RESULTS

The Results Obtained From The Study Are Represented In The Following Tables:

Table (1):

Shows the prevalence of persistent and acute diarrhea cases in both urban and rural areas. It revealed that (75%) of urban children experienced acute diarrhea whereas (5.6%) experienced persistent diarrhea. On the other hand, (85%) of rural children suffered from acute and (10.5%) sufferd from persistent diarrhea. The difference was statistically significant ($P < 0.01$).

Table (2):

Shows the monthly incidence of persistent diarrhea episodes /100 child. June and Jully (summer months) had the highest incidence (1.83%) in rural; (1.16%) in urban area).

Table (3):

Shows the monthly incidence of persistent diarrhea episodes /100 acute diarrhea episode. June and Jully had the highest incidence also.

Table (4):

Shows the age (in years) in relation to diarrhea. Persistent diarrhea cases were younger (mean.811) than acute cases (mean 2.201) and those without diarrhea (mean 3.247). The difference was significant statistically.

Table (5):

Shows the age distribution in persistent diarrhea cases. (49.5%) of cases aged between 6 and 12 months, (20%) of cases ages less than 6 months and (23.7%) of cases aged 1-2 years.

Table (6):

Shows the relation between sex and diarrhea. For persistent cases (52.6%) were males and (47.4%) were females but for acute cases (51.7%) were males and (48.5%) were females. This was insignificant statistically (P >0.05).

Table (7):

Shows the nutritional status of both acute and persistent diarrhea cases. (44.3%) of persistent cases were malnourished while (29.3%) of acute cases were molnourished. The difference was statistically significant ($P < 0.01$).

Table (8):

Shows the feeding pattern in relation to the type of diarrhea. (55.7%) of persistent cases and (51.5%) of acute cases were formula fed while (19.6%) of persistent cases and (26.8%) of acute cases were breast fed. The difference was insignificant statistically.

Table (9):

Shows the relation between previous vaccinations and the occurence of diarrhea. There was no significant difference between acute and persistent diarrhea cases as regards previous vaccination (BCG, DPT, Polio or measles).

Table (10):

- Shows housing conditions in relation to diarrhea. Bad building (Roof, Floor, Walls) was significantly assaciated with persistent diarrhea ($P < 0.05$).

- Source of drinking water: (10.8%) of infants with persistent diarrhea and (7.2%) of acute diarrhea cases were drinking water from a common source (tap or pump). The difference was not insignificant statistically.

- The majority (66.7%) of houses of persistent cases had non piped system for sewage disposal in comparison to (43.1%) of houses of acute cases. The difference was statistically significant ($P < 0.05$).

- The presence of animals in the house was more reported in persistent cases (44.6%) than acute ones (37.2%). The difference was significant statistically.

- Electricity did not illuminate (2.2%) of houses of persistent diarrhea while (0.4%) of houses of acute cases were not illuminated. The difference was insignificant (P >0.05).

Table (11):

Shows electric sets in the house in relation to diarrhea. The presence of electric sets in the house (Television; Radio; Washing Mashing and Fridge) was not significantly associated with either type of diarrhea (P >0.05).

Table (12):

Shows previous deaths in the family in relation to the type of diarrhea. (4.43%) of families of persistent cases had previous deaths while (3.43%) of famililes of acute diarrhea cases had suffered previous deaths. The difference is not statistically significant.

Table (13):

Shows the mean crowding index of families in rural and urban communities. The mean crowding index was higher in rural area (1.4) than urban one (1.1).

Table (14):

Shows the econonic status of the involved families. The poor classes were predominating in both rural and urban communities while rich classes were significantly less ($P < 0.05$).

Table (15):

Shows mother's practice for proper management of diarrhea. (59.8%) of mothers of infants with persistent diarrhea, and (70.3%) of mothers of infants with acute diarrhea conducted good practice for proper management of diarrhea. The difference is significant statistically.

Table (16):

Shows mother's idea about the main cause of diarrhea. (61.9%) and (57.7%) of mothers of children with acute and persistent diarrhea respectively considered food pollution to be the main cause of diarrhea. The difference is insignificant.

Table (17):

Shows mother's education in relation to diarrhea type. (65.4%) of mothers of cases with persistent diarrhea were illetrate compared to (54.5%) of mothers of acute cases. The difference was insignificant statistically.

Table (18):

Shows events that occured in the last month preceding the persistent episode. The results showed that:

* 21.6% of persistent cases had history of acute diarrhea episode in the last month before the occurance of persistent diarrhea.

* 4.1% of persistent cases suffered a previous attack of persistent diarrhea.

* 11.3% of persistent cases suffered from acute infections.

* 16.7% of persistent cases had history of animal milk introduction for the first time for infant feeding.

Table (19):

Shows the frequency of stool at the start of diarrhea. (78.2%) of cases with persistent diarrhea passed 3-7 motions per day at the start of diarrhea (mean 5.14).

Table (20):

Shows the stool consistency in relation to persistent diarrhea. The episodes of watery stools are nearly two times more likely to persist.

Table (21):

Shows treatment given for diarrhea according to the mother's answer. Constipating agents were given to (73.3%) of cases while antibiotics and antiparasitics were given to (71.3%) of cases.

Table (22):

Shows stool blood and/or mucus in relation to persistent diarrhea. (39.61%) of cases passed blood and/or mucus in their stools.

Table (23:

Shows stool analysis for cases of persistent and acute diarrhea. Persistent diarrhea was more likely to occur with:

* Reducing substance in stool (55.76%) of cases but in acute cases (19.23%) only.

* Pus cells in 59.61% but in acute cases 40.38%.

* Fat globules in 48.07% but in acute cases 11.53%.

Tables (24; 25; and 26):

Show the relationship between vomiting and persistent diarrhea. Persistent diarrhea was more likely to occur if vomiting:

* Was 1-6 times per day (45.5% of cases).
* Preceded diarrhea (38.6% of cases).
* Lasted 1-4 days (63.4% of cases).

Table (27):

Shows associated symptoms with persistent diarrhea.

* Fever was present in 19.8% of cases.
* Ear discharge in 6.9% of cases.
* Cough was present in 11.9% of cases.

RESULTS

Table (1): Prevalence of persistent and acute diarrhea cases in urban and rural areas.

Residence	Acute		Persistent		No Diarrhea		Total	
	No.	%	No.	%	No.	%	No.	%
Urban	450 (46.9)	75	34 (53.1)	5.6	116 (81.1)	19.33	600	100
Rural	510 (53.1)	85	63 (64.9)	10.5	27 (18.9)	4.5	600	100
Total	960	100	97	100	143	100	1200	100

$chi^2 = 67.81$ $P < 0.01$

Table (2): Monthly incidence of P.D. episodes /100 child.

Month	Rural		Urban		Total	
	No.	%	No.	%	No.	%
November	3	0.5	—	—	3	0.5
December	8	1.33	—	—	8	1.33
January	7	1.16	—	—	7	1.16
February	8	1.33	2	0.33	10	0.83
March	5	0.83	6	1.0	11	0.91
April	7	1.16	6	1.0	13	1.08
May	7	1.16	6	1.0	13	1.08
June	11	1.83	7	1.16	18	1.5
July	11	1.83	7	1.16	18	1.5

Table (3): Monthly incidence of P.D. episodes /100 acute episode.

Month	Rural			Urban			Total		
	No.		%	No.		%	No.		%
	P.D	Acute		P.D	Acute		P.D	Acute	
November	3	54	5.5	—	—	—	3	54	5.5
December	8	116	6.9	—	—	—	8	116	6.9
January	7	126	5.5	—	—	—	7	126	5.5
February	8	129	6.2	2	56	3.5	10	185	4.5
March	5	132	3.7	6	145	4.1	11	277	3.9
April	7	148	4.7	6	155	3.8	13	303	4.2
May	7	191	3.6	6	192	3.1	13	383	3.3
June	11	150	7.3	7	198	3.5	18	348	5.1
July	11	170	6.4	7	208	3.3	18	378	4.7
Total	67	1216	5.5	34	954	3.5	101	2170	4.6

Table (4): Infant age (Years) in relation to persistent and acute diarrhea cases.

	No.	Mean	S.D.	F. test	P. value
Acute diarrhea	960	2.201	1.21	135.081	< 0.01
P.D.	97	0.811	0.69		
No. diarrhea	143	3.247	0.715		

Table (5): Age distribution in persistent diarrhea cases.

Age	Persistent	
(Months)	No.	%
0 - 6	20	20
> 6 - 12	48	49.5
> 12 - 24	23	23.7
> 24	6	6.2
Total	97	100

Table (6): Relation between sex and diarrhea.

Sex	Acute Diarrhea		P.D.		Total	
	No.	%.	No.	%	NO.	%.
Males	496 (51.7)	91.81 90.68	51 52.6	9.19 9.32	547 51.8	100
Females	464 (48.3)	92.39 40.45	46 47.4	7.61 9.2	510 48.2	100
Total	960 100		97 100		1057 100	

chi^2 = 0.0415 P >0.05

Table (7): Nutritional status in P.D. and acute diarrhea cases.

Diarrhea cases	Nutritional status				Total	
	Wellnourished cases		Malnourished cases			
	No.	%	No.	%	No.	%
Persistent	54	55.7%	43	44.3%	97	100
			Mild 17 (17.5%)	Moderate 18 (18.6%)	Severe 8 (8.8%)	
Acute	679	70.7%	281	29.3%	960	100
			Mild 96 (10%)	Moderate 174 (17.8%)	Severe 14 (1.5%)	

chi^2 = 8.704 P <0.01

Table (8): Feeding pattern in relation to type of diarrhea.

	P.D. No. 97		Acute No. 960	
Exclusive breast	19	(19.6%)	260	26.8%
Non exclusive breast	24	(24.7%)	210	21.6%
Formula feeding	54	(55.7%)	490	51.5%
Total	97	(100%)	960	100%

chi^2 = 2.569 P >0.05

Table(9): Previous vaccinations in relation to diarrhea.

		Peristent D. n = 97		Acute D. n = 960		No. D. n = 143	
		No.	%	No.	%	No.	%
BCG	Vaccinated	95	97.94	935	97.39	140	97.90
	not vaccinated	2	2.06	25	2.61	3	2.10
DPT	Proper	96	98.97	955	99.48	142	99.30
	improper	1	1.03	5	0.52	1	0.70
Measles	Vaccinated	28	96.55	789	99	141	98.6
	not vaccinated	1	3.45	8	1	2	1.4

Table (10): Housing conditions in relation to acute and persistent diarrhea.

Housing conditions	Acute diarrhea Pres.	(%)	Abs.	(%)	Persistent diarrhea Pres.	(%)	Abs.	(%)	p
Roof of house cement or others	400	57.2	299	42.8	32	34.8	60	65.2	<0.05
Floor of house cement, wood, or others.	414	59.2	285	40.8	34	36.96	58	63.04	<0.05
Wall of house red brick or others.	507	72.5	192	27.5	48	52.2	44	47.8	<0.05
Source of drinking water, Private or common.	650	92.8	49	7.2	82	98.2	10	10.8	>0.05
Sanitary disposal piped or non-piped.	398	56.9	301	43.1	30	33.3	62	66.7	<0.05
House electricity present or not-present.	696	99.6	3	0.4	90	97.8	2	2.2	>0.05
Animal in house present or not-present.	260	37.2	439	62.8	41	44.6	51	55.4	<0.05

Table(11): Presence of electric sets in the house in relation to diarrhea.

		Persistent D.		Acute D.			
		No.	%	No.	%	X^2	P
Television	Present	89	96.74	681	97.42	0.0016	>0.05
	Absent	3	3.26	18	2.58		
Radio	Present	88	95.66	687	98.28	1.67	>0.05
	Absent	4	4.34	12	1.72		
Fridge	Present	64	69.57	548	78.39	3.136	>0.05
	Absent	28	30.43	151	21.61		
Washing Machine	Present	87	94.57	671	95.99	0.135	>0.05
	Absent	5	5.43	28	4.01		

Table (12): Previous deaths in the family in relation the type of diarrhea.

	Persistent D.		Acute D.	
	No.	%	No.	%
Previous deaths	4	4.34	24	3.43
No Previous deaths	88	95.66	675	96.57
Total	92	100	699	100

$chi^2 = 0.0213$ P >0.01

Table (13): Mean crowding index of families in rural and urban communities.

	No	Mean	S.D.
Rural	363	1.413	0.616
Urban	429	1.151	0.521

Table (14): Economic status of families involved.

	Rich		Medium		Poor		Total	
	No.	%	No.	%	No.	%	No.	%
Rural	14	3.59	125	32.05	251	64.35	390	100
Urban	5	1.13	117	25.53	319	72.33	441	100

X^2 = 9.5 P= <0.05

Table (15): Maternal practice for proper management of diarrhea.

