

FREQUENCY AND FACTORS ASSOCIATED WITH DIARRHEA IN CHILDREN FROM 0 TO 5 YEARS OLD IN KADUTU HEALTH ZONE, SOUTH KIVU PROVINCE (EASTERN DR CONGO)



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ABSTRACT

Introduction: The diarrheal diseases of food causes remain a major cause of morbidity and mortality of children under 5 years old in various health zones of Eastern DR Congo in general and South-Kivu province in particular. The last two years, Kadutu health zone had recorded diarrhea cases exceeding the action level. **Aim and Objectives:** This study was proposed to help reducing cases of diarrhea belongings to different contaminations registered in the studied health zone, by (i) determining the socio-demographic and economic characteristics of the studied population (2i) determining frequency of disease, (3i) assessment of knowledge about the disease and causes relating thereto and (4i) identification of factors associated with diarrheal diseases. **Methods:** An analytical cross-sectional study was conducted among 291 women of childbearing age spread in Kadutu health areas were considered in this study from January to June 2018. Collected data encoding was performed using Excel software 8.0 (2016) and analyzed by Epi-Info 3.5.1. (2016). Frequencies, percentages, mean and standard deviation were calculated, the Odds ratio and confidence intervals fixed at 95% observed with a significance degree of 5%. **Results:** 48.8% of respondents were aged <25 years. 55.3% of women had observed diarrhea in the last 6 months, 72.9% had a child with diarrhea. 84.3% interviewees practice the hand washing. The type of food before episode of diarrhea ($p=0.002$), the changes of food ration composition ($p=0.0001$), medicines used for diarrhea treatment ($p=0.0001$), presence of diarrhea in the last 6 months ($p=0.0001$) and the child's gender ($p=0.0001$) are statistically high significant factors for diarrheal diseases. **Conclusion:** In view of these results, ensuring quality training to women on the incidence of diarrheal diseases will solve the problem. Personal hygiene can make a good prevention of diarrheal disease in all cases.

Keywords: endemic-epidemic diseases; infectious disease; food contamination; diarrheal diseases; frequency; associated factors.

1. INTRODUCTION

Diarrheal diseases are a major public health problem in developing countries. Diarrhea is among the most frequent diseases and widespread in the world. It is a leading cause of infant mortality in developing countries and is responsible for a major disease before the age of five years [1]. The WHO approve that every year 1.3 million diarrheal episodes are recorded in the world [2]. And nearly 1.9 billion children under age 5 died from diarrheal diseases [3]. Diarrheal diseases are a leading cause of morbidity and mortality worldwide, WHO and UNICEF indicate that diarrhea affects approximately 2 billion people worldwide each year and children under 5 years are the layer of the most vulnerable population. Currently, diarrhea worried by their endemic and epidemic character, in third place among the deadliest infectious diseases in the world with 2.5 million deaths all mixed age [4]. In industrialized countries, diarrheal diseases are the second leading cause of hospital admission and the most common cause of pediatric consultation [7]. In USA, rotavirus causes some three million cases of diarrhea per year and 50,000 cases of hospitalization, one child under 5 years about 78 were hospitalized for diarrhea due to rotavirus [7]. In France, acute diarrheal diseases account for significant morbidity and are responsible for 2.9 to 3 million annual pediatric consultations [8]. A study in France on infectious diarrhea reported that 39% of cases of diarrhea were due to rotavirus [9]. In India, around 140,000 children below age die for diarrhea caused by rotavirus each year, either 1 in 200 children [10].

The annual incidence of diarrhea episodes in children under 5 each year in developing countries amounts to 2 billion and diarrheal episodes with a median incidence rate of 3.2 episodes [10].

According to the WHO and UNICEF, 1.9 million children under 5 years old die in countries with limited resources. Of these deaths 78% from Africa and South-east Asia [4]. In these countries, diarrhea is especially popular because of lack of access to clean water, adequate latrines, as well as poor hygiene [11].

In Cameroon, in 2004, there is evidence that diarrheal mortality of children is determined by the behavior of parents' hygiene and the living standards of households than elements of the physical environment, regardless of sector residence [13]. Among the main causes of child mortality in Cameroon, diarrheal diseases are in first position. And among the leading causes of morbidity, they were ranked third with a prevalence of 13.6% across the country.

