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Trends in Diarrhea Hospitalization among Children <5 Years Old Before and During the Covid-19 Season in Fako Division, Cameroon: A Situation Clouded by Sociopolitical Conflict

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Abstract

Diarrhea is a major cause of illness and death for children under 5 in sub-Saharan Africa, with around 500k deaths annually. COVID-19 affected hospitalization rates for diarrhea. This study was done in four hospitals in Fako Division on diarrhea hospitalization records of children under 5 from 2013 to 2022. Stratified sampling was used, and data was summarized using means, standard deviations, frequencies, and percentages. Differences were evaluated using chi square with a significance level of P<0.05. Diarrhea hospitalization rate was high at 30.9%, with more cases reported during Covid-19 than before. Peak hospitalization occurred in 2019 and 2020. However, there was a significant decrease in hospitalization rates in 2021 and 2022. Children aged 0-5 months had the highest rates of diarrhea hospitalization at 29.4%. High diarrhea rates in the study area were due to conflict-related population influx. COVID-19 season saw higher hospitalization rates due to virus-induced diarrhea and population influx. Infants under 5 are most vulnerable to diarrhea. More diarrhea hospitalizations in COVID-19 season due to influx of displaced families and COVID-19 - induced diarrhea caused unusual data.

Keywords*: Age, COVID-19, Children, Coverage, Diarrhea, Rotavirus, Vaccine, Vaccination, Sub-Saharan Africa.*

Introduction

It is saddening that about 500,000 children die annually from diarrhea, especially in sub-Saharan Africa, south and southeast Asia, where diarrhea continues to be the leading cause of disease and death among children under the age of five [1]. According to estimates, African children under the age of five have at least five episodes of diarrhea every year [2]. In children, diarrhea can be defined as, three or more bowel movements (passage of loose stool) within 24 hours or watery stool that is different from normal [3]. These diarrheal diseases result mainly from contaminated food and water sources and inadequate hygiene [4, 5]. The etiologic agents of diarrhea in children are diverse, including bacterial, parasitic, and viral agents with rotaviruses causing the most severe, dehydrating diarrhoea [5, 4, 6, 7]. The COVID-19 pandemic has raised concerns about the impact it had on essential medical services, particularly in low-income countries [8]. The measures put in place by various countries to control the spread of the virus had an impact on the rates of different infections, including gastroenteritis [9]. The inclusion of rotavirus vaccines into national immunization programs has reduced severe rotavirus diarrhea in children by about 40% in low-income and middle-income countries [10].

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The effects of sociopolitical conflict on health systems are far-reaching. A report by Doctors without Borders in Turkey explains how a small pediatric and maternal care facility in southern Khartoum was transformed into a facility capable of responding to mass casualty events [11]. "Displacement caused by conflict puts additional stress on host populations and their services and could increase population density," states Dunn in a dissertation. Most deaths related to conflict, particularly for children, are not due to direct causes such as war-related trauma but are due to pre-existing health issues, including diarrheal disease, acute respiratory infections, measles, malaria, and severe malnutrition, which were already the leading causes of death before the conflict. Thus, conflict exacerbates pre-existing health issues and introduces new ones [12].

There is little data concerning the impact of COVID-19 on diarrhoea hospitalization in Cameroon, particularly in the Southwest Region which was at the peak of a sociopolitical conflict during the COVID-19 season.

Methods

This was a retrospective cross-sectional study carried out in four hospitals within the Fako Division of the Southwest Region of Cameroon where there is little or no data on Rotavirus vaccination coverage. This Division is cosmopolitan with children from all socioeconomic and cultural backgrounds. The study population included diarrhoea hospitalization records in four hospitals from the year 2013 to 2022 of children less than 5 years of age. A sample size of 500 was calculated, drawing inspiration from a study by Ndze et. al. on Rotavirus among children less than five years of age in the Northwest region of Cameroon [13]. The stratified sampling method was used. Continuous variables were summarized into means and standard deviations while categorical variables reported as frequencies and percentages were used to evaluate the descriptive statistics. The differences in proportions were evaluated using Pearson's chi-square (X^2). The level of significance was set at $P<0.05$.