Maternal practice	Acute diarrhea No.	%	P.D. No.	%	Total No.	%
Bad	285	29.7%	39	40.2%	324	30.7%
Good	675	70.3%	58	59.8	733	69.3%
Total	960	100	97	100	1057	100

chi^2 = 4.104 P <0.05

Table (16): Mother's idea about the main cause of diarrhea.

Mother's idea	Acute diarrhea No.	%	P.D. No.	%	Total No.	%
Food pollution	595	61.9%	56	57.7%	651	61.6%
Other cause	365	38.1%	41	42.3%	604	38.4%
Total	960	100	97	100	1057	100

chi^2 = 0.504 P <0.05

Table(17): Mother's education in relation to persistent and acute diarrhea.

Mother's education.	Acute diarrhea No.	%	P.D. No.	%	Total No.	%
Uneducated	523	54.5%	62	65.4%	585	55.4%
Primary education	160	17.1%	11	11.3%	605	16.5%
High education	273	28.4%	24	24%	297	28.1%
Total	960	100	97	100	1057	100

X^2 = 3.378 P= <0.05

Table (18): Events in last month preceeding persistent diarrhea.

	Events in the last month	
	No.	%
Acute diarrhea	21	21.6
P.D.	4	4.1
Acute infections	11	11.3
Introduction of animal milk	16	16.7
Nothing was reported	48	46.4
Total	97	100

Table (19): Frequency of stools at the start of diarrhea

Frequency	No.	%
1-2	10	9.9 %
3-7	79	78.2 %
8-10	12	11.9 %
Total	101	100.0 %

Table (20): Stool consistency in relation to P.D.

Consistency	No.	%
Fluid	57	56.4 %
Semifluid	35	34.7 %
Formed	9	8.9 %
Total	101	100.0 %

Table (21): Treatment of diarrhea according to mother's Answer.

	No.	%
O R S	67	66.33 %
Constipating agents	74	73.26 %
Spasmolytics	19	18.81 %
Anti-emetic	59	58.41 %
Antibiotic and Antiparasitic	72	71.28 %
Antipyretics	11	10.89 %
Other drugs	18	17.82 %

Table (22): Presence of blood and mucus in the stool in relation to P.D.

	No.	%
Blood	1	0.99 %
Mucus	33	32.67 %
Blood and mucus	6	5.95 %
No	61	60.39 %
Total	101	100.0 %

Table(23): Stool analysis for cases of acute & persistent diarrhea.

	Persistent D.		Acute D.	
	No.	%	No.	%
Reducing substance	29	55.76	10	19.23
Pus cells	31	59.61	21	40.38
Protozoa Ameba	9	17.30	12	23.07
Giardia	2	3.84	6	11.53
Parasites	4	7.69	1	1.92
Fat globules	25	48.07	6	11.53
Undigested food	3	5.76	7	13.46
Total	52		52	

Table (24): Frequency of Vomiting in relation to P.D.

Frequency	No.	%
No Vomiting	50	49.51 %
1 - 3	29	28.71 %
4 - 6	17	16.83 %
6 - 10	5	4.95 %
Total	101	100.0 %

Table (25): Relation of vomiting to persistent diarrhea.

	No.	%
No Vomiting	35	34.65 %
Before diarrhea	39	38.62 %
With diarrhea	9	8.91 %
After diarrhea	18	17.82 %

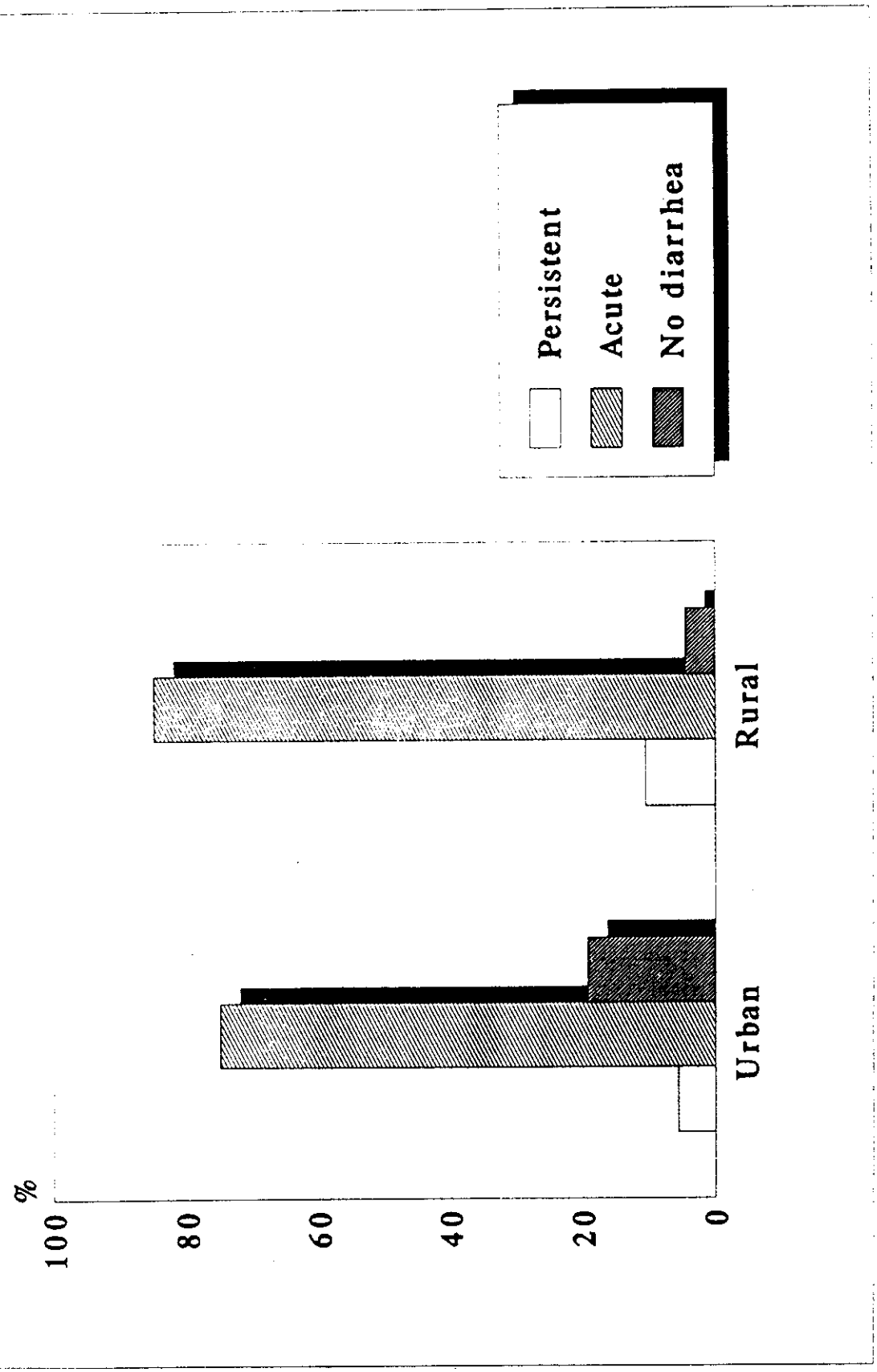
Table (26): Duration of vomiting (In days) in relation to P.D.

	No.	%
No Vomiting	35	34.65 %
1 day	24	23.76 %
2 days	20	19.80 %
3 days	12	11.88 %
4 days	8	7.92 %
5 days	2	1.99 %
Total	101	100.0 %

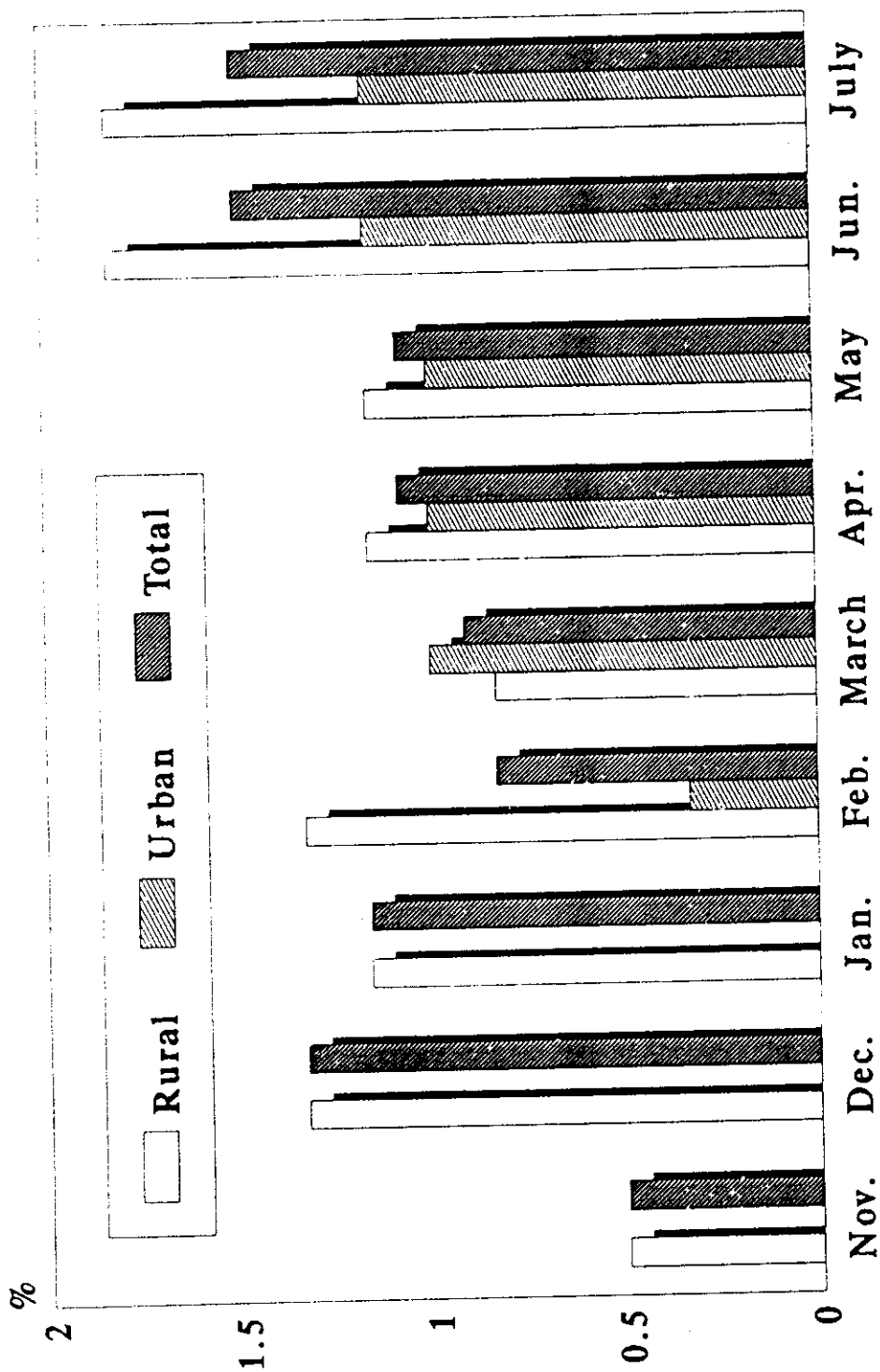
Table (27): Associated symptoms with persistent diarrhea.

