

# Prevalence of Diarrhea and Association with Socio-Demographic Factors among Children Under Five in Mayo Camp-Khartoum State Sudan

ELMANSSURY, AHMED, ELNADIF<sup>1</sup>, DAFALLA, SAFA, ABDALLA<sup>2</sup><sup>1</sup>Department of public health, College of public health and health informatics, Qassim university Bokayriyah<sup>2</sup>Department of public health, College of public health and health informatics, Hail university, KSA

Corresponding author: Elmanssury, Ahmed, Elnadif

## ABSTRACT

**Background:** Diarrhoeal diseases remain among the most common causes of mortality and morbidity in children, particularly in low- and middle-income countries (LMICs). In 2013, of the 6.3 million children worldwide who died before they reached their fifth birthday, about half (3.2 million) died from infectious diseases, with diarrhoea killing more than 500,000 children. Sudan has one of highest prevalence rates of diarrhoea and Global Acute Malnutrition.

**Objectives:** To determine the prevalence of diarrhea and impact of socio-demographic factors on the prevalence among Children under five years,

**Methodology:** a community-based cross-sectional research was carried out to study the prevalence of diarrhoea among children under 5 years of age.

**Results:** The average prevalence of diarrheal cases occurring during the 2 weeks preceding the interview was 35.0 percent (n = 311). The prevalence was higher among boys than among girls (25% and 10%, respectively). Our research showed that sociodemographic factors such as family size, number of < 5 siblings and occupation of the mother were not significantly correlated with diarrheal disease in children under 5 years of age, whereas the research showed a high significance between the educational level of the mother and the diarrheal disease family income in children under 5 years of age.

**Conclusions:** our study showed High prevalence of diarrhea in children under the age of five, with the highest prevalence among male compared with female. correlation highly associated between education of mothers, income levels, and diarrheal disease.

**Keywords:** Prevalence, Diarrhea, sociodemographic, children, Association

## INTRODUCTION

Diarrhoea remains a significant public health concern today. Diarrhoea is among the leading causes of childhood morbidity and mortality in developing nations. [1]. This represents 8% of all deaths and is the second leading cause of death among children under-5 years old [2] and 2.5 million deaths occur each year. In the first two years of life, around 80 per cent of deaths due to diarrhoea occur [1]. Long-term complications such as malnutrition, growth retardation, and immune impairment are several times this amount. Overall, on average, these children undergo 3.2 diarrhoea episodes per child per year [3].

Diarrhea is the most severe water and sanitation-related public health concern and can be both "waterborne" and "water-washed." In recent decades, consensus has been reached that sanitation, personal hygiene, water availability and good quality drinking water are main factors for the prevention of diarrhoea, and that the quantity of water available to people for hygiene is of equal or greater importance for the prevention of diarrhoea than the quality of bacteriological water [4]. Infectious diarrhoea in developing countries is often debilitating and contributes significantly to infant malnutrition and mortality [5].

Reducing child mortality is one of the Millennium Development Goals (MDGs). Diarrhoea continues to be a leading cause of child morbidity and mortality in the developing world [6] and [7]. Sudan has one of highest prevalence rates of diarrhoea and Global Acute Malnutrition. In one study by [8]. the incidence of diarrhoea in a village near Khartoum was 217 episodes per 100 children per year, and was one of the three commonest causes of morbidity. In a 2000 Multiple Indicator Cluster Survey report, 28% of children below the age of 5 years in north Sudan had diarrhoea in the two weeks prior to the survey, varying from 40% in Blue Nile to 19% in South Kordofan [9].

Epidemiological studies indicate that the factors that decide the frequency of diarrhoea in children are complex and each factor's relative contribution differs as a function of the relationship between socio-economic, environmental and behavioural variables. [10]. Other study showed that Diarrhoea was associated with child's age, gender, and social status.

Although many studies have been conducted in developed and developing countries, most of these studies were based on hospital or community based studies. Further, prevalence and

correlates for diarrhoea may vary with season, geographical area, and between countries. We are not aware of any study on the prevalence association of diarrhoea that was conducted in camps in Khartoum on a larger scale. Hence, the aim of this study was to assess the factors associated with diarrhoea using a large sample size from a community-based survey.

## METHODOLOGY

A community-based cross-sectional research (descriptive study) was carried out to study the prevalence of diarrhoea among children under 5 years of age. Both mothers / caregivers are the source population-under-five children living in the camp and the research population is mothers with children under five years of age living in the selected households sampled and from whom data was collected. Mothers with their child under five years of age able to participate in the chosen households were included and mother's / care providers were exempt from children under five who had other health conditions, were seriously ill and others who did not live permanently in the camp.

**Sample size:** The sample size was determined by using the following formula:  $N = Z^2 \times p \times q / d^2$

Where : ( N: is maximum size required, Z= 1.96 @ 95% confidence, P: is expected prevalence rate =28.2% at CI 95% , q: 1-p , d= is the margin of sample error tolerated (%) =0.05) Apply the formula:  $n = \frac{(1.96)^2 \times p \times q}{(0.05)^2} = 311$  So the 311 household was obtained.