Results

Sociodemographic and Clinical Outcomes of Children <5 years

The sociodemographic and clinical outcomes of hospitalized children <5 years are shown in Table 1. Most females (54.5%) were hospitalized. The median age of children was 9.5 months (Range: 0.03 – 59 months) with more children (44.5%) belonging to the age group 0 – 5 months. Most of the children (73.6%) presented with fever during hospitalization and 32.7% reported vomiting.

Table 1. Sociodemographic and Clinical Outcome of Hospitalized Children

Variable	Category	%(n)
Sex	Male	45.5(50)
	Female	54.5(60)
Age group (months)	0 – 5	44.5(49)
	6 – 11	9.1(10)
	12 – 18	23.6(26)
	19 – 35	8.2(9)
	36 – 59	14.5(16)
Fever	Yes	73.6(81)
	No	26.4(29)
Vomiting	Yes	32.7(36)
	No	67.3(74)

Yearly Hospitalization Trends among Children <5 years

Hospitalization decreased from 2013 to 2015. However, records of hospitalization from 2016 to 2017 were not documented. Peak hospitalization was recorded in 2019 (27.3%; 30) and 2020 (30.0%; 33) respectively as shown in Figure 1. There was a significant steady decrease in hospitalization in 2021 and 2022.

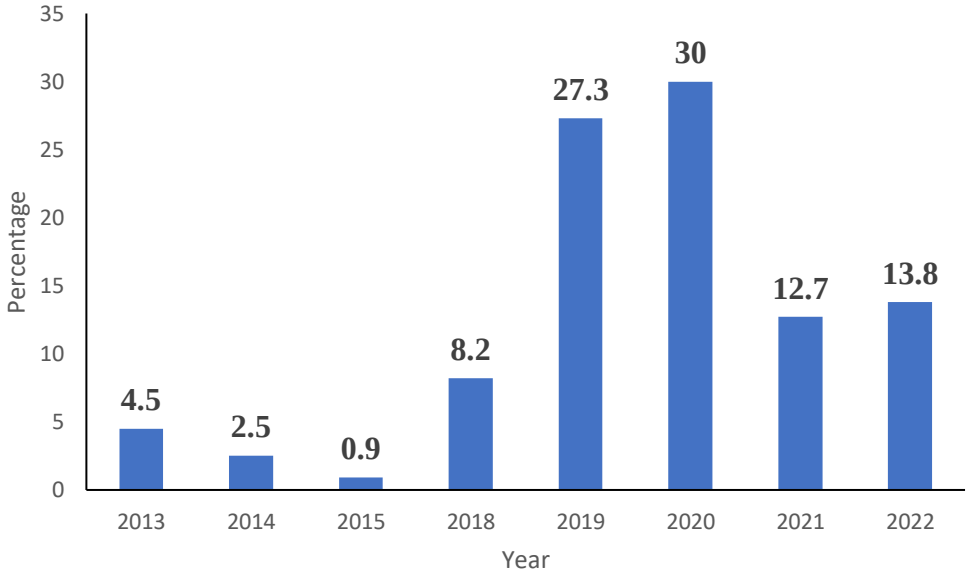

Figure 1. Yearly Trends in Diarrhea Hospitalization among Children <5 Years

Trend in Hospitalization with Different Age Groups

The trends in hospitalization among different age groups is shown in Figure 2. Children in the age group 0 – 5 months were hospitalized throughout 2013 to 2022 with a peak in 2019 (28.6%) and the lowest in 2015 (2.0%) as shown in Figure 2. Children who were older (36 – 59 months) were not hospitalized in 2013 and 2014. However, a peak (37.5%) was reported in 2020. Similarly, children in the 12 – 18 months recorded the highest (38.5%) hospitalization in 2020.