	Persistent D.	
	No.	%
Fever	20	19.8
Ear discharge	7	6.93
Cough	12	11.88

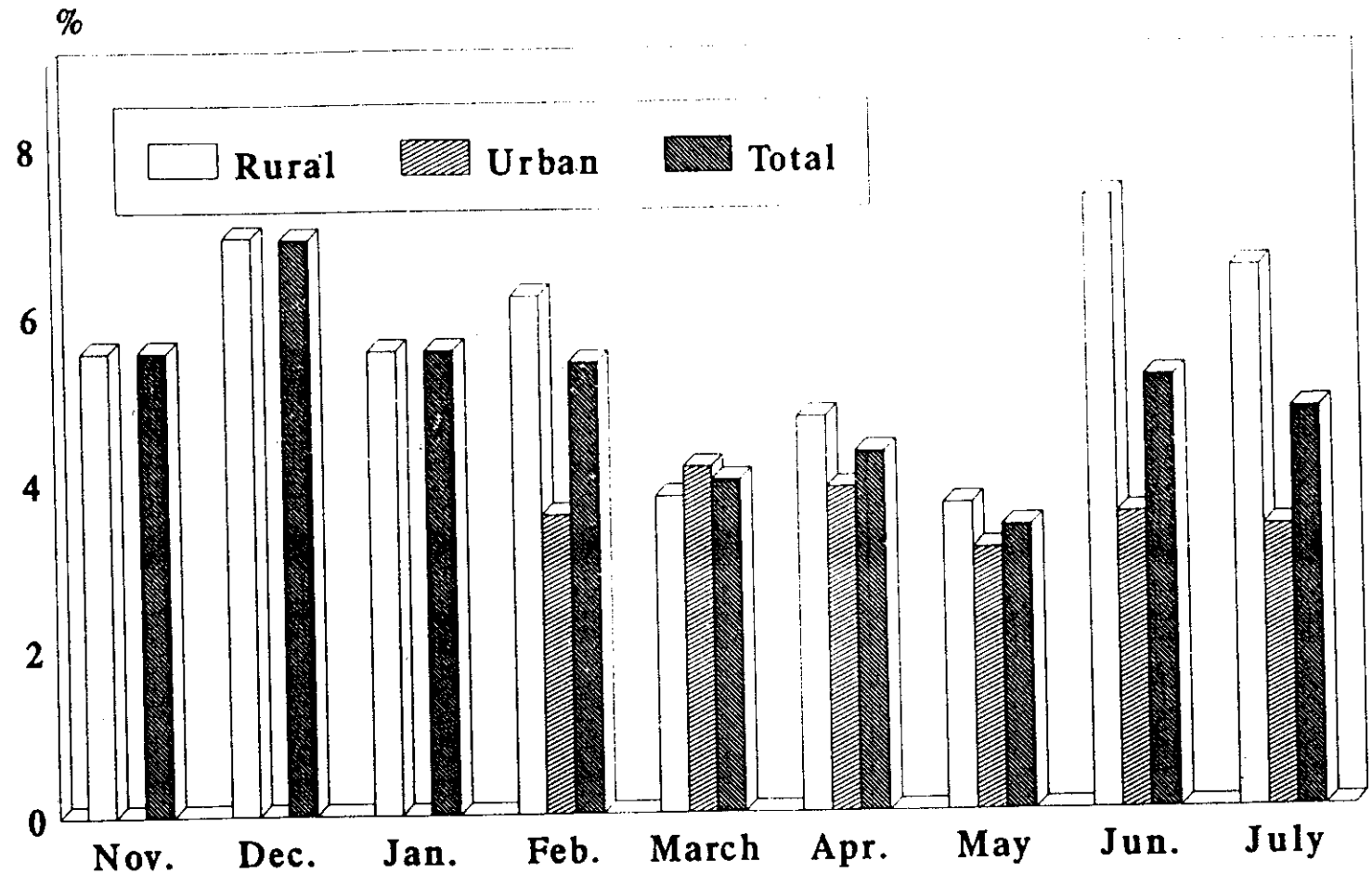
Residence In Relation To Persistent And Acute Diarrhea

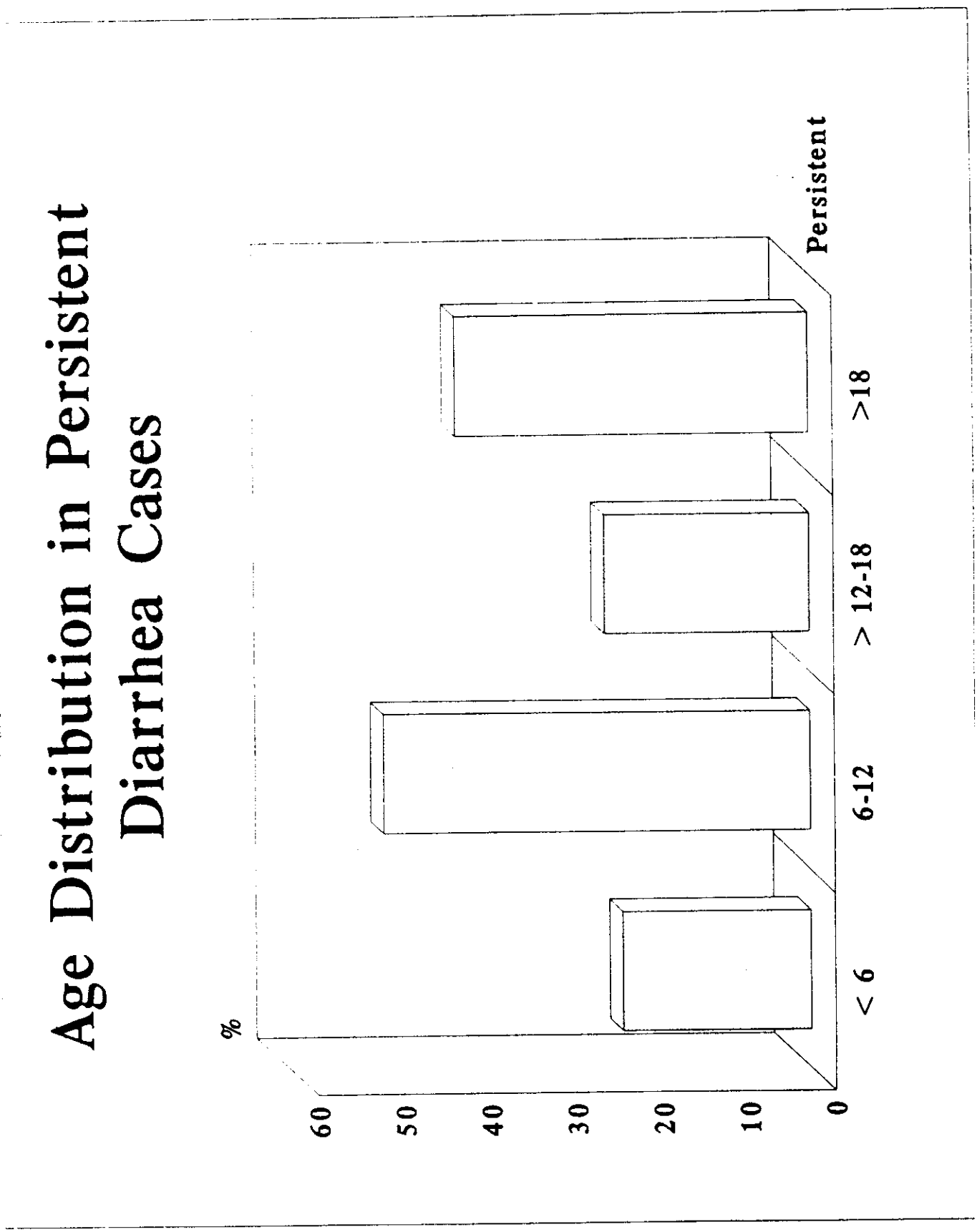


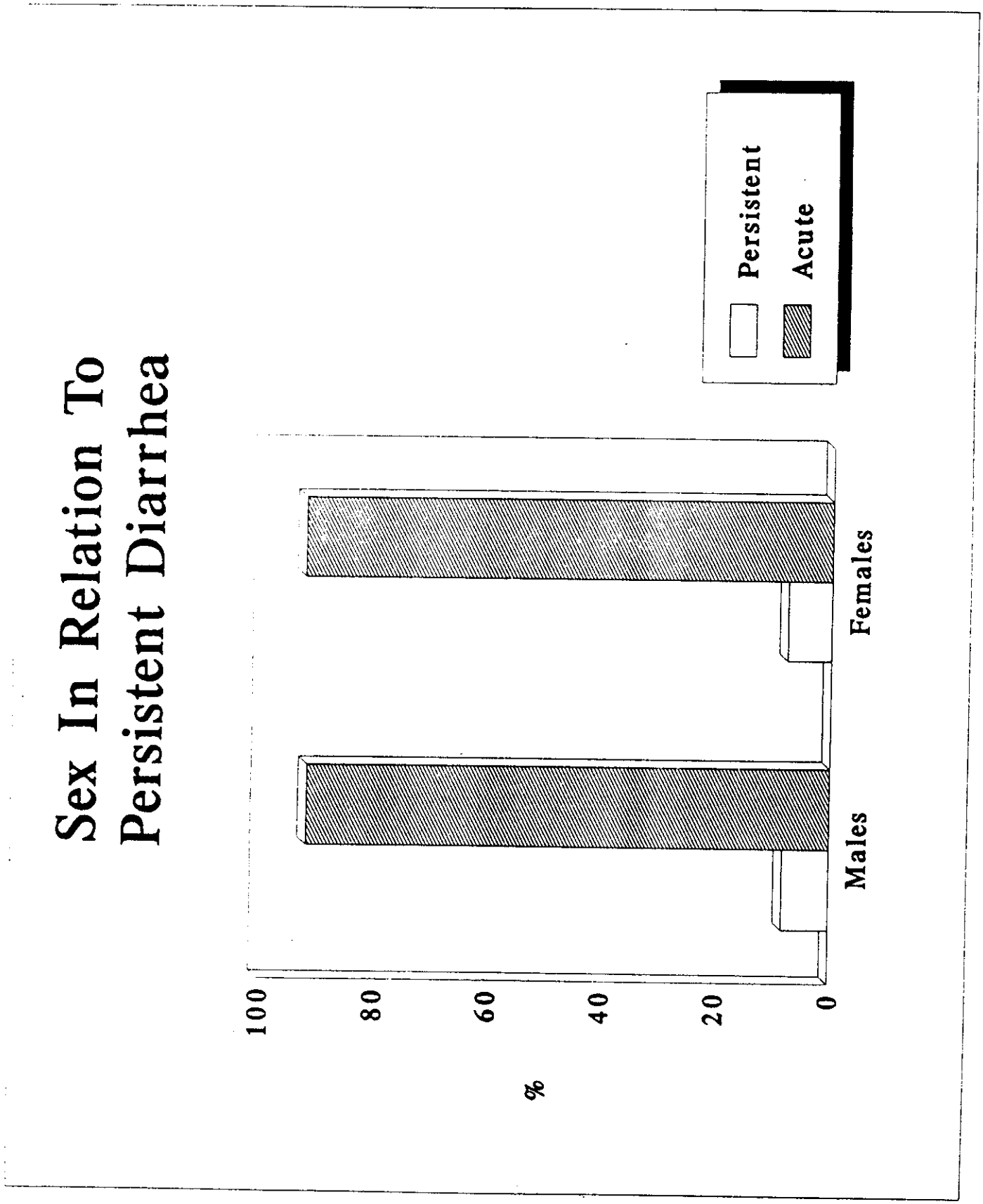
Monthly Incidence of P.D. Episode Per 100 Child



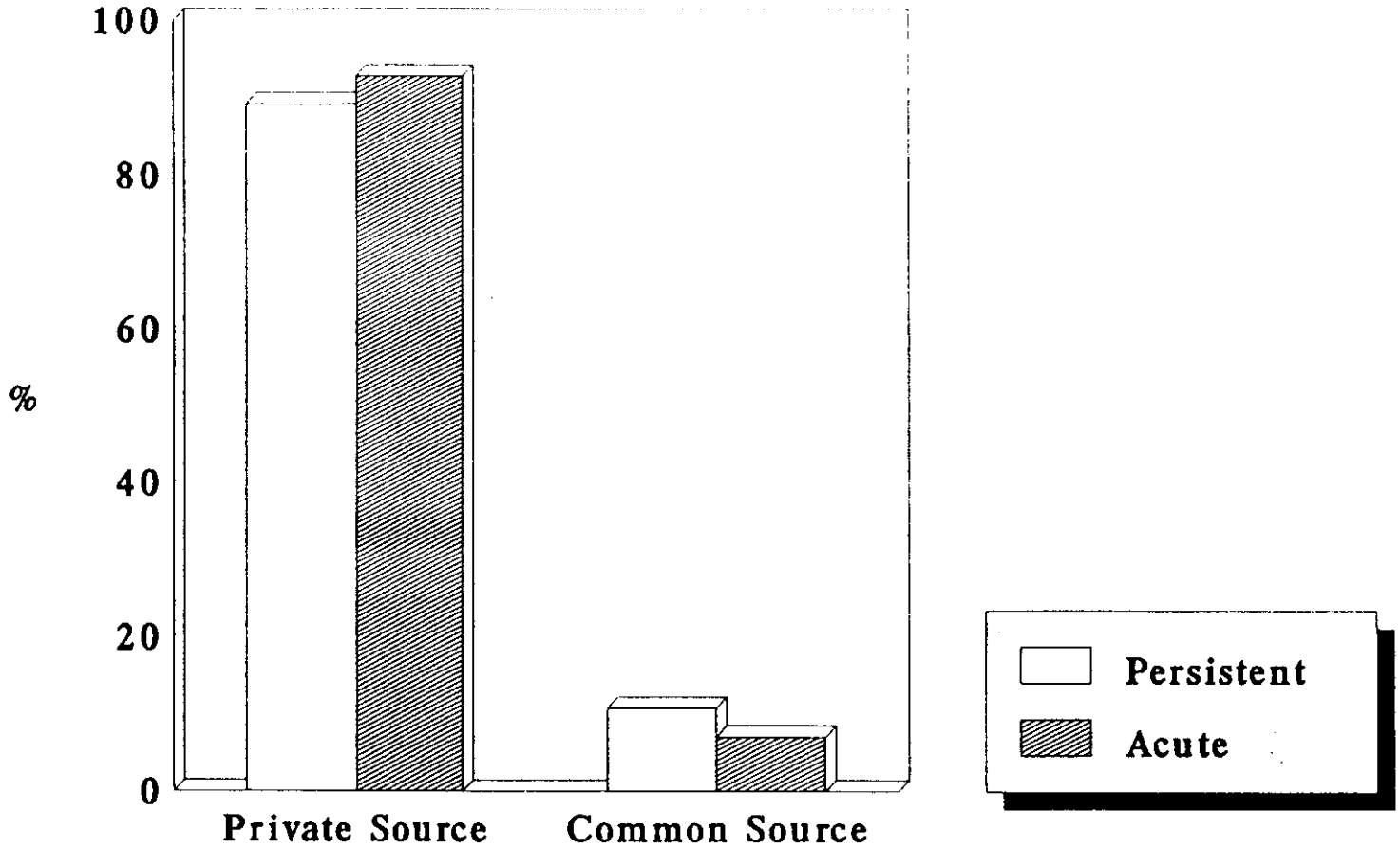
Monthly Incidence of P.D. Episode Per 100 Acute Diarrhea Episode