In Chad, in 2004 according to the second EDST (Demographic Health Chad), diarrheal prevalence in children under 5 years is 13.3% [15]. In 2005, according to the Chadian health information system, 7,377 new cases of diarrhea with dehydration were recorded in health centers and 4,452 in hospitals [15]. In Burkina Faso, with an average annual incidence of 6.8 episodes per child, childhood diarrhea is third in their disease after malaria and respiratory infections [16]. In Ivory Coast, in 2006, the prevalence of diarrhea was 19% in rural areas, against 15% in urban areas. They are the second cause of illness after malaria [17].

In the Democratic Republic of Congo, the United Nations Children's Fund revealed that the diarrheal diseases are responsible of at least 13.5% of infant mortality in 2003 and the report of Multi Indicator Cluster Survey (MICS-DRC) discovered that the prevalence of diarrhea was 18% in 2010 [38]. Scientific studies conducted by WHO have shown that diarrhea is the second cause of death in children in the D.R. Congo [18]. In South Kivu province, according to the report of the Provincial Directorate of Health, diarrheal diseases are a serious health problem in the province, in 2016, 111,829 cases we recorded including 8 deaths cases of diarrhea and in 2017, 198,629 cases including 7 deaths [19]. The Kadutu health zone (study area) is among those who recorded more cases of diarrhea in the last two years in the province. It recorded respectively in 2016, 2,707 cases and 2017, 3,771 cases [20]. This justifies how diarrheal diseases are a major threat to the country [14].

View the magnitude of diarrhea food causes in South Kivu province in general and Kadutu health zone in particular, this study aims to contribute to the reduction of diarrheal diseases cases in children of 0-5 years old recorded in our study area, by (i) determination of socio-demographic and economic characteristics of the studied population, (2i) determining the illness frequency, (3i) assessment of knowledge about the disease and causes relating thereto and (4i) the identification of factors associated with diarrheal diseases in Kadutu health zone.

2. MATERIALS AND METHODS

2.1 Study site

Kadutu urban health zone (study area), is one of three health areas of Bukavu health district, located in DR Congo, South Kivu province, Bukavu, Kadutu commune (Fig. 1). It has superficies of 15 km² and bounded on the North by the Weshu river that separates it to Bagira urban health area, on South-East by Kawa River and the main road of industrial avenue that separates Ibanda urban health district. To the West by Kawa River which separates it from Kabare health zone, and to South-West by Nyantende health zone.

The population of Kadutu health zone is estimated at 326,634 inhabitants. The main occupations of the population are small trade, state workers and periphery substantially agriculture. You meet a cultural and technical brewing so that the traditional cultures of each other were even forgotten.

2.3 Type of study

We conducted an analytical cross-sectional study in Kadutu health zone which considered children between 0-5 years old.

2.4 Sampling

Interviews were conducted using a semi-structured questionnaire. Each selected respondent was meet at home. Only women living in Kadutu health zone and have children under 5 years were interviewed following the simple random method by opinion poll in the thirteen health areas component the studied health zone by following formula of simple proportion which states:

$$n \geq \frac{\sum^2 \cdot p \cdot q \cdot d}{a^2} = \frac{(1,96)^2 \times 22(100-22) \times 1}{5^2} = 263.68 \approx 264 + 10\% = 264 + 27 = 291 \text{ households.}$$

with:

n=sample;

\sum^2 =risk of error made: (1.96) 95% CI

p=estimated prevalence of diarrhea to 22% [37]

a²=desired Accuracy 5%

$q = \text{supplement } p = (1-p)$

$d = \text{effect of cluster or degree of the sample} = 1$

10% = management of incompleteness.

Criteria of inclusion

To be part of survey, the interviewed must:

- † Being a woman of Kadutu health zone with children ranging in age from 0-5 years,
- † Accept to respond to the survey questions.

2.5 Parameters studied

† Dependent variable: frequency of diarrheal diseases.

† Independent variables: socio-demographic and economic characteristics of mothers, mothers' knowledge of diarrhea and feeding practices of mothers about hygiene water, hand and food.

2.6 Statistical analysis and data processing

Three tools were used during the data collection: a survey questionnaire, observation, and maintenance. A regular descent on field four times a week to collect data. Collected data was entered into Microsoft Excel 8.0 (2016) and analyzed using the statistical software Epi-Info 3.5.1 (2016). The analysis used the chi-square test, logistic regression, odds ratio and 95% CI with level of significance (p-value) set at 5%.

