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Factors related to the occurrence of diarrheal disease among under-five children in Lalitpur district of Nepal

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ABSTRACT

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A cross-sectional descriptive study was conducted to identify the factors (socio-demographic, behavioral, child, environmental and sanitation) related to the occurrence of diarrheal disease in under-five pre-school children in the Lalitpur district of Nepal. Data of 179 caregivers of the under-five children were collected from two urban schools, during the winter season (Jan-Feb, 2010) where the incidence of diarrhea was high. Data were collected by structured questionnaire and face to face interviews in both schools. Chi-square test and Multiple Logistic Regression were used to identify factors related to the occurrence of diarrheal disease.

Caregivers were mostly female (78.77%), and 72.63% were mothers. 46.93% had secondary education or higher, and 39.11% were of low family income. More than half had a fair level of knowledge. 49.16% had good diarrhea practice, and 88% believed that first teeth emergence can cause diarrhea. Most of their children were 37- 48 months old. 82.68% had normal birth weight, and 46.93% had exclusive breastfeeding.

Most caregivers reported no diarrhea in their children in the month prior to the day of the interview, 20.67% reported one episode, and only 0.56% reported two episodes. 86.84% had watery type of diarrhea. Diarrhea occurred more often in children of ≥ 30 years old female caregivers with primary education and having poor practice on diarrhea. Diarrhea also occurred more often in children with low birth weight and not exclusively breastfed. However, there was no statistically significant association. Two factors were statistically significant associated with the occurrence of diarrheal disease: unhygienic drinking water storage system (O.R.= 2.53, 95% CI = 1.12 - 5.73) and unhygienic drainage system by having blocked drainage near by around the house, (O.R. = 2.12, 95% CI = 1.02 - 4.41). Clean storage of drinking water and hygienic drainage system should be encouraged. A good sewerage system may be expected to have a long term impact in the prevention of diarrhea.

Keywords Diarrhea Under-five children Caregivers Hygiene Environment Sanitation

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

ปัจจัยที่มีความสัมพันธ์กับการเกิดโรคอุจจาระร่วงในเด็กอายุน้อยกว่า 5 ปี ในอำเภอลาลิพัว ประเทศเนปาล

บทคัดย่อ

เทเคนดะ คาร์กิ สุพัตรา ศรีวณิชชากร จิราพร ชมพิกุล. ปัจจัยที่มีความสัมพันธ์กับการเกิดโรคอุจจาระร่วงในเด็กอายุน้อยกว่า 5 ปี ในอำเภอลาลิพัว ประเทศเนปาล ว.สาธารณสุขและการพัฒนา, 2553; 8(3): 237-51.

การศึกษาแบบตัดขวางนี้เพื่อค้นหาปัจจัยเสี่ยงต่อการเกิดโรคอุจจาระร่วงในเด็กอายุน้อยกว่า 5 ปี ในอำเภอลาลิพัว ประเทศเนปาล ดำเนินการเก็บรวบรวมข้อมูลจากโรงเรียนที่อยู่ในเมือง 2 แห่งในช่วงฤดูหนาว (มกราคม - กุมภาพันธ์ 2553) ซึ่งเป็นช่วงที่มีอุบัติการณ์ของโรคอุจจาระร่วงสูง โดยการสัมภาษณ์ผู้ดูแลเด็กจำนวน 179 คนตามแบบสอบถามที่สร้างขึ้น วิเคราะห์ข้อมูลด้วย Chi-square test และ Multiple Logistic Regression

ผู้ดูแลเด็กส่วนใหญ่เป็นผู้หญิง และเป็นมารดาของเด็ก 46.93% ของผู้ดูแลเด็กจบการศึกษาระดับมัธยมศึกษาตอนต้น หรือสูงกว่า 39.11% มีรายได้ครอบครัวน้อย มากกว่าครึ่งหนึ่งของผู้ดูแลเด็กมีความรู้เกี่ยวกับโรคอุจจาระร่วงในระดับปานกลาง 49.16% ของผู้ดูแลเด็ก มีการปฏิบัติที่ถูกต้องเกี่ยวกับโรคอุจจาระร่วง 88% เชื่อว่าฟันน้ำนมที่ขึ้นซี่แรกสามารถเป็นสาเหตุของการเกิดโรคอุจจาระร่วงในเด็กได้ เด็กส่วนใหญ่มีอายุ 37-48 เดือน 82.68% ของเด็ก มีน้ำหนักแรกเกิดปกติ และ 46.93% ได้กินนมมารดาอย่างเดียว