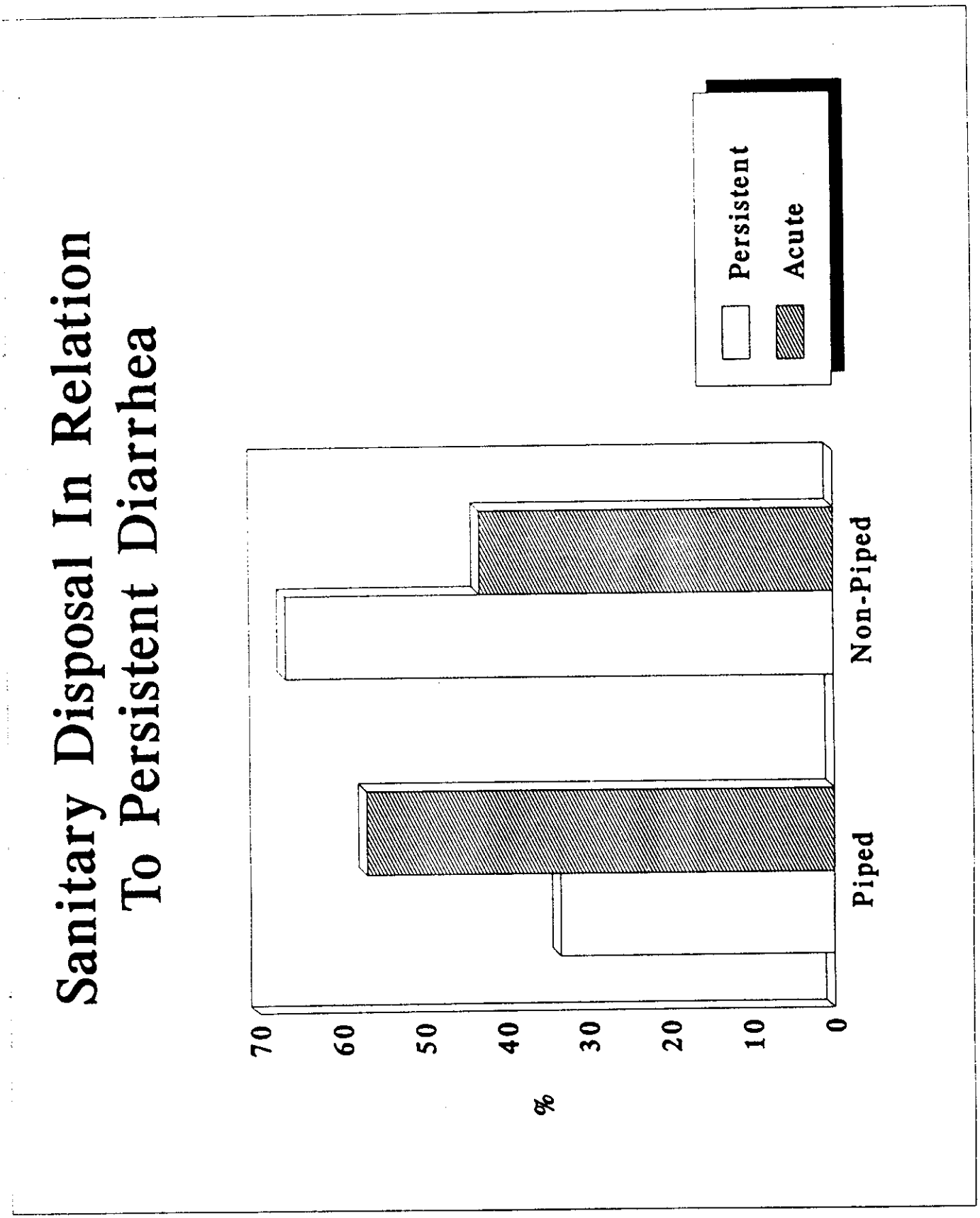



Age Distribution in Persistent Diarrhea Cases
%
60
50
40
30
20
10
0
< 6
6-12
> 12-18
>18
Persistent

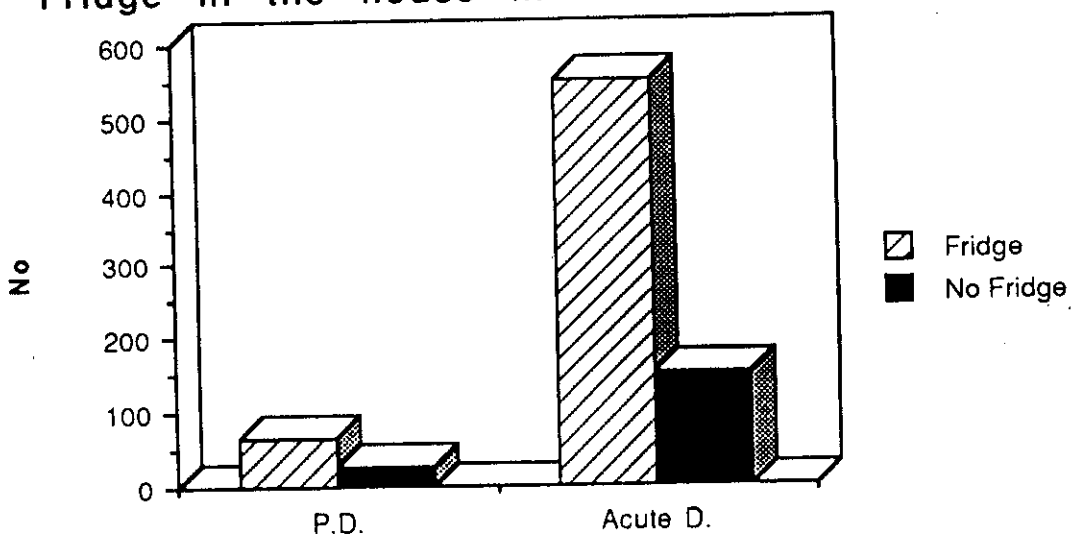

Sex In Relation To
Persistent Diarrhea
Persistent
Acute
100
80
60
40
20
0
%
Males
Females

Source of Drinking Water In Relation To Persistent Diarrhea

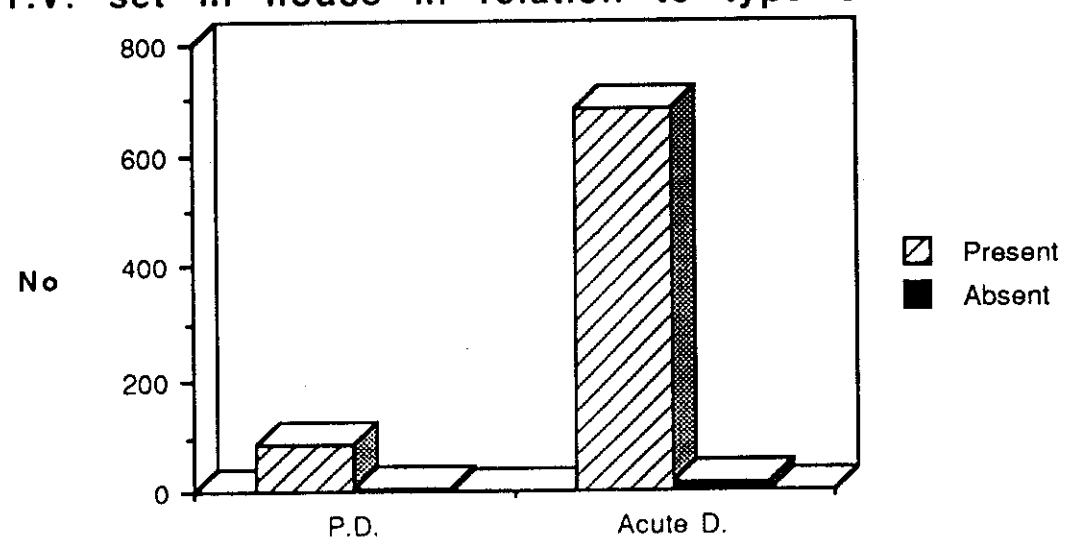


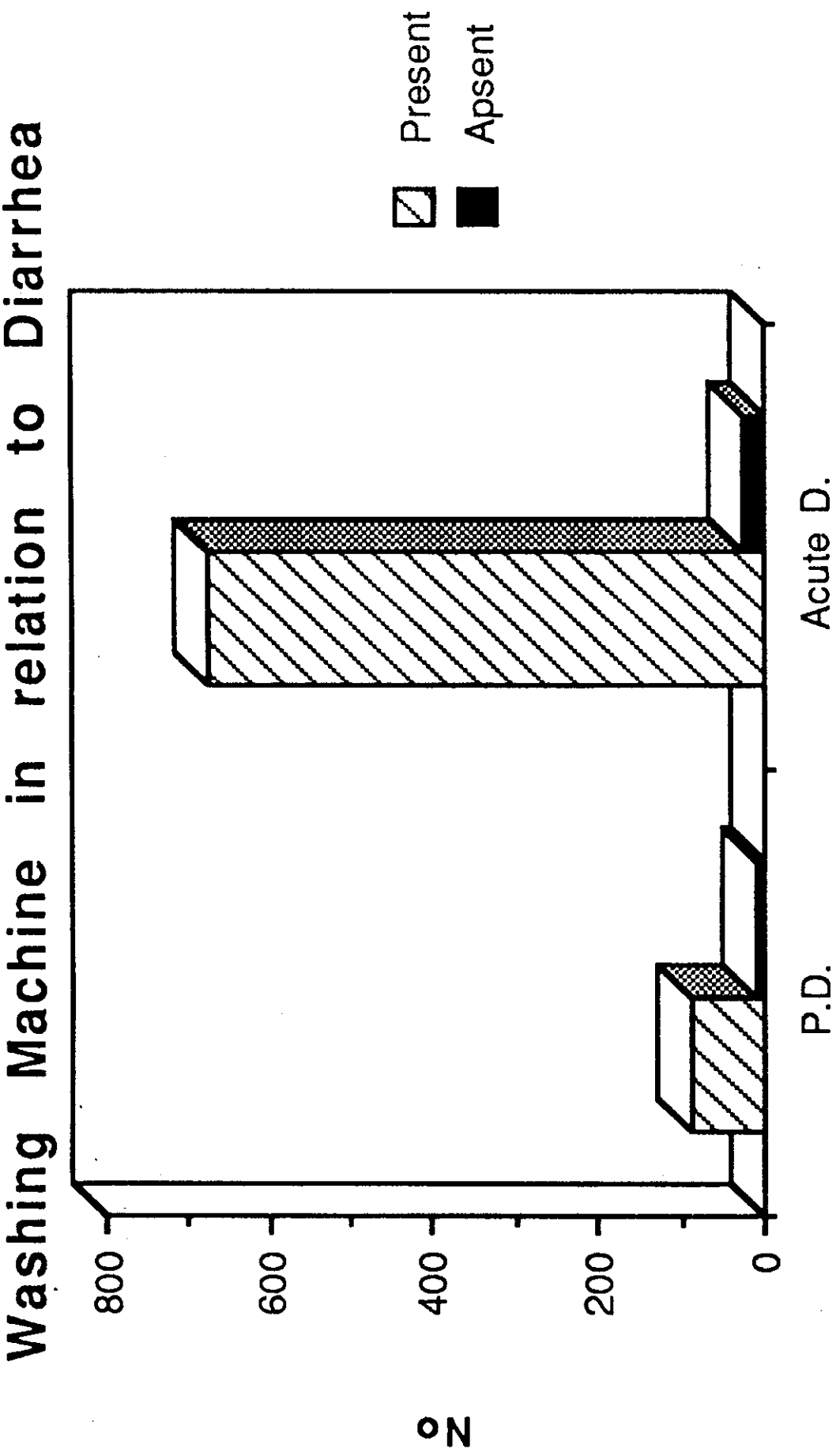

Sanitary Disposal In Relation
To Persistent Diarrhea
Persistent
Acute
70
60
50
40
30
20
10
0
%
Piped
Non-Piped