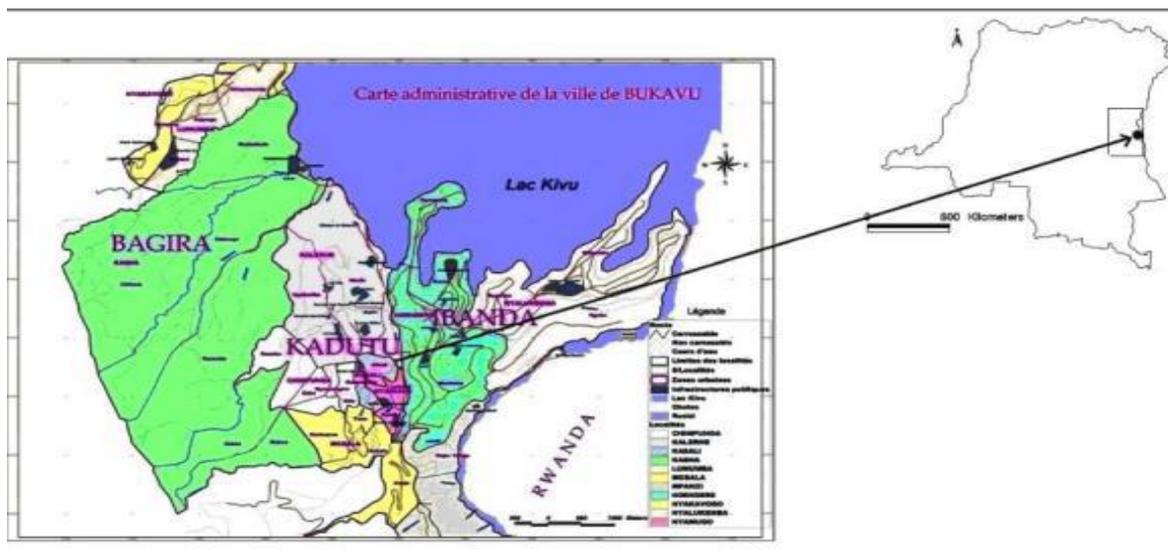


Figure 1. Map showing the administrative division of Bukavu town and Kadutu Health Zone (study zone).

3. RESULTS AND DISCUSSION

A significant number of women investigated are <25 years old with a mean of 27.5 ± 5.9 years including the age of their youngest child >12 months old. Almost all women are married, their half have a primary level of study and Catholic religion. 280 households were investigating or 96.2% have a household size ≤ 7 children per family and 71.1% women are housewives. Although most of them, either 207 keep their children themselves (Table 1).

It is observed a slight relation between our results and those of Manegabe, who found in his study that the majority of mothers were aged between 20 and 34 years and they have children with age ≤ 6 months. According to his results, most of surveyed mothers are illiterate or with primary school level and are Christian. Many had one to six children, mothers had an economic activity and fathers are government employed [25].

Our results are consistent with other researchers like Atokare who found that the age of mother is crucial to the occurrence of diarrhea for children under five years old because most are young mothers tend not much takes care of their children. This can be explained by the lack of experience in child care [1]. Also, with those children whose mothers have completed primary education according Randianasolo, suffered more frequently from diarrhea. The relation between the education level of mother and diarrhea is linear [26]. By cons education level plays a catalytic role ensuring optimal

use of health services. So, for him, the educated parents make use of health services than illiterate and thus better protect their children [27] and socio-economic environment in which the child lives is usually a reflection of the activity of the parents. According to Akoto, the economic status of mother is an important variable and occupation of women can influence the health of children through feeding (breastfeeding, weaning, etc.) or the attention and care that there are agreed [28].

Table 1. Socio-demographic characteristics of women interviewed

Characteristics	n=291	%
Age of mother (year)		27.5 ± 5.9
<25	142	48.8
25-35	101	34.7
≥35	48	16.5
Age of last born (month)		16.0 ± 12.2
≤ 12	144	49.5
>12	147	50.5
Marital status		
Single	2	0.6
Married	287	98.8
Widow	2	0.6
Study level		
University	97	33.3
Secondary	8	2.7
Primary	176	60.4
Illiterate	10	3.6
Religion		
Catholic	188	64.6
Protestant	89	30.5
Others	14	4.8
Household size (person)		3.4 ± 1.8
≤7	280	96.2
>7	11	3.8
Profession of the mother		
Housewife	207	71.1
Tradeswomen	73	25
Government worker	11	3.7
Child keeper (caretakers)		
Mother	197	67.6
Grand sister	71	24.3
Grand mother	15	5.2
House girl	8	2.9

The results in Table 2 exhibit the frequency of diarrheal diseases in Kadutu health zone. Almost half of women surveyed have already registered a case of diarrhea in their families in the last six months. 72.9% cases of diarrhea were observed during our study period and often have children of their age is below two years old and mainly male of which 31.7% had no access to health care structures. By observing the above results on the frequency of diarrhea we are aware for the situation in Kadutu health zone.