เด็กส่วนใหญ่ไม่เป็นโรคอุจจาระร่วงในช่วง 1 เดือนที่ผ่านมา มีเพียง 20.67% ที่เป็น 1 ครั้ง และมีเพียง 0.56% ที่เป็น 2 ครั้ง 86.84% เป็นโรคอุจจาระร่วงแบบถ่ายเป็นน้ำ โรคอุจจาระร่วงในเด็กพบมากในกลุ่มที่ผู้ดูแลเด็กอายุมากกว่า หรือเท่ากับ 30 ปี จบการศึกษาระดับประถมศึกษาและมีการปฏิบัติที่ไม่ถูกต้องเกี่ยวกับโรคอุจจาระร่วง เด็กที่มีน้ำหนักแรกเกิดต่ำกว่ามาตรฐาน และไม่ได้รับนมแม่อย่างเดียวในช่วง 6 เดือนแรก พบว่ามีสัดส่วนการเป็นโรคอุจจาระร่วงได้สูง แต่ความสัมพันธ์นี้ไม่พบว่ามีนัยสำคัญทางสถิติ ปัจจัยที่มีความสัมพันธ์กับการเกิดโรคอุจจาระร่วงอย่างมีนัยสำคัญทางสถิติ ได้แก่ การใช้ภาชนะเก็บน้ำดื่มที่ไม่สะอาด (O.R. = 2.53, 95% CI = 1.12 - 5.73) และการมีสิ่งกีดขวางการระบายน้ำรอบบริเวณบ้าน (O.R. = 2.12, 95% CI = 1.02 - 4.41)

ควรมีการส่งเสริมให้ประชาชนใช้ภาชนะที่สะอาดในการเก็บน้ำดื่ม และการดูแลไม่ให้มีสิ่งกีดขวางการระบายของน้ำรอบบริเวณบ้าน การมีระบบระบายของเสียที่ดีน่าจะส่งผลต่อการป้องกันการเกิดโรคอุจจาระร่วงได้ในระยะยาว

คำสำคัญ โรคอุจจาระร่วง เด็กอายุน้อยกว่า 5 ปี ผู้ดูแลเด็ก สุขอนามัย สิ่งแวดล้อม การสุขาภิบาล

INTRODUCTION

Diarrhea is one of the major killer diseases of under-five children. The mortality rate for children under-five years suffering from acute diarrhea has fallen from 4.5 million deaths annually in 1979 to 1.6 million deaths in 2002 but continues to be highest among the children of developing countries[1]. Seven out of 10 deaths in underdeveloped countries are caused by pneumonia, diarrhea, measles, malaria and under-nutrition. Diarrheal diseases are related to more than 4 billion episodes per year and more than 3 million deaths seen in 80% of the under-five children in 1995. On average, children below 3 years of age experience three episodes of diarrhea each year. About 50% of deaths are due to acute watery stool, 35% are due to persistent diarrhea and 15% are due to dysentery[2].

In Nepal, dehydration caused by severe diarrhea is a major cause of morbidity and mortality among under-five children. The causative agent of diarrhea is mostly related to contaminated water and unhygienic practices in food preparation and disposal of excreta. Prevalence of acute diarrhea in 2006 was 12% and 2% had bloody diarrhea, most commonly observed in the age group of 6-11 months and 12-23 months. Diarrhea has got a seasonal variation with two peaks, summer (May to July) and winter (December to February)[3].

Report addressed by UNICEF and WHO on October 14, 2009, despite the existence of inexpensive and efficient means of treatment, diarrhea kills more children than AIDS, malaria and measles combined, according to a report, titled "Diarrhea: Why Children Are Still Dying and What Can Be Done," includes information on the causes of diarrhea, data on access to means of prevention and treatment, and a seven-point plan to reduce diarrhea deaths[4].