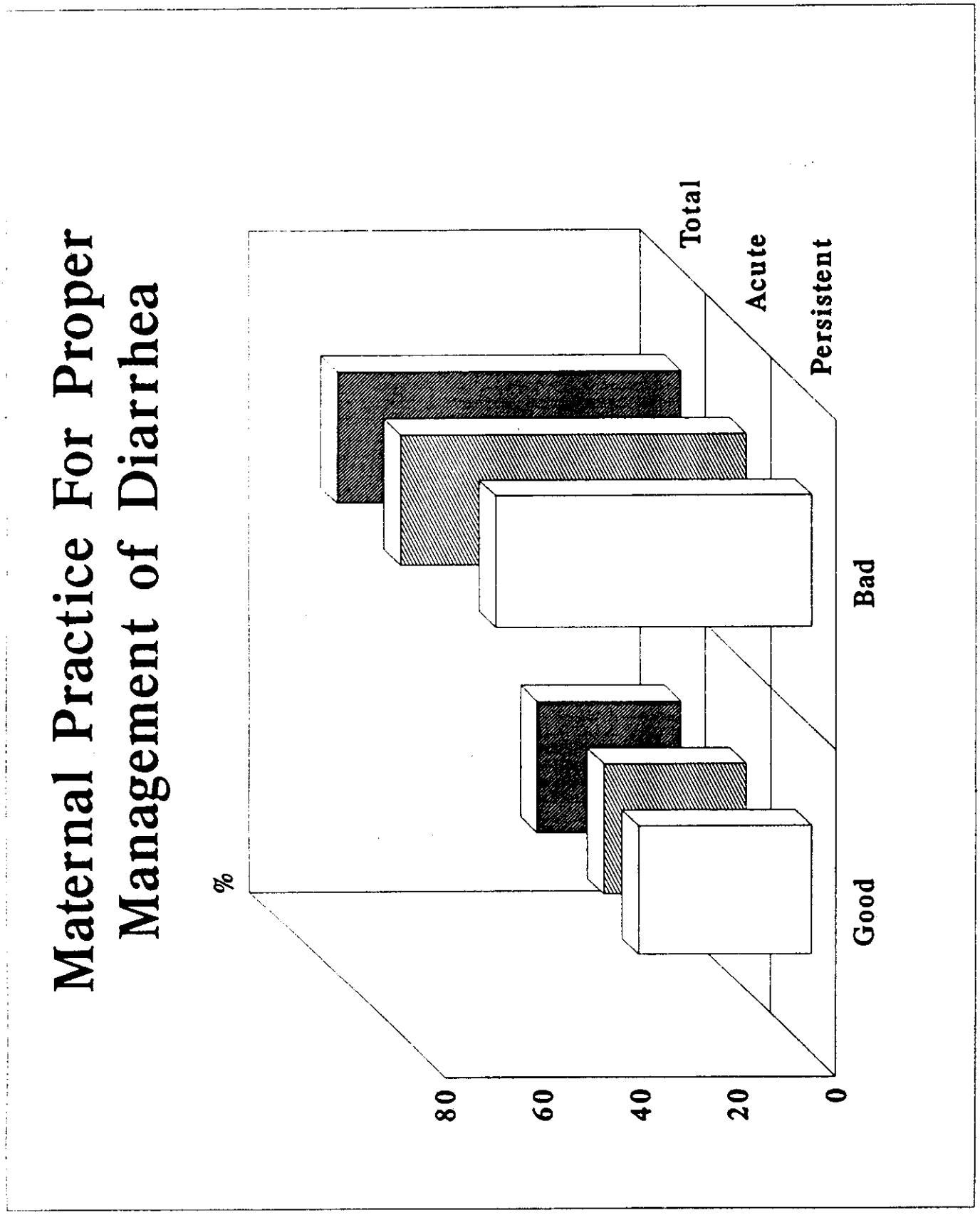
Fridge in the house in relation to diarrhea



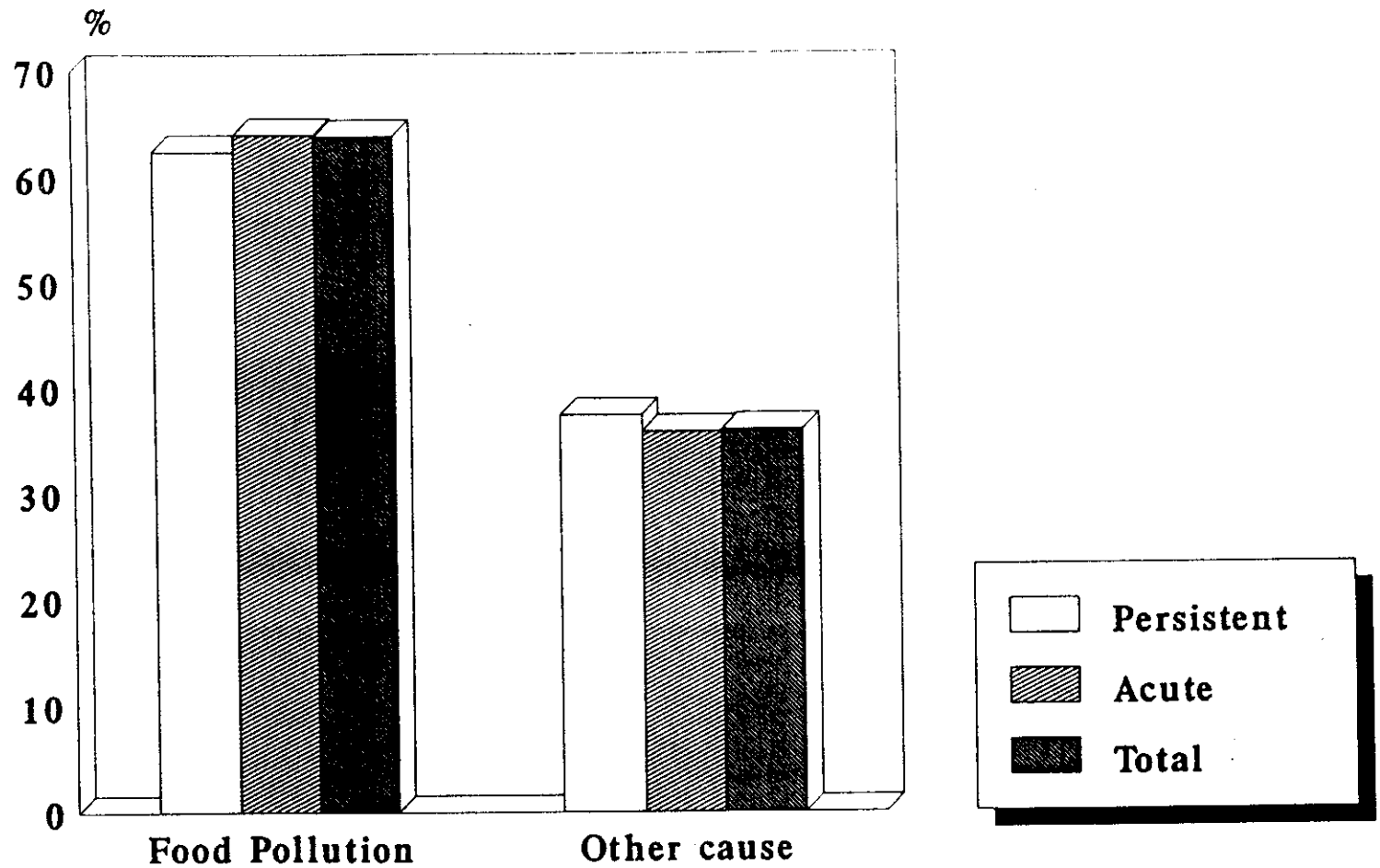
T.V. set in house in relation to type of Diarrhea



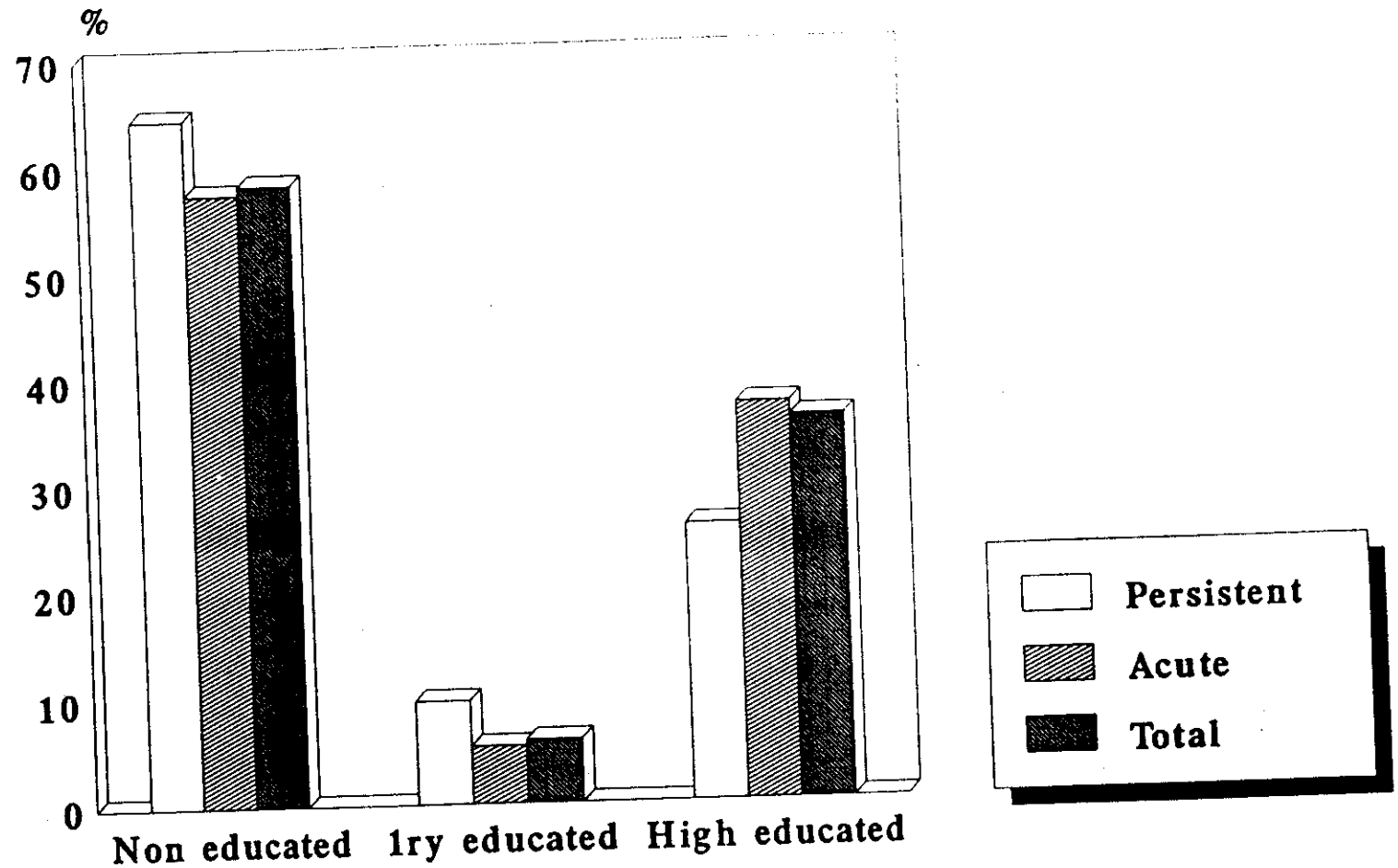

Washing Machine in relation to Diarrhea
Present
Apsent
800
600
400
200
0
No
P.D.
Acute D.