These results are analogous to those by WHO on the prevalence of mortality due to diarrhea, according to the most current statistics published in 2014 by diarrheal disease mortality figures have decreased by 50% in 2012 but it still occupies the 5th place of death in the world and second place in poor countries [34].

Koueta had found results similar to those of our study; male patients accounted for 62%. The mean age was 9.5 months with a range of 21 days to 59 months. Children from 0 to 12 months were the most affected with 68 patients being 66% of cases [36]. This author also finds in his study that seven hundred fourteen children were hospitalized during the period of his study of which 143 (20%) under 5 years for diarrhea. Boys were many with an age ranging from 0 to 11 months [36].

Table 2: Frequency of diarrheal diseases in Kadutu health zone.

Frequency	n=291	%
Cases of diarrhea during these 6 months		
Yes	161	55.3
Non	130	44.7
Current child case with diarrhea		
Yes	212	72.9
Non	79	27.1
Age of child who had diarrhea (n=212)		
		19.7 ± 1.8
≤ 24	157	74.1
> 24	55	25.9
Gender of child with diarrhea		
Male	159	75.0
Female	53	25.0
Have brought the child to the health center (n=212)		
Yes	145	68.3
Non	67	31.7

Of all the women surveyed, only 173 (59.5%) practice hand hygiene before breastfeeding the child of which only 27 (5.7%) do each time, the leftovers (either 84.3%) only sometimes. In the 291 households surveyed in which only 69 have given children boiled water of which 15 (21.7%) give each time. Women of Kadutu health zone have habit of giving their children raw foods (Table 3). It is a close correlation between our results and those of Beninguise, the quality and availability of water have an impact on diarrheal diseases of children by means of consumption, food preparation, personal hygiene and hygiene in the household. Indeed, households with good quality water (treated) and an internal source of supply had lower prevalence of diarrhea compared to others who do not have it [37]. But especially with those of Ratsimbazafy in his study on the behavior of mothers towards children diarrheal diseases, had found only 30% of mothers with diarrheal children washed their hands during the 5 critical times (before preparing food, before eating or feeding, have handled tough stool children or after cleaning, tough going to the toilet and washing hands of children as they are dirty) shows that more than half (58.57%) of mothers of children with diarrheal disease have their point of water within 20 meters of their latrines. Only a third (either 42.86%) mothers clean their latrines with soapy water. Almost a quarter of mothers put no lid on their container to protect the water against some germs [37].

Table 3: Mothers' practices about water, hands and children hygiene.

Mothers practices	n=291	%
<i>Hands washing before breastfeeding</i>		
Yes	173	59.5
Non	118	40.5
<i>Number of time (n=173)</i>		
Sometimes	146	84.3
Each time	27	15.7
<i>Boiled water habit</i>		
Yes	69	23.7
Non	222	76.3
<i>Number of time</i>		
Sometimes	54	78.3
Each time	15	21.7
<i>Sterilized utensils</i>		
Yes	232	79.7
Non	59	20.3
<i>Number of time (n=232)</i>		
Sometimes	148	63.7
Each time	84	36.3
<i>Eating habit of raw foods</i>		
Yes	217	74.6
Non	74	25.4
<i>Frequency of consummation</i>		
Sometimes	217	100
<i>Wash baby's pot</i>		
Yes	229	79.3
Non	62	20.7

The results in Table 4 exhibit the existence of statistically significant association between the incidence of diarrheal diseases in children whose age is less than or equal to 5 years and some observed variables such as the type of food before the diarrhea episode ($p=0.001$), modification of the food composition ($p=0.001$), medicines used for diarrhea ($p=0.027$), diarrhea cases observed during the last 6 months ($p=0.009$) and the gender of the sick children ($p=0.006$). Other variables did not show statistically significant differences ($p>0.05$).

