continue feeding during diarrhoea' and 'give extra food during convalescence'.

The present study revealed that mothers' feeding practices of their infants during diarrhoeal episodes, particularly whether breast-feeding is continued or not and whether fluids and solid foods are used, need corrective intervention, particularly among less educated mothers. This supports findings of previous studies in the country, which revealed that the knowledge and management practice of many aspects of diarrhoea was grossly deficient, particularly among the younger and less educated mothers<sup>3,15</sup>.

The lack of breast-feeding was not significantly associated with diarrhoeal episodes in our study, in contradiction to the findings of most studies reporting that diarrhoea is much more common in non-breast-fed children than in breast-fed children<sup>12,13</sup>. This may be real or may be due to sampling errors or variations. It is gratifying to know that the majority of the mothers contacted health services for sickness episodes and that these health services were mostly government PHCCs, which are the appropriate first contact facilities. Studies have reported that mothers contacted health facilities for only about a third to half of the sickness episodes in their children<sup>16</sup>.

In conclusion, diarrhoeal episodes in children under two years of age are prevalent in an urban environment in the KSA and some corrective measures need to be undertaken. PHCCs are appropriate settings for these measures. The aim in the future should be to boost mothers' knowledge in general and their proper practice in particular. We have to note here that the data were collected from mothers about past events in their children and recall bias is possible in such situations. We were not able to validate mothers' responses and in about 10% of cases anthropometric measurements of the children were missing or incomplete.

## References

- 1 *Morbidity Mortality Weekly Report* 1998; **47**(46): 998–1001.
- 2 Tulloch J, Richards L. Childhood diarrhea and acute respiratory infections in developing countries. *Med. J. Aust.* 1993; **159**(1): 46–51.
- 3 Al Mazrou Y, Farid S. *Saudi Arabia Child Health Survey*. Kingdom of Saudi Arabia: Ministry of Health, 1991; 63–107.
- 4 Al-Abad A, Bella H. Diarrhea in under fives in a Saudi semiurban community. *Trop. Geogr. Med.* 1990; **42**(3): 233–7.
- 5 Qadri M, Al-Ghamdi M, Musharaf A, Haq M. A study on diarrheal diseases in children under five years of age. *Ann. Saud. Med.* 1992; **12**: 459–62.
- 6 Kalter H, Gray R, Black R, Gultiano S. Validation of the diagnosis of childhood morbidity using maternal health interviews. *Int. J. Epidemiol.* 1991; **20**(1): 193–8.
- 7 Rousham E, Northrop-Clewes C, Lunn P. Maternal report of child illness and the biochemical status of the child: use of morbidity interviews in rural Bangladesh. *Br. J. Nutr.* 1998; **80**(5): 451–6.
- 8 Goldman N, Vaughan B, Pebley A. The use of calendars to measure child illness in health interview surveys. *Int. J. Epidemiol.* 1998; **27**(3): 505–12.
- 9 Al Mazrou Y, Khan M, Aziz K, Farag M, Al Jefry M. The social factors in the prevalence of diarrheal diseases in under-five Saudi children. *J. Trop. Pediatr.* 1995; **41**(Suppl. 1): 45–52.
- 10 Brown K, Black R, Lopez de Romana G, Creed de Kanashiro H. Infant feeding practices and their relationship with diarrhea and other diseases in Huascar (Lima), Peru. *Pediatrics* 1989; **83**(1): 31–40.
- 11 Milaat W, Ellassouli S. Epidemiology of diarrhea in two major cities in Saudi Arabia. *J. Community Dis.* 1995; **27**(2): 84–91.
- 12 Perera B, Ganesan S, Jayarasa J, Ranaweera S. The impact of breast feeding practices on respiratory and diarrhea in infancy: a study from Sri Lanka. *J. Trop. Pediatr.* 1999; **45**(2): 115–8.
- 13 Ahiadeke C. Breast-feeding, diarrhea and sanitation as components of infant and child health: a study of large scale survey data from Ghana and Nigeria. *J. Biol. Sci.* 2000; **32**: 47–61.
- 14 Keith N. *Feeding, weaning, and diarrhea illness in young Hausa children in Niger*. Doctoral dissertation, Michigan State University, Lansing, MI, 1991.
- 15 Rasheed P. Perception of diarrheal diseases among mothers and mothers to be: implications for health education in Saudi Arabia. *Soc. Sci. Med.* 1993; **36**(3): 373–7.
- 16 Mikhail B. Hispanic mother's beliefs and practices regarding selected children's health problems. *West. J. Nurs. Res.* 1994; **16**(6): 623–38.