Maternal Practice For Proper Management of Diarrhea
%
80
60
40
20
0
Total
Acute
Persistent
Bad
Good

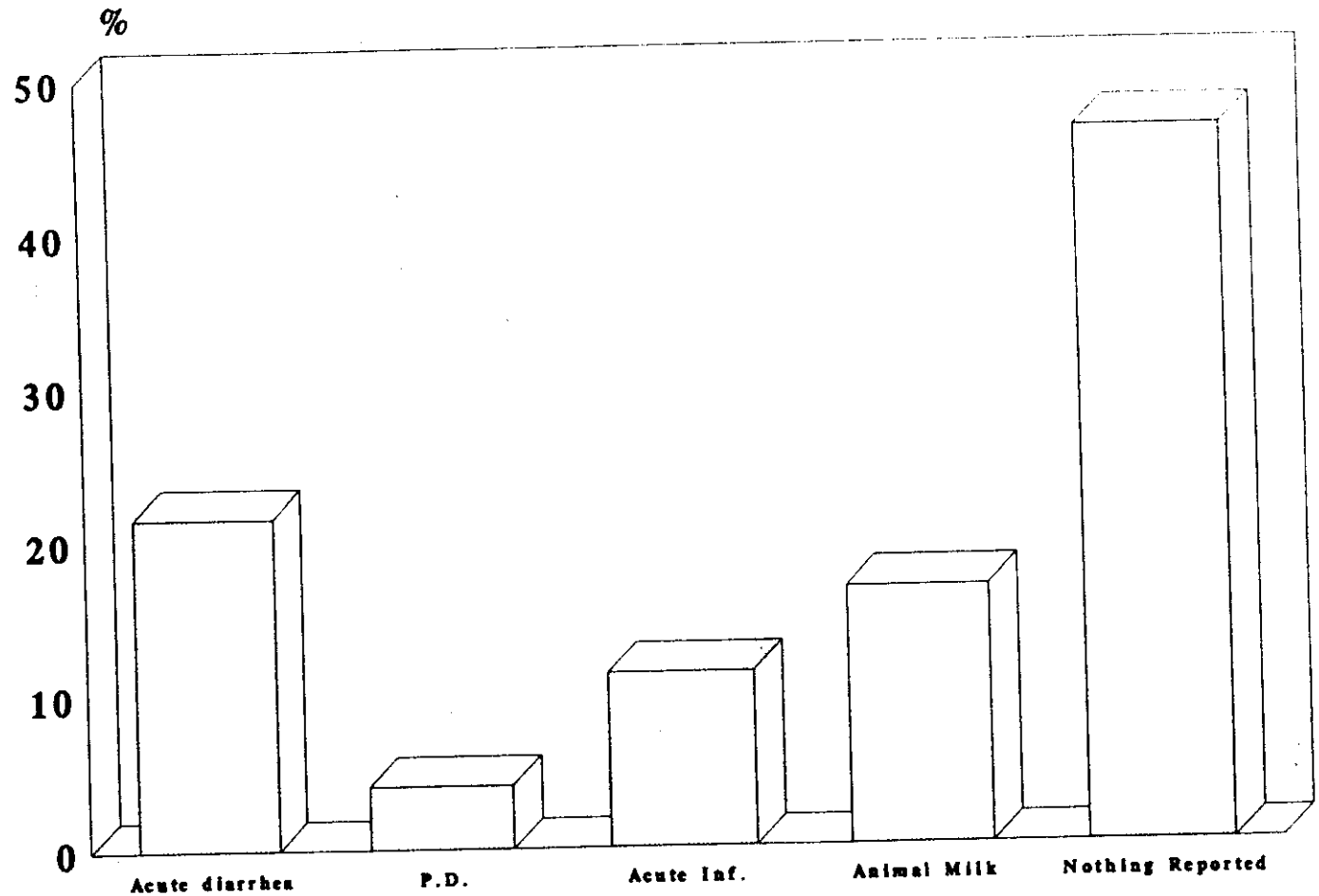
Mother's Idea about the Main Cause of Diarrhea



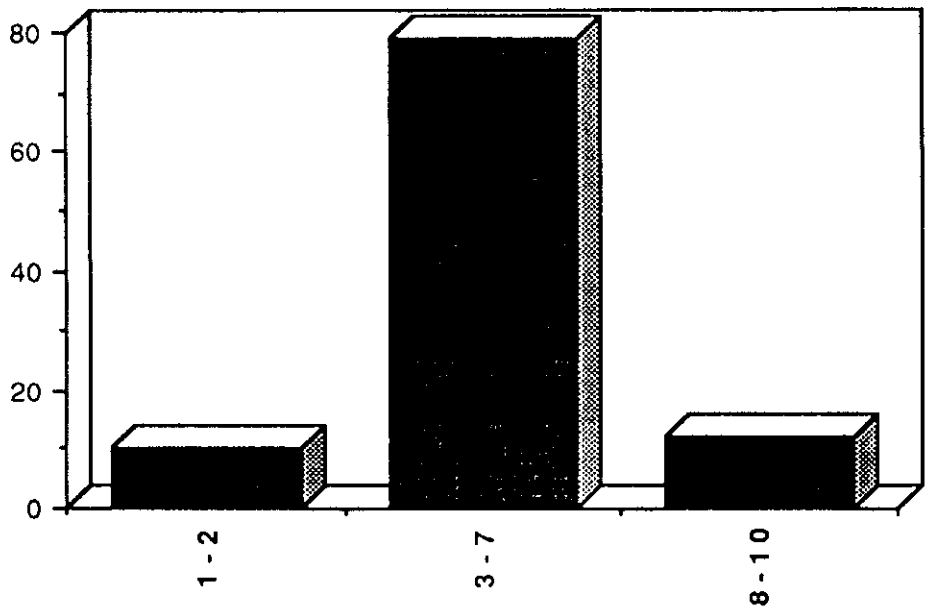
Mother's Education In Relation To Persistent and Acute Diarrhea



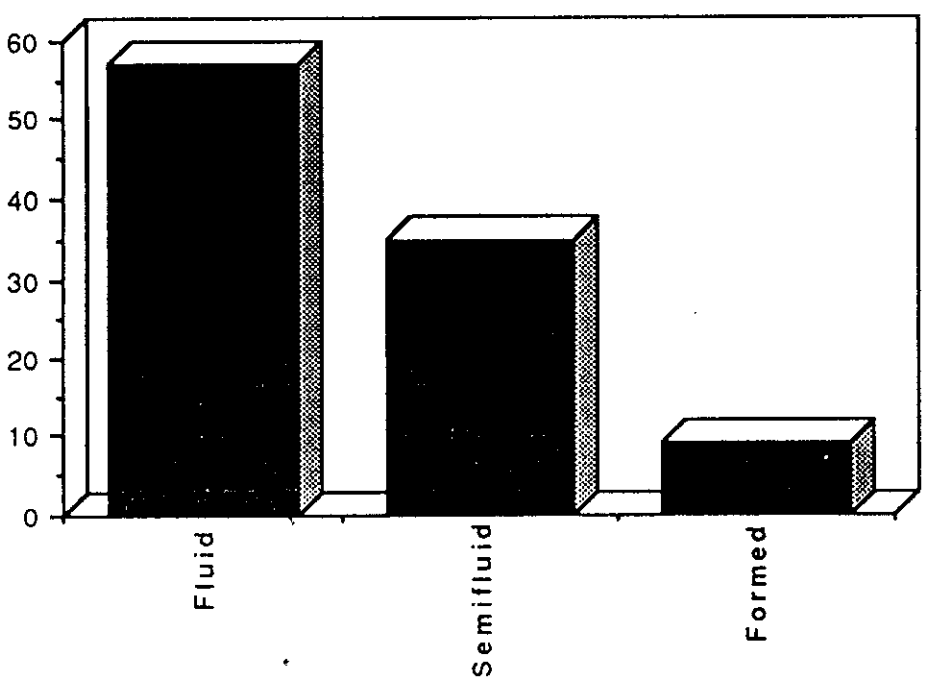
Events in Last Month Preceding Persistent Diarrhea



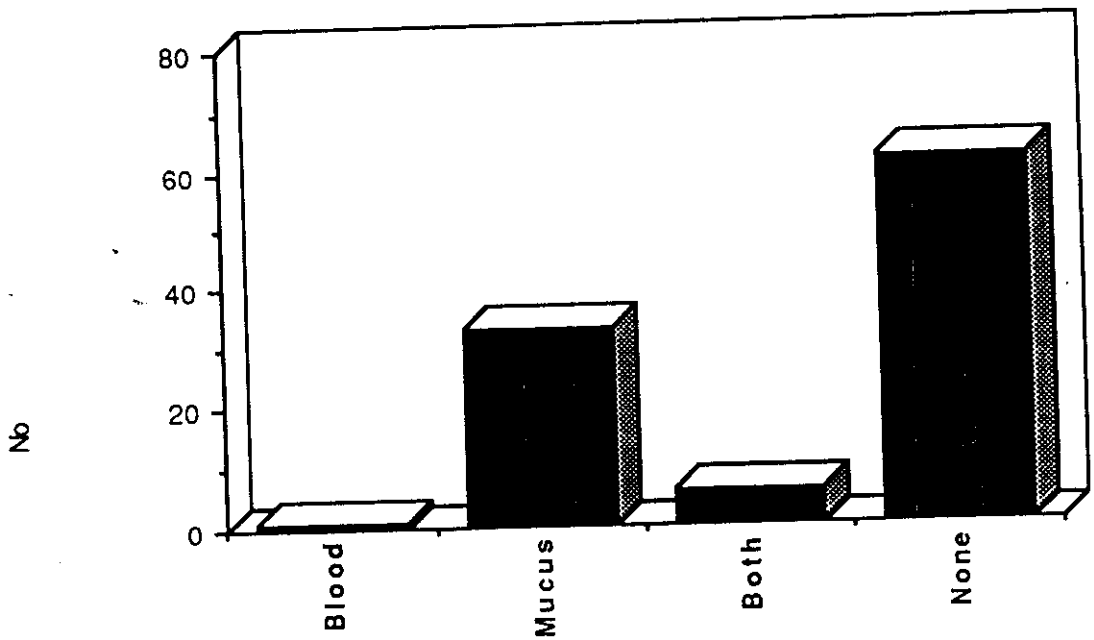
Frequency of stools at start of diarrhea



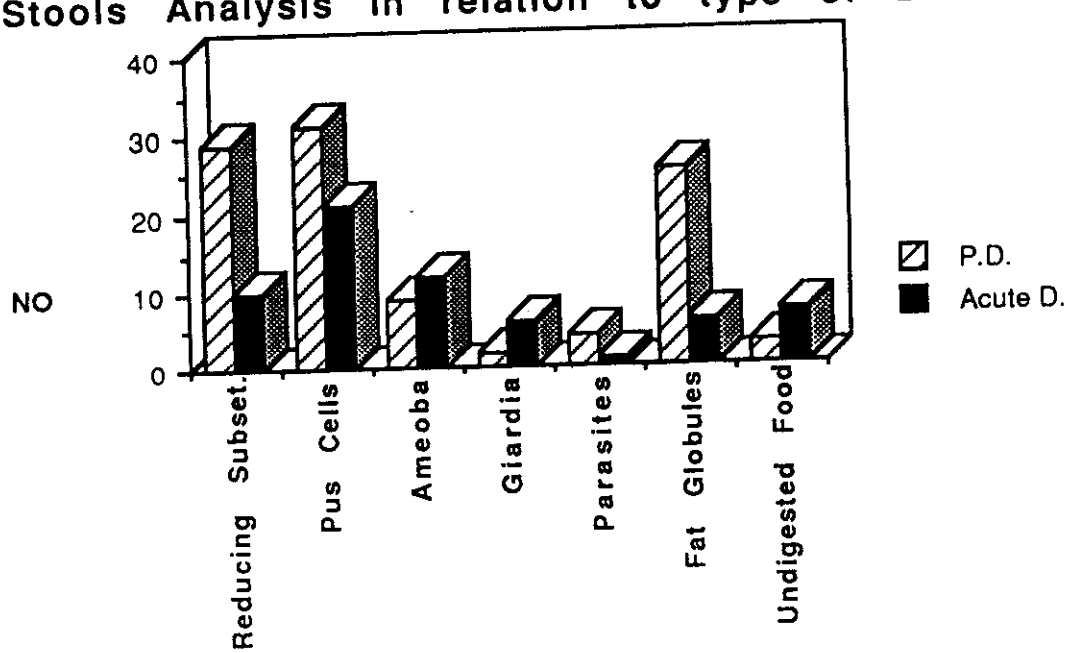
Stool Consistancy in relation to P.D.