Table 4: Variables associated with the frequency of diarrhea.

Variables	n=291	% Diarrhea	OR (CI à 95%)	p-value
Age (year)				
<35	48	22.9	1,0	
≥35	243	28.0	1.3 (0.6-2.7)	0.470
Religion				
Christian	277	28.5	11.6(0.6-1.0)	0.089
Non-Christian	14	0.0	1,0	
Household size				
≤7	280	27.1	0.9(0.2-3.8)	0.992
>7	11	27.3	1,0	
Children's caretakers				
Mother of child	197	28.9	1.3 (0.7-2.3)	0.321
others (grand sister, grand-mother, etc.)	94	23.4	1,0	
Foods diversification				
Yes	256	26.6	0.7(0.3-1.7)	0.580
Non	32	31.3	1,0	
Type of foods before the diarrheic episode				
Exclusive breastfeeding	200	18.5	3.7(2.1-6.5)	0.001*
Others	91	46.2	1,0	
Judgment on child Appetit				
Non modified	269	27.1	0.9(0.3-2.6)	0.989
Others (decreases, increases, etc.)	22	27.3	1,0	
Modification of food ratio composition				
Yes	181	34.8	3.1(1.7-5.7)	0.001*
Non	110	14.5	1,0	
Medicines used in case of diarrhea				
Utilization of Oral Serum	221	33.5	0.1(0.0-0.8)	0.027*
Anti-diarrheic	47	6.4	1.3(0.2-9.0)	0.725
Others	23	8.7	1,0	
Tips on diarrhea				
Yes	272	27.3	1.0(0.3-3.0)	0.932
Non	19	26.3	1,0	
Cases of diarrhea during the last 6 moths				
Yes	161	18.0	0.3(0.2-0.6)	0.009*
Non	130	38.5	1,0	
Child's gender				
Male	239	23.0	0.3(0.1-0.6)	0.006*
Female	52	46.2	1,0	

OR: Odd Ratio

Several studies have found conflicting results with those of our research in the sense that among them the education level of mothers is not significantly associated with diarrheal morbidity in children of the studied health zone, mother's religion discriminates children with respect to diarrheal morbidity and the highest proportion of children with diarrhea was observed in women belonging to other religions like Muslims [28]. Others also where there is some resemblance it emerges from analysis results bivariate as the age of child and maternal occupation were the main factors for diarrheal disease in children under 5 ($p<0.05$). Our results are close to those of Atokare, sociocultural factors (education level of mother and ethnicity mother), socioeconomic factors (the activity of mothers), environment (hygienic level and residence place), demographic factors (age of mother, age and gender of the child) and behavioral (introduction of other solid or semi-solid foods) are determinants of diarrheal morbidity in children under five years [27].

The type of food before diarrhea episode ($p=0.002$), modification of the food ratio composition ($p=0.0001$), medicines used for diarrhea ($p=0.0001$), incidence of diarrhea in the last 6 months ($p=0.0001$) and the gender of sickening children ($p=0.0001$) as independent factors influencing the incidence of diarrheal diseases in the studied health zone (Table 5). The above factors retained after a logistic regression was also found by Atokare after a multivariate analysis. His results revealed that only age of the child remained independently associated to diarrheal diseases in children under 5 years old [28]. Our results are also contradicted to those found in this study, the multivariate analyzes demonstrated that only the age of the child remained independently associated to diarrheal diseases in children [27].

Table 5: Factors associated with the incidence of diarrheal diseases

Factors	ORa	IC à 95%	p-value
Type of food before the diarrheic episode	0.17	0.07-0.43	0.002
Modification of the ratio food composition	0.05	0.02-0.13	0.000
Medicines used in diarrhea cases	10.47	4.47-24.52	0.000
Cases of diarrhea during the last 6 months	0.07	0.02-0.21	0.000
Child's gender	13.27	5.75-30.58	0.000

ORa: Odds ratio adjusted.

4. CONCLUSION

Diarrhea diseases in children from 0 to 5 years old is of high frequency in Kadutu health zone. and caused by the: type of food given to children before the episode diarrhea, changes in food ratio composition, medicines used for diarrhea treatment, presence of diarrhea in the last 6 months and the child's gender are factors implicated to diarrhea in children aged from 0 to 5 years. The establishment of food and hygiene surveillance programme in timing of health zone activities would be necessary.

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