In the developing world, 24,000 children under the age of five die every day from preventable causes like diarrhea contracted from unclean water. Some 88 percent of diarrheal deaths worldwide are attributable to unsafe water, inadequate sanitation and poor hygiene. As of 2006, an estimated 2.5 billion people around the world were not using adequate sanitation facilities, and about 1 in 4 people in developing countries practiced open defecation[4].

Access to clean water and good hygiene practices are extremely effective in preventing childhood diarrhea**.** Hand washing with soap has been shown to reduce the incidence of diarrheal disease by over 40 percent, making it one of the most cost-effective interventions for reducing child deaths caused by this neglected killer [4].

Even after having standard management of diarrhea through community based integrated management of childhood illness (CB-IMCI) program in the district since 2008, it is clear that the multiple factors are working to cause diarrhea. These includes, how diarrhea is managed at home by mothers or caregivers, not recognizing its seriousness in time and not taking children to a health provider in time, not giving enough attention on environment, sanitation and hygiene. Diarrhea is the second most common cause of morbidity and third most common cause of mortality among children aged 12-59 months in Nepal[5].

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

This study, therefore, was conducted to identify factors related to the occurrence of diarrheal disease in pre-school children under the age of five years, in the schools of Lalitpur district of Nepal.

METHODOLOGY

A cross-sectional study was conducted to identify factors related to the occurrence of diarrheal disease in pre-school children under the age of five years, in the schools of Lalitpur district of Nepal. Two schools were selected from thirteen pre-primary schools by cluster sampling, as all pre-primary schools located in Lalitpur, are in same geographical area, similar environment with same water and sanitation facilities. After getting approval from the ethics committee of Mahidol University Institutional Review Board MU-IRB (COA. No. Mu-IRB 2009/ 292.2611), the questionnaires were pre-tested for reliability by selecting 30 caregivers from Pumori Primary School in Lolitpur. A sample of 179 was collected through the structured questionnaire in Nepali language, by face to face interview, from January to February, 2010. Mothers or caregivers who came to pick up their children in the play group class were interviewed. The questionnaire used in the study consisted of four parts, namely; socio-demographic factors, behavior practice of caregivers, child factors, and environment and sanitation factors. Questions regarding knowledge, attitude and practice were related to the recogniz-ing danger signs and their management, breastfeeding, meaning of diarrhea and dehydration, hand washing, food preparation, feeding, use of ORS and disposal of children's stools. Kuder-Richardson formula 20 for the knowledge part was 0.70 and Cronbach's Alpha for the attitude part was 0.69.

Knowledge was classified into three categories: good (>80% of the total score of 20), fair (60 -80%) and poor (<60%). Attitude was categorized into two groups: positive (>75th percentiles of the total score) and negative (≤75th percentiles). Similarly practice part had total scores of 24 and was categorized into three groups: good (>80%), fair (60-80%) and poor (<60%).

Descriptive statistics were used to calculate frequency, percentage, mean, median, maximum, minimum, quartile deviation and standard deviation of the independent and dependent variables. Chi-square test was used to assess significant association between each independent variable and dependent variable. Crude odds ratio was used to show the strength of association with 95% confidence interval. The association between the independent variables and occurrence of diarrhea in under-five children were determined by multiple logistic regression.

RESULTS

Socio-demographic characteristics of caregivers

The socio-demographic characteristics of caregivers included their age, gender, relation to the child, education, occupation, family income and time given during daytime for the child care.

Over half (55.31%) of the caregivers were of age above 30 yrs (55.31%) having median as 30 yrs with minimum age of 20 yrs and maximum of 61 yrs. Mostly caregivers were female (78.77%) and 72.63% were mothers. Nearly half (46.93%) of the caregivers finished secondary or higher secondary education (7-12), and only 16.76% graduated with bachelor and above level. Most of the caregivers earned their living by agriculture and looking after the house and children as house wife (45.81%). Majority (39.11%) belonged to the low income group, middle and high income group at each level represented less than one third. The majority of the caregivers (51.96%) spent 8-15 hrs to take care of their children.