Investigators were trained to administer the interview, to follow data quality assurance procedures and to adhere to principles of ethical conduct in human research. The survey questionnaire was pre-tested in a neighborhood of mayo camps that was not otherwise considered, to ensure that questions were properly understood by the local communities. In the pilot study, ten households were interviewed and any observed shortcomings in the instruments were corrected before the start of data collection. The pre-test also provided crucial information on the validity and usefulness of the data collected.

Independent variables included the following: (i) sociodemographic information (Gender, Family size, mother's or caregiver's educational level, Income, number of children under the age of five in the household); (ii) socioeconomic status (occupation); and (iii) occurrence of diarrhea. Socioeconomic status of the households was classified as either "richest", "middle"

or "poorest", based on a cumulative standardized assets score, which was calculated using principal component analysis. All asset variables considered were dichotomous (e.g. presence or absence of radio).

In this study, diarrhea was defined by a question "In the last 2 weeks, (child's name) had diarrhea" on the passage of three or more loose/watery stools per day with/without blood in the stools in the past 2 weeks prior to data collection, as perceived by the mother/caregiver.

The response options were either 'YES' or 'NO'. Water sources were also inquired into by the question "What is the main source of drinking water for this household?", and for analysis it was further categorized into - either Treated (Boil, add bleach/chlorine, use water filter) or Untreated water (others or nothing has been done). Place of defecation was categorized into Open latrine, Own latrine, Shared latrine.

**Data Analysis:** The data collected was entered and analysed using version 10.0 of the (SPSS) software, a relationship between diarrhoea as a variable dependent and potential risk factor as an effect created by cross-tabulation and Chi-Square Tests. As a  $P < 0.05$ , significance was taken.

## RESULTS

**Sociodemographic characteristics of the surveyed households:** In the survey conducted in four mayo camps, a total of 311 children under the age of five (51 percent males) participated.

Table 1 summarizes the demographic and socioeconomic profiles of the households surveyed. The study found that the proportion of family size above seven individuals was higher (44.7 percent), and the number of less than five brothers was equivalent (44.7 percent). The majority of mothers (39.2 per cent;  $n = 122$ ) were illiterate.

Casual labor was the largest occupation (80.1%;  $n = 249$ ). Middle income (69.5%  $n = 216$ ) accounted for more than half of the study population.

According to the findings of our study, find that only twenty percent of the households were drinking water from treated sources, while majority of them (79.8) use untreated sources. Regarding place of defecation, one hundred twenty-four (39.9%) of the households used open latrine, seventy-eight (25.1%) have own latrine, and one hundred nine (35%) shared latrine

**Prevalence of diarrhea among children under the age of five:**

The prevalence of diarrhea among children under the age of five was calculated based on the number of children confirmed to have diarrhea as the numerator and the total number of children in the study as the denominator during the 2 weeks preceding the interview. The average prevalence of diarrheal cases occurring

during the 2 weeks preceding the interview was 35.0 percent ( $n = 311$ ). The prevalence was higher among boys than among girls (25% and 10%, respectively).

**Socio-demographic variables associated with diarrhea:** In order to classify the socio-demographic variables associated with diarrhea, multivariate analyses were carried out in Tables 3. Diarrhea among children under the age of five was significantly higher among mother education levels ( $X^2 = 144,284$ ,  $P$ -value = 0,000). The analysis also revealed the importance of family income ( $X^2 = 32.006$ ,  $P$ -value = 0.028). Socioeconomic status, on the other hand, (family size, number of siblings < 5 and occupation) was negatively correlated with the incidence of diarrhea.

Table 1: socio- demographic characteristics of the study group in Mayo farm camp

Demographic-character	Frequency	Percent (100%)	
Gender	Male	158	51
	Female	152	49
Family size	2-3 member	31	35.4
	4-6	141	19.9
	7 and more	139	44.7
Number of <5 brother	1 child	110	35.4
	2 children	62	19.9
	3 children or more	139	44.7
Mothers education level	Illiterate	122	39.2
	Informal education	106	34.1
	Primary	83	26.7
Occupation	Casual labour	249	80.1
	Trader	31	10
	Others	31	10
Income /SDG	201-300 SDG	48	15.4
	301-400	216	69.5
	>400	47	15.1
Source of water	Treated	63	20.2
	Untreated	248	79.8
Place of defecation	Open latrine.	124	39.9
	Own latrine	78	25.1
	Shared latrine	109	35

Table 2: Prevalence of diarrhea among under five children in Mayo camp

Child has currently or in the last 2 weeks	Frequency	Percent (%)
Diarrhea		
• Male	78	25%
• Female	31	10%
Total	109	35.0%
No Diarrhea	202	65.0%
Total	311	100.0%

Table 3: Prevalence of diarrhea in relation to different socio-demographic variables under five year's children in Mayo camp