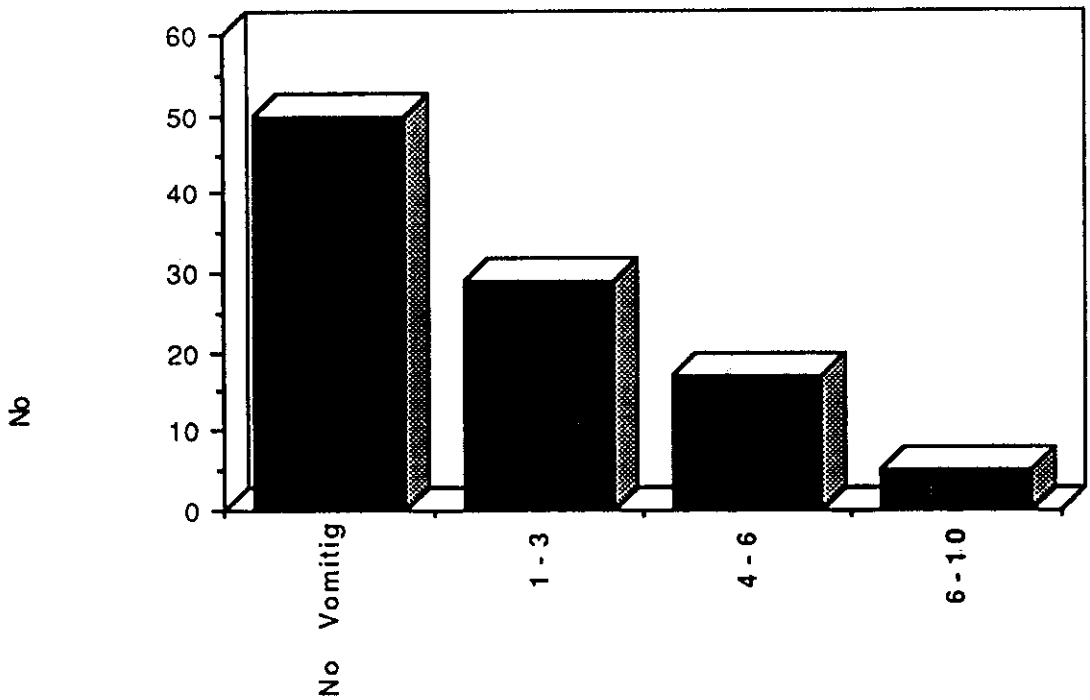
Stool character in relation to P.D



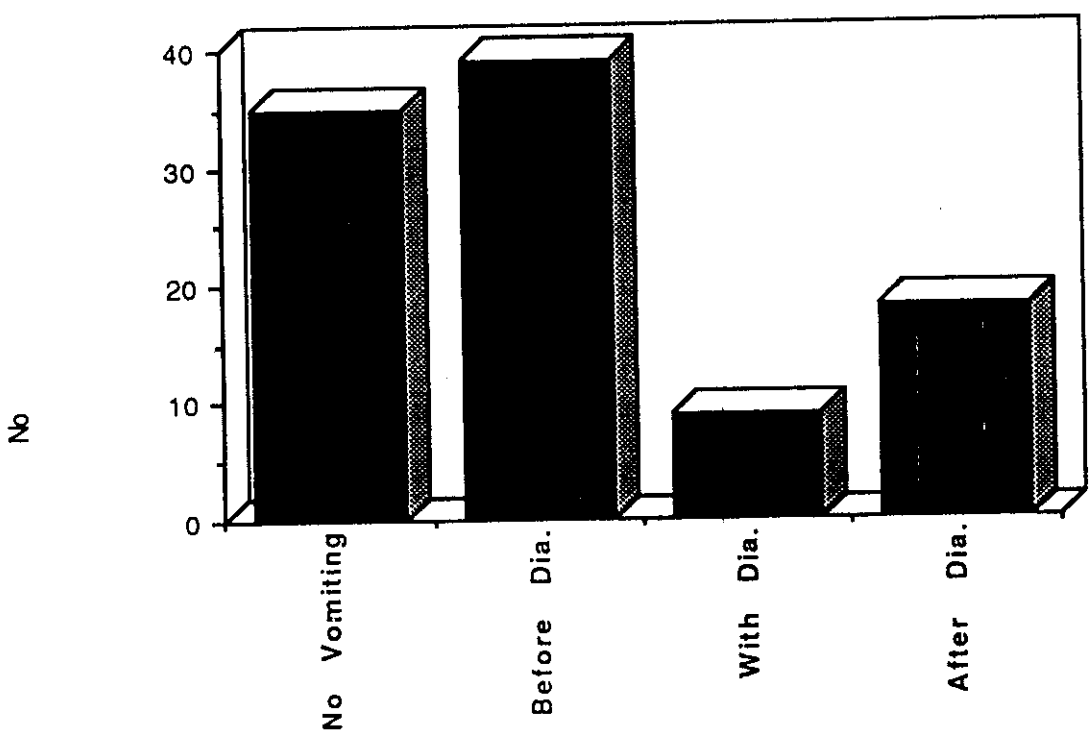
Stools Analysis in relation to type of Diarrhea



Frequency of vomiting in relation to P.D.



Start of Vomiting in relation to diarrhea



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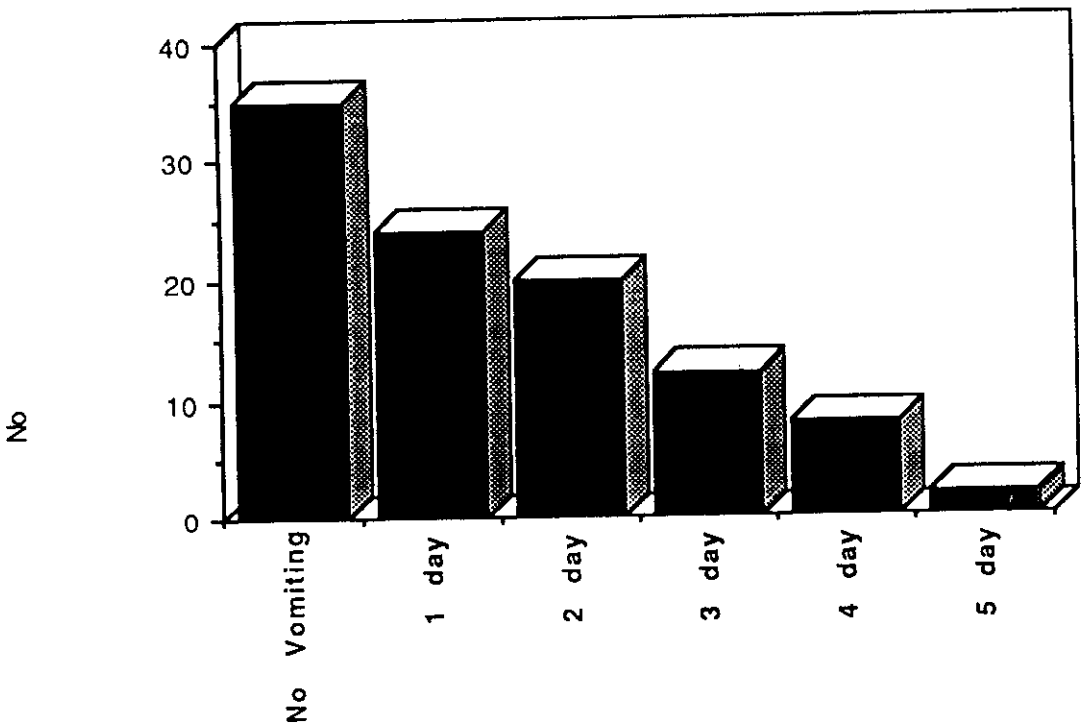
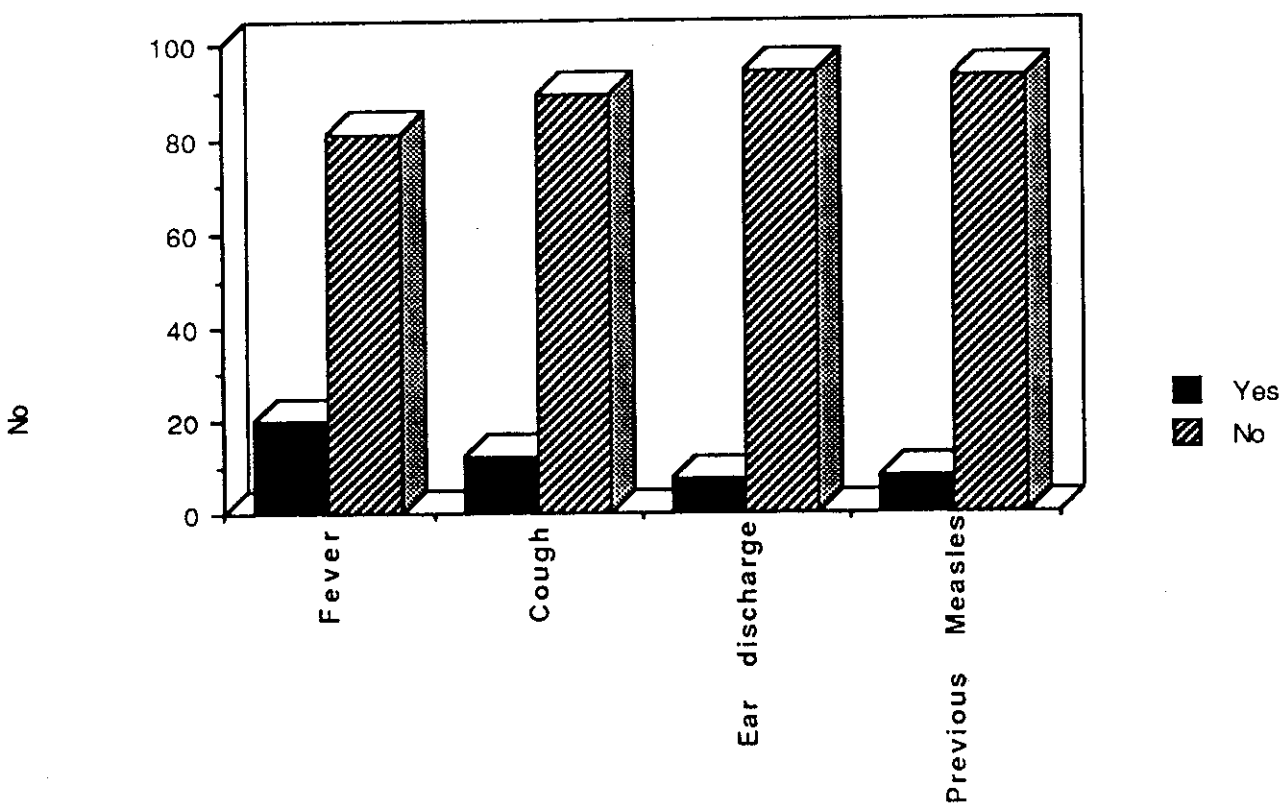


Other diseases in relation to P.D.



DISCUSSION

DISCUSSION

Persistent diarrhea is defined as diarrheal episode of presumed infectious aetiology that begins acutely but has an unusually long duration which lasts for at least 14 days or more ***(Candy, 1989)***. The term does not include chronic or recurnet diarrheal disorders ***(Black et al., 1987)***.

Persistent diarrhea is increasingly recognized as an important pediatric health problem in developing countries and the elucidation of risk factors, epidemiological studies and the development of treatment and control measures would be greatly facilitated if the aetiologic agents of persistent diarrhea could be identified ***(Bhan et al., 1989)***.

This study was conducted in Qalubya governerate in both urban (Atrib) and rural (EL-Manshia), Communities. In this study 1200 infant and child under 4 years of age were enrolled according to the selection criteria, 600 infant and child from each community (rural and urban).

The study aimed at the detection of the magnitude of persistent diarrhea problem and the identification of the possible risk factors causing this problem.

We found the incidence of acute diarrhea in the studied population was 2.26 episodes per child per year. It was comparable in the different studied communities, in the different geographic locations and in the rural and urban areas, where it ranged between 1.3-2.0 episodes per child per year, in Assuit, Giza, Ismailia governorates representing lower, middle and upper Egypt ***(Hassanein et al., 1992)***. The estimated incidence of acute diarrhea in the present study

was lower than that estimated by ***EL-Alamy et al. (1986)*** in Egypt, which could be due to the widespread use of ORS. It is also comparable to the incidence reported for children in Africa, Assia and Latin America ***(Snyder and Merson, 1982)***.

The results of this study showed that the prevalence of persistent diarrhea was 10.5% and 5.6% in rural and urban communities respectively. The difference was significant statistically. On the other hand, the monthly incidence of persistent diarrhea per 100 child was ranged from 0.5% to 1.83% in rural area and 0.33% to 1.16% in urban area. While the monthly incidence of persistent diarrhea episodes per 100 acute diarrhea episodes ranged from 3.6% to 7.3% and 3.1% to 4.1% for rural and urban communities respectively.

Black et al. (1982) reported that the incidence of persistent diarrhea has been estimated between 2 to 20% of diarrheal episodes. ***WHO, (1988)*** reported that the incidence of persistent diarrhea varies widely in different regions. In

Brazil and Bangladish 8 - 10% of patients under 5 years had persisent episodes ***(Abdullah, 1990 & Shahid et al., 1988)***.

While it ranged between 7.6 and 10.8 episodes per 100 child per year in Ismailia, Giza and Assuit gover-norates ***(Hassanein et al., 1992)***. These results contrast with the much higher incidence reported in some other developing countries like Gambia and India, where it was 38, 31 episodes respectively ***(WHO, 1988)***.

This wide range of reported incidence of persistent diarrhea can be attributed also to the use of different case definition and study methodologies.

Regarding the seasonality of persistent diarrhea it was noticed that the monthly incidence of persistent diarrhea episodes per 100 child was higher in June and Jully months than in other months in both urban and rural communities. This demonstrated that attending in hot months is a risk factor for persistent diarrhea. This may

depend on the type of infective organism that causes diarrhea during the hot months which has an invasive charecter to the intestinal epithelium (e.g.enteroinvasive E.Coli, shigella and cryptosporiduium) as bacterial diarrhea is generally more common in summer ***(Abdullah, 1990)***.

We studied also the risk factors that can be etiologic agents for P.D.:

Host Risk Factors:

- Age:

The results of this study showed that the majority of persistent diarrhea cases were below 1 year of age; between 6-12 months age (49.5% of cases). The problem of persistent diarrhea decreased with increasing age of children. Also the mean age of persistent diarrhea cases was younger (less than 1 year) than acute ones, this difference was significant.