Level of Knowledge, attitude and practice on diarrhea of caregivers

Most of the caregivers (53.07%) had fair level of knowledge and 39.11% had good knowledge and only 7.82% had poor knowledge. Majority of the caregivers (75%) had negative attitude towards childhood diarrhea. About 50% of the caregivers had good level of practice on childhood diarrhea.

Child characteristics

The child characteristics included age of the child in months, birth weight in grams, measles immunization, milk during first six months of life, diarrhea during the past one month, episodes of diarrhea in one month and types of diarrhea. Table 1 shows that age of most children (36.31%) were from 37 to 48 months. Majority (82.68%) were in the normal birth weight (2,500 to 4,000 gms) group. Measles immunization had received by all children. Exclusive breastfeeding received by approximately half (46.93%) of the children, whereas more than half (53.07%) had received breast milk and others such as powdered milk during first six months of life. There was considerable prevalence (21.23%) of diarrhea, as this time was at the peak of the winter season, one episode of diarrhea in majority (20.67%) with mostly (86.84%) of watery type of diarrhea.

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

Table 1 Percentage distribution by child characteristics (n =179)

Child characterstics	Number	Percent
Age group (months)		
≤ 36	58	32.40
37-48	65	**36.31**
48-59	56	31.28
Median= 45 QD= 7.5 Min=24 Max=59		
Birth weight (grams)		
1,600 – 2,500	31	17.32
2,500 – 4,000	148	**82.68**
Median= 2,700 QD=380 Min=1,600 Max= 4,000		
Milk during first six months of life		
Breast milk only	84	**46.93**
Others	95	53.07
Diarrhea during past one month		
Yes	38	**21.23**
No	141	78.77
Episodes of diarrhea in the past one month		
0	141	78.77
1	37	**20.67**
2	1	0.56
Type of diarrhea		
Watery	33	**86.84**
Blood mixed	4	**10.53**
Associated with fever	1	2.63

Environmental and Sanitation factors related to diarrhea

In relation to the environment and sanitation, regarding housing sanitation, water resources, human waste disposal and solid waste management were mostly having hygienic practices (54.19%-98.88%). Only 54.19% had hygienic for housing sanitation regarding house - files and breeding places near the houses. More than half had hygienic source of water for drintring (65.92%) and for other use (98.88%).

Relationship between the socio-demographic factors of caregivers and occurrence of diarrhea

As shown in Table 2, children of caregivers with primary education or less had more (29.23%), diarrhea than other groups and 2.68 times in greater risk to have diarrhea compared to those with the bachelor degree and above. However, the results revealed that those relationships were not statistically significant.

Table 2 Relationship between the socio-demographic factors of caregivers and diarrheal disease occurrence among under-five children (n =179)

Socio-demographic Factors	Diarrheal disease occurrence (%)		Crude OR	95% CI for OR		*P-value*
	Yes	No		Lower	Uper	
Age (yrs)						**0.709**
≥ 30	22.50	77.50	**1.15**	0.56	2.35	0.709
< 30	20.20	79.80	**1.00**			
Gender						**0.053**
Male	10.53	89.47	**0.37**	0.12	1.12	0.078
Female	24.11	75.89	**1.00**			
Relation						**0.315**
Others	16.33	83.67	**0.65**	0.27	1.53	**0.327**
Mother	23.08	76.92	**1.00**			
Education (yrs)						**0.126**
Primary (≤ 6)	29.23	70.77	**2.68**	0.82	8.74	**0.101**
Secondary (7-12)	17.86	82.14	**1.41**	0.43	4.65	**0.570**
Bachelor and above	13.33	86.67	**1.00**			

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

Table 2 Relationship between the socio-demographic factors of caregivers and diarrheal disease occurrence among under-five children (Cont.)