Socio-demographic variables	Prevalence of diarrhea among under five children in Mayo camp		$X^2$	P-value	
	Yes	No			
Family size	2-3 member	00 (00.0%)	31(15.3%)	52.099	0.213
	4-6	78(71.6%)	63(31.2%)		
	7 and more	31(28.4%)	108(53.5%)		
Number of <5 siblings	1 child	16(14.7%)	94(46.5%)	145.131	0.519
	2 children	62(56.9%)	00(00.0%)		
	3 children or more	31(28.4%)	108(53.5%)		
Mothers education level	Illiterate	92(84.4%)	30(14.9%)	144.284	0.000
	Informal education	11(10.1%)	95(47.0%)		
	Formal education	6(5.5%)	77(38.1%)		
Occupation	Casual labour	93(85.3%)	156(77.2%)	21.043	0.19
	Trader	16(14.8%)	15(7.4%)		
	Others	00(00.0%)	31(15.3%)		
Income /SDG	201-300 SDG	00(00.0%)	48(23.8%)	32.006	0.028
	301-400	93(85.3%)	123(60.9%)		
	>400	16(14.7%)	31(15.3%)		

## DISCUSSION

We compared diarrhea prevalence and socio-demographic factors among children under the age of five in the Mayo camp in this

report. We found that the 2-week, caregiver-reported prevalence of diarrhea among children under 5 years of age was 35%, slightly above the incidence reported in M bour, Senegal, for the same age

group in 2017 (26%) [11]. And study conducted in Debre Berhan town, Ethiopia 13.9%, [12]. Malawi 20%, [13]. In addition to the 2014 study conducted in Northwest Ethiopia, which confirmed that the prevalence of diarrheal disease among children younger than 5 years of age was (21.5%) [12], as well as the study conducted in 2013 in Eastern Ethiopia and 2018 in the North Gondar Region (22.5%). (22.2%) respectively. Our rate is also very high compared to the 2015 survey reporting (11 percent) for this region recorded in the Wolitta Soddo Area, Southern, Ethiopia [14], in addition to the study conducted by Irfan and et al. that recorded (28.5 percent) [4]. Our rate agreement with Touray and colleagues (2012 ) reported the same prevalence among children under 5 years in Mauritania 35%. [10]. As with Ebrahim (2003), diarrhea prevalence rates ranged from 17% to 27% in the North and 41% in Southern Sudan among children under 5 years of age. [15].

In this study, the highest prevalence identified in male children (25 percent) rather than female children under the age of five years (10 percent) correlates with ATU et al. (2015), which indicates a high prevalence of diarrhea among males rather than females. [16]. In terms of personal hygiene, sanitation, and leisure activities, this higher incidence may be due to behavioral disparities in gender; male children go to play football and end up going to bed with soap and water without a bath.

The study found that 45.3 percent of the family size per household was 4-6 members, according to the Sudan Household Health Survey (SHHS) 2006; the largest proportion (28 percent) of the total households were households with 4-5 members. The study shows that 39.2 percent of mothers were illiterate and 84.4 percent of their children have diarrhea at present or in the last 2 weeks, 44.7 percent have 3 children under 5, 28.4 percent of them have diarrhea at present or in the last 2 weeks that meets the Bui Viet argument. Other demographic factors, such as younger age of mothers, low level of mother education, high number of birth order of siblings, were significantly associated with more diarrhea in children less than five. this also similar with previous study conducted in Jijiga, Somalia region, [17], Hadaleala District, [18]. Arba Minch, [19], Shiko District southwest Ethobia, [20]. However, this finding was higher than other study conducted in north Gondar zone, [21].

The study found that 80.1 percent of households headed by low monthly income casual labor accounted for 69.5 percent in the range 301-400SDG and 85.3 percent of them had diarrhea, which coincides with the British Medical Journal, currently or within the last 2 weeks; Poverty is related to inadequate accommodation, crowding, dirt floors, lack of access to adequate clean water or fecal waste disposal, cohabitation with domestic animals that can carry human pathogens, and lack of refrigerated food storage, all of which increase diarrhea frequency [22] This study, on the other hand, disagreed with the Goba District Southeast Ethiopia study, which stated that drinking water sources were not the factor associated with the prevalence of diarrheal disease. [23]. Our research showed that sociodemographic factors such as family size , number of < 5 siblings, and occupation of the mother were not significantly associated with diarrheal disease in children under five years of age, while the study showed high significance in children under five years of age between the educational level of the mother and family income with diarrheal disease, this finding contradicts the study conducted by Bako (2017) which reported that infant age, age of mothers, and education of mothers were not significantly associated with infant diarrhea disease[24]. Similarly, the social status of infants under six months of age in Sudan was substantially associated with diarrhea disease [25].

## CONCLUSION

The prevalence of diarrhea among children under the age of five at Mayo Camp is high. The highest prevalence was recorded in this study in male children (25 percent) rather than female children under the age of five (10 percent). Diarrhea was associated significantly with the level of education and income of the mother, while other sociodemographic characteristics (family size, number

of < 5 siblings, and occupation of the mother) were not associated significantly with diarrhea.

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