In other localities ; Assuit, Ismailia and Giza, ***Hassanein et al. (1992).*** reported that the peak incidence of P.D. episodes occurred in infants aged 6-12 months and reached 19.0 episodes per 100 child per year. The incidence decreased significantly in children more than 2 years of age. Our results parallel also with those observed in some developing countries like Brazil, Peru and India ***(WHO, 1988).*** It was also observed that infants less than 6 months of age had the lowest incidence of diarrhea episodes compared to older children. This observation could be due to high prevelance of breast feeding at that age.

WHO, (1988) reported that the incidence of persistent diarrhea during the first year of life and the chance that an acute diarrheal episode will become prolonged is also greatest in this age group. In northern India, the incidence of persistent diarrhea was greater in the age group 0-11 months than at age 12-35 months. Age could be implicated because it is related to the

child's immunological and non-immunological defence such as passively acquired maternal IgG and breast milk IgA and gastric acid production ***(Black and Brown, 1988)***.

Baqui et al. (1992); Nasser et al. (1988) and Roy et al. (1989) had shown that the incidence of P.D. is greatest during the first year of life. This reflects the age specific prevelance of other possible risk factors such as the child immunological defences, the introduction of weaning food, malnutrition or diarrhea associated with specific enteropathogens.

- Sex:

The results showed that there was no significant difference between sex and occurrence of persistent diarrhea as reported in other localities; Assuit, Giza and Ismailia ***Hassanein et al., 1992 and Shahid et al., 1988.***

Nutritional Status:

It was noticed from the results of the present study that malnutrition was significantly predominated in persistent diarrhea cases (44.3%) than in acute ones (29.3%). Many studies have shown that diarrhea contributes to malnutrition *(Mata et al., 1977 and Mansy et al., 1983)*. However, several recent studies have shown that malnutrition is also a risk factor for prolonged diarrhea, thus in malnurished children, the mean duration of diarrhea episodes is longer and there is a higher incidence of persistent diarrhea *(Hirschhorn, 1985 and Lima et al., 1992)*. **EL-Sabagh et al. (1987)** reported that 28.4% of diarrhea cases had bouts for longer than 7 days; the majority of these cases were malnourished. Also **Edmead et al. (1981)** reported that persistent diarrhea occurs in 19% of children predominantly young malnourished infants. There is increasing recognition that a substantial proportion of diarrhea-related deaths are associated with persistent diarrhea which is accompanied with deterioration in the nutritional status *(Black et al., 1984 and Fauveau et al., 1992)*.

The longer duration of bouts in the malnourished children may be explained by the fact that malnourished children have prolonged diarrhea precisely because their cell-renewal time may be five to ten days or longer. They simply do not have enough protein to make new cells quickly as described by ***Hirschhorn. (1985).***

Diarrheal infections could contribute to malnutrition through a combination of interacting factors; including effects of the pathogens on intestinal function, diminished appetite, decreased feeding by the infant caretaker and direct loss through diarrhea and vomiting ***(Mata, 1978).***

Immunological competence may be a critical risk factor in the development of prolonged diarrhea. It was noticed that factors responsible for impaired cell mediated or humoral immunological response such as measles infection and malnutrition may increase the risk of developing P.D. Children with deprssed cell mediated immune competence have more prolonged diarrhea episodes than children with greater responsiveness even after controlling nutritional status ***(Kaster et al., 1987 and Black et al., 1988).***

Generally, no one can deny that the malnourished child has longer diarrheal duration. But we must not forget that persistent diarrhea can lead to malnutrition, i.e. malnutrition may be a result as well as risk factor of persistent diarrhea ***(Palmer et al., 1986 and Black et al., 1984)***.

Vaccinations:

Pervious vaccinations had no significant effect on the incidence of persistent diarrhea.

Feeding Practices:

The results of the present study about the feeding practices of the studied cases, showed that the majority of diarrhea cases (persistent and acute) were formula fed children (55.7% & 51.5% respectively).

A study in Burma has shown that the duration of acute diarrhea is shorter in children who are breast-fed during the episode than in those who are not breast-fed. However, it is not known whether continued breastfeeding protects against the development of persistent diarrhea ***(WHO, 1988)***. ***Shadid et al. (1988)*** reported in their study that the lack of breast feeding has been reported as risk factor for persistent diarrhea. This is due to reduced intake of protecting factors in breast milk, contamination of animal milk with enteropathogens, damage of the gut mucosa due to hypersensitivity to animal milk protein and intolerance to lactose or other mechanisms ***(WHO, 1988)***.

On study of the effects of preillnes feeding practices especially breast-feeding, in India and Peru, there was no evidence that the risk of developing persistent diarrhea was related to preillnees feeding pattern. These results are surprising, given the protective effect of breast-feeding on the incidence and severity of acute diarrhea ***(WHO, 1988)***.

The type and quantity of food that the child receives either before or during diarrhea may affect the possibility of developing prolonged diarrhea. Malabsorption of CHO, lactose and other disaccharides and monosacharides has been reported during and after acute diarrhea ***Lifschitz et al., 1988.*** Furthermore, decreased absorption of fat, protein, vitamins and minerals has been described with certain forms of P.D. These unabsorped nutrients might exert osmotic and toxic effects on the intestinal mucosa. They may inhibit pancreatic and biliary secretions and impair mucosal renewal ***(Black et al., 1988 and Roy et al., 1989).***

Environmental Risk Factors: -

- Housing Conditions:

The results showed that there was significant relation between bad housing conditions; floor, roof, walls, sewage disposal, animal in the house, and source of drinking water and the

occurrence of persistent diarrhea. On the other hand, the presence or absence of electricity or electric sets (T.V., radio, washing machine, fridge) in houses has no value on the diarrhea either acute or persistent.

- Economic Status:

The majority of families were belonging to poor classes either in the rural (64.4%) or urban (72.3%) communities. Also the mean crowding index was slightly higher in rural than urban communities.

These results agree with the results of ***Gordan et al. (1964)*** who mentioned that many features of environmental hygiene and sanitation influence the frequency of diarrheal diseases. Among them the fecal and waste disposal, the standard of housing, crowding, sanitation facilities, the storange and the preparation of food, as well as the state of water supply and the

presence of flies. Also, ***Hassanein, (1984)*** mentioned that in smaller families there is less exposure to infectious agents and individual children can receive more attention.

Unsanitary home environment favours the presence and multiplication of pathogens. Prevalence and occurrence of diarrhea is higher in families with low socioeconomic and hygienic standards ***(Black et al., 1983 and Pacey, 1987)***. The incidence of diarrhea is more closely related to socioeconomic conditions than to climate, to poverty rather than to place. Children from poor families with adverse socioeconomic status, where poverty and ignorance were present, tend to have a higher incidence of diarrhea ***(Ironside, 1976)***.

On the other hand, the study in Assuit, Giza and Ismaillia showed that these factors have no role in P.D. ***(Hassanein et al., 1992)***. While ***Khin et al. (1991)*** reported in thier study that a child with malnutrition and persistent diarrhea, even after discharge from hospital after successful treatment of diarrhea and nutritional rehabilitation, goes back into the same house hold where

environmental contamination with high levels of fecal coliforms in the drinking water and behavioral factors again predispose the child towards another episode of the same illness indicating that environmental factors are risk factors as reported in our study.

Previous deaths in the family history of previous deaths in the family didn't differ significantly between acute and persistant cases.

Maternal Attitude and Diarrheal Disease:

- **Maternal practice about the proper management of diarrhea:**

30.7% of the mothers had good knowledge about the proper management of diarrhea. While the percentage of mothers who had bad practice for proper management of diarrhea, were more or less similar in both acute and persistent cases (70.3% and 59.8% respectively).

It has been postulated that inappropriate use of antibiotics, antiparasitic or antimotality drugs may favour the growth of pathogenic or commensal bacteria in the small intestine leading to malabsorption and probably to P.D. ***(WHO, 1988)***.

- Mother's knowledge about the main cause of diarrhea:

61.6% of mothers mentioned that the main cause of diarrhea is food pollution.

- Mother's education:

54.5% and 65.4% of mothers of infants with acute and persistent diarrhea respectively were uneducated.

Khin et al. (1991) reported that maternal education was an important risk factor, the relative risk of developing persistent diarrhea and PEM being more in children of mothers who has elementary school level or lower education. Lack of mother's knowledge that flies, unsafe water and poor personal hygiene could be associated with diarrhea.

- Events Occurred in Last Month Preceeding Persistent Diarrhea:

It was observed that 21.6% and 4.1% of persistent diarrhea cases were suffering from acute and persistent diarrhea respectively in last month before onset of the present persistent diarrhea. In Guatemala and India, the risk of developing persistent diarrhea increased two to four folds during the 2 months following an episode of acute diarrhea or suffering one documented episode of persistent diarrhea *(WHO, 1988)*.

11.3% of persistent diarrhea cases were suffering from acute infection before the present illness. Some studies in Peru showed that children who had recently measles, respiratory infections and febrile exanthems; experienced diarrhea episodes more frequently, these episode lasted 30% longer than in controls as it leads to reduced immunological competence *(WHO, 1988)*.

About 16.7% of persistent diarrhea cases received animal milk for first time in the month preceeded the present persistent illness. The study in India has shown, however that the incidence of persistent diarrhea does increase two to three fold during the first month following the introduction of animal milk. Whether this increase is due to reduced intake of protective factors in breast milk, contamination of animal milk with enteropathogens, damage to the gut mucosa due to hypersensitivity to animal milk proteins, intolerance to lactose or other mechanisms is not known ***(WHO, 1988)***.

Most of children with persistent diarrhea passed 3-7 motions per day (78.2%) during the start of the episode, stools were mostly watery (57%) with early adminestration of antibiotics and/or antiprotozoals (72%).
These results agree with those obtained by ***Araya et al. (1991) and Khashaba et al. (1992)***

While stools with mucus, blood or pus were described in Bangladish by ***Shahid et al. (1988)*** they were not significant in statistical analysis of our patients or in that of ***Araya et al. (1991)***.

Presence of reducing substance in stools was significantly associated with persistent diarrhea (55.7%) of cases had reducing substance in stools. Lactose malabsorption is an important factor in the subgroup of children whose diarrhea becomes persistent ***(WHO, 1988)***.

Associated Symptones:-

Vomiting:

(45.5%) of cases of persistent diarrhea had vomiting 1-6 times/day.

Vomiting preceded the diarrhea in (38.6%) of cases.

Vomiting lasted 1-3 days in most cases (55.4%).

Vomiting was considered by **Bhutta et al.** ***(1991)*** as a risk factor associated with delayed recovery.

Fever:

19.8% of cases were associated with fever.

Others:

Cough and ear dischange were not significantly associated with persistent diarrhea.

In summary this study has shown that P.D. is common and important health problem in Egypt. The risk of developing P.D. increased in infants less than one year. Comparison of children suffering from P.D. with those having acute episode have shown that the following risk factors are significant in prolonging the diarrheal episode; malnutrition, feeding practice, bad housing conditions, economic status, bad practice of uneducated mothers and the occurrence of acute episode or acute infections before the present illness, and the frequent passage of watery stools or stools containing blood and /or mucus especially if associated with repeated vomiting and the use of antibiotics for treatment of acute diarrheal episode.

SUMMARY AND CONCLUSIONS

SUMMARY

In this prospective study, 1200 infant and child (600 from rural and 600 from urban area) were followed-up for the detection and follow-up of cases of diarrhea for the elucidation of the risk factors that might be operative in the development persistent diarrhea.

The study was done in Qalyuobia Governerate in two areas (urban and rural); the target population of this study was children under the age of 4 years who are living in the study areas. Permanent settlers only were included in the study for prevention of contamination of our sample with those living in other areas. This study was carried out from November 1990 to July 1991.

The following results were obtained at the end of the study:

1- The magnitude of the problem of persistent diarrhea:

a- Prevalence of persistent diarrhea:

The results showed that the prevalence of persistent diarrhea was 5.6% in urban community in comparison to 10.5% in rural one. The difference was significant statistically.

b- Monthly incidence of persistent diarrhea:

1- Monthly incidence of persistent diarrhea episode /100 acute diarrhea episode ranged from 3.66% to 7.33 in rural area and 3.39 to 6.9 in urban area.

2- Monthly incidence of persistent diarrhea episodes /100 child was ranged 1.16 to 1.83 and 0.5 to 1.5 in rural and urban area respectively.

2- Risk factors for development of persistent diarrhea:

a- Host risk factors:

1- Age: The mean age of persistent diarrhea cases was significantly younger than cases with acute diarrhea.

2- Sex: The results showed no significant difference between sex in both types of diarrhea.

3- Nutritional Status: Malnutrition was significantly more observed in persistent diarrhea cases.

4- Feeding Practices: Feeding pattern prior to illness showed no significant difference in both types of diarrhea; although the acute diarrhea cases showed increased cases who were breast fed.