Socio-demographic Factors	Diarrheal disease occurrence (%)		Crude OR	95% CI for OR		*P-value*
	Yes	No		Lower	Uper	
Occupation						**0.709**
Housewife / Agr.	20.73	79.27	**1.37**	0.42	4.54	**0.603**
Service worker	23.61	76.39	**1.62**	0.49	5.39	**0.429**
Self employed	16.00	84.00	**1.00**			
Family Income (US $ per month)						**0.353**
< 150	17.14	82.86	**0.83**	0.33	2.05	**0.683**
150-250	27.78	72.22	**1.54**	0.63	3.47	**0.342**
≥ 250	20.00	80.00	**1.00**			
Time given for child care (hrs)						**0.709**
< 8 hrs	28.57	71.43	**1.40**	0.39	5.06	**0.608**
8-15 hrs	19.35	80.65	**0.84**	0.39	1.79	**0.652**
≥ 16 hrs	22.22	77.78	**1.00**			

Relationship between knowledge, attitude and practice of caregivers and diarrhea occurrences

Children having diarrhea were mostly (23.16%) from the caregivers of fair knowledge group and they were in the risks of having diarrhea 1.32 times compared to those of the caregivers having good knowledge. However, the association was not significant (Table 3).

Table 3 Relationship between behavioral factors of caregivers and diarrheal disease occurrence among under-five children.

Behavioral Factors	Diarrheal disease occurrence (%)		Crude OR	95% CI for OR		*P-value*
	Yes	No		Lower	Uper	
Knowledge Level						**0.985**
Poor (4-11)	21.43	78.57	**1.20**	0.29	4.91	**0.804**
Fair (12-16)	23.16	76.84	**1.32**	0.61	2.85	**0.477**
Good (17-19)	18.57	81.43	**1.00**			
Attitude level						**0.885**
Negative (≤ 34)	21.48	78.52	**1.06**	0.46	1.06	**0.885**
Positive (35-43)	20.45	79.55	**1.00**			
Practice level						
Poor (≤ 14)	33.33	66.67	**2.43**	0.88	6.71	**0.086**
Fair (15-19)	22.39	77.61	**1.40**	0.63	3.12	**0.405**
Good (≥ 20)	17.05	82.95	**1.00**			

Children of caregivers with negative attitude had more (21.48%) cases of diarrhea and they were 1.06 times in the risks of having diarrhea compare to those of positive attitude. Diarrheal disease occurrence was higher (33.33%) among children of the caregivers with poor practice level as compared to those with fair and good practice.

Children of caregivers having poor practice had 2.43 times greater risk of having diarrhea compare to those having good practice. Similarly children of caregivers having fair practice were susceptible for diarrhea 1.40 times compared to those having good practice. Relationship was not found to be significance although practice presented the trend. The research tried to examine an association of each item of practice questionnaire in relation to the diarrheal dissease occurrence. Way of cleaning feeding botles was found to be significant association with diarrheal disease occurrence (*p-value* = 0.017).

Relationship between child factors and diarrhea occurrences

Children in the age group of 36 to 48 months had more (26.56%) diarrhea as compared to other groups as shown in Table 4. Similarly children with less than 2,500 gms birth weight were having more diarrhea (29.03%), showing

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

the risk of having diarrhea by 1.68 times compare to the normal birth weight. Children who received others milk during the first six months of life (not-exclusive) had more (26.32%) diarrhea with a risk of having diarrhea 1.95 times more than exclusively breastfed children. The relationship was not statistically significant.

Table 4 Relationship between the child factors and diarrheal disease occurrence (n=179)

Child Factors	Diarrheal disease occurrence (%)		Crude OR	95% CI for OR		*P-value*
	Yes	No		Lower	Uper	
Children's age (m.)						**0.244**
< 36	22.03	77.97	**2.29**	0.89	5.88	**0.086**
36-48	**26.56**	73.44	**1.65**	0.63	4.28	**0.305**
≥ 48-59	14.29	85.71	**1.00**			
Birth weight (grms)						**0.257**
< 2,500	**29.03**	70.97	**1.68**	0.70	4.03	**0.246**
≥ 2,500	19.59	80.41	**1.00**			
Milk during first six months of life						
Others (**not exclusive**)	**26.32**	73.68	**1.95**	0.92	4.12	**0.080**
Mother/Human milk (**exclusive**)	15.48	84.52	**1.00**			

Relationship between environment and sanitation factors of caregivers and diarrhea occurrence

The majority of the environmental factors (housing sanitation, water resources, human waste disposal and solid waste management) were associated with diarrhea occurrence. Children living in unhygienic conditions had more diarrhea in comparison to those living in the hygienic ones. There were only two factors : unhygienic drinking water storage (*p-value* = 0.020) and unhygienic drainage system by having blocked drainage around or near the house (*p-value* = 0.045), which showed statistically significant associated with diarrhea occurrence.

Table 5 Relationship between environmental and sanitation factors and diarrheal disease occurrence (n=179)

Environmental and sanitation factors	Diarrheal disease occurrence (%)		Crude OR	95% CI for OR		*P-value*
	Yes	No		Lower	Uper	
Drinking water storage						**0.020***
Unhygienic	26.85	73.15	**2.53**	1.12	5.73	0.026
Hygienic	12.68	87.32	1.00			
Blocked drainage around the house						**0.045***
Unhygienic	52.63	47.37	**2.12**	1.02	4.41	0.044
Hygienic	29.79	70.21	1.00			

* *p-value* < 0.05

Predicting factors for diarrheal disease occurrence

The significant factors from the Chi-square tests were used to perform multiple logistic regression in order to determine the association of the factors with diarrheal disease occurrence. Although there was only one variable statistically significant but others not significant were also used to adjust OR as shown in Table 6. Birth weight level was not found to have a significant association with diarrhea but it showed the strength of association (OR= 1.38) with diarrhea in under-five children. Children with unhygienic drinking water storage had 2.58 times greater risk of having diarrhea than those with hygienic ones, and in the blocked drainage around or near the house present were in 2.03 times greater risk of having diarrhea than that of not having blocked drainage, after controlling other study factors in the model.

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

Table 6 Adjusted OR and 95% CI for OR from Muliple Logistics Regression

Predictors	Adjusted OR	95% CI for OR		*P-value*
		Lower	Upper	
Birth weight level				
< 2500	**1.38**	0.54	3.52	0.499
≤ 2500	**1.00**			
Knowledge score	**1.05**	0.93	1.19	0.421
Attitude score	**1.01**	0.95	1.08	0.734
Practice score	**0.96**	0.85	1.07	0.463
Drinking water storage				
Unhygienic	**2.58**	1.12	5.94	0.026*
Hygienic	**1.00**			
Blocked drainage				
Unhygienic	**2.03**	0.22	1.11	0.089
Hygienic	**1.00**			

* *p-value* < 0.05

DISCUSSION

The results revealed that the incidence of diarrhea in under-five children (21.23%) which is quite high as compare to the national prevalence (12%). This could be because data collected at one point of time at the peak of the winter season when viral diarrhea infection occurs[3]. Although 78.77% did not have diarrhea but one time episode of diarrhea was maximum (20.67%) found in the last one month and it was mostly (86.84%) associated with watery diarrhea. Similar study by Vongxay P. found, one time diarrhea in the last six months (84.1%)[6]. In developing countries, children under three years old experience on average three episodes of diarrhea every year[2]. In a comparative study of incidence of diarrhea among children in two different environmental situations in Calcutta found 1.6 and 1.4 episodes of diarrhea per child per year respectively. Malnourished children and partially breastfed children had more episodes of diarrhea than the normal children[7].

This study revealed that majority of the caregivers were mothers aged 30 or more and the result had shown no significant association between the caregivers' ages and diarrheal disease occurrence among under-five children. The study in Jordan by El-Gilany AH et al goes against that mothers age less than 25 yrs were having more diarrhea[8]. Diarrhea preventive

behavior seen more in bachelor educated than the secondary and up than the primary and less educated. This shows the positive association to the study of Kyriacou A. et al in screening for fecal contamination in primary school Crete, Greece in which those children who had parents with the highest education level (>12years), had the lowest percentage (48.8%) of fecal contamination on their hands[9]. It was observed that the majority of the caregivers were house wife (45.81%). There was no significant association between occupation and the occurrence of diarrhea among under-five children. The result of this study is similar to the study of Vongxay P. in Khon Kaen province, Thailand. This could be because of their living envir onment being homogenous in nature although there might be different types of occupation[6]. The researcher had found that the majorities (40%) of the caregivers were from the lower income group than middle level and upper level, but the occurrence of diarrhea among under-five children was in higher side (27.78%) in the middle income group compare to the other group and it was not statistically significant. This might be due to the limitation of data collection on true house income. Regarding time given for child care, those who were giving less time (< 8hrs) were having more cases of diarrhea which was not statistically significant. This study could not compare to those children who spent number of hours in day care centre or schools.

The occurrence of diarrhea among the knowledge level was highest (23.16%) in the fair group compare to the poor group (21.43%). The result did not follow the trend and it was not statistically significant. Information from mass media like radio and television is available, so they manage diarrhea early, even though they are less educated. This probably meant that having good or poor knowledge does not necessarily lead the people to practice accordingly. Truong TY. had found no significant association (*p-value* = 0.185) between maternal knowledge and diarrhea in under-five children[10].

This study found out that nearly half (49.16%) of caregivers were doing good practice during diarrhea in under-five children. The trend of diarrhea was highest (33.33%) in poor practice level, fair level (22.39%) and lowest (17.05%) in the good practice level. All the level showed no significant association with diarrhea. This could be not having compliance with knowledge, attitude and practice among the caregivers. Similar finding was observed in a study by Labay EM[11]. Regarding hand washing with the soap the study found that (53.07%) before preparing food and (50.84%) before feeding the child. A safe stool disposal as primary barrier to transmission of infective agents, may be more important than hand washing before eating, is explained in a review article by Curtis V. et al[12].

Diarrhea was more (26.56%) common in 37-48 months age group and there was a positive association (Crude OR 1.35) with diarrhea, although statistically not significant. In the study of Truong TY, 55.7% of children below 12 months were diarrhea cases, and it was statistically significant (*p-value* = 0.005). On the contrary Vongxay P. study found that at 2-3 yrs age

Journal of Public Health and Development
Vol. 8 No. 3 September - December 2010

group, found maximum (42.7%) number of diarrhea cases[6].

This study found that maximum numbers of diarrhea cases (29.03%) in low birth weight (<2,500gms) compare to the normal birth weight group. In the study of Buonya GB et al in Papua New Guinea found the same association as low birth weight babies having more diarrhea[12]. More than half (53.07%) of the children in this study were not exclusively breastfed during their first six months of life and they had more diarrhea (26.32%) as compared to the exclusively fed (15.48%). Infants under 2 months of age who are not breastfed are 25 times as likely to die of diarrhea than infants exclusively breastfed[14].

The researcher found that majority of the environmental and sanitation factors were having more diarrhea in unhygienic, in comparison to the hygienic ones. There were two significant variables, drinking water storage (*p-value* = 0.020) and blocked drainage around or near the house (*p-value* = 0.045), they show association of diarrhea with statistical significance (*p-value* < 0.05). A study by Sheth M. et al in India 2004, about diarrhea prevention through food safety education found that environmental sanitation and personal hygiene were main contribution to the reduction of incidence of diarrhea[15]. So clean storage of drinking water and not having blocked drainage showing a good preventive behavior on diarrhea, can explain a good sewerage system can have a long term impact in the prevention of diarrhea.

RECOMMENDATIONS

1. Way of drinking water storage and not having blocked drainage around or near the house were found to be quite significant and hygienic, which should be encouraged to continue and disseminated this message during the health education activities performed by Lalitpur district health office.

2. Majority of caregivers still have false belief like “teeth eruption can cause diarrhea” and “medicine should be used to get better from diarrhea early”. Lalitpur district health office should give priority to disseminate these statements positively as an important health message to the community.

3. Cohort study or Case-control study is required to examine the relationship between the study factors and occurrence of diarrhea.

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