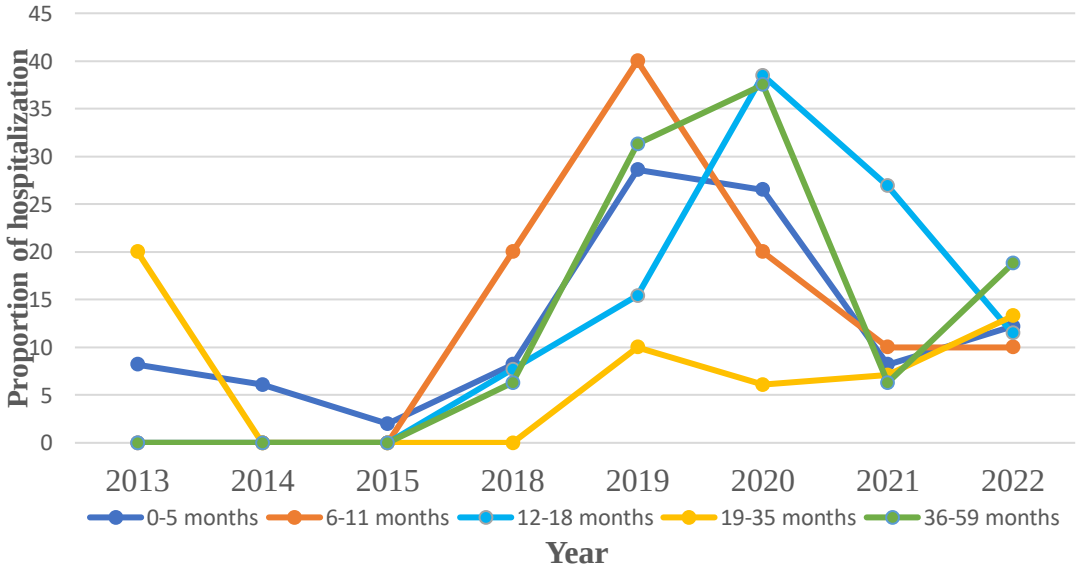

Figure 2. Trend in Diarrhea Hospitalization within Different Age Groups of Children <5 Years

Rate of Diarrhea Hospitalization

The overall prevalence of hospitalized diarrhoea was 30.9% (34/110) as shown in Figure 3. Meanwhile, 69.1% of children who were hospitalized did not have diarrhoea.

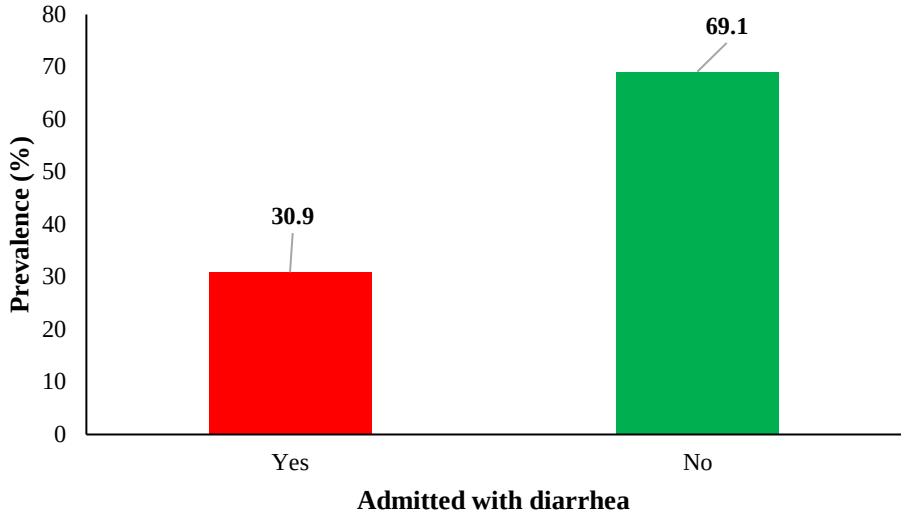

Figure 3. Prevalence of Diarrhea among Hospitalized Children <5 Years

Table 2. Association of Hospitalized Children with Diarrhea with Sex and Age

Variable	Category	Admitted with diarrhea %(n)	Chi square; P value
Sex	Male	52.9(18)	1.112; 0.292
	Female	47.1(16)	
Age group (months)	0 – 5	29.4(10)	8.946; 0.062
	6 – 11	14.7(5)	
	12 – 18	35.3(12)	
	19 – 35	11.8(4)	
	36 – 59	8.8(3)	

There was no difference in hospitalized children with diarrhoea and sex. Similarly, no difference was reported among the different age groups but children 0 – 5 months recorded the highest rates of diarrhoea hospitalization (29.4%) when compared with the other age groups as shown in Table 2.

Diarrhea Cases Before and During COVID-19

Figure 4 shows the number of diarrhoea cases before and during COVID-19. More cases of diarrhoea (18.2%) were reported during Covid 19 than before (12.7%). However, the difference in the diarrhoea cases before and during Covid 19 was not significant ($z = 0.735$; $P = 0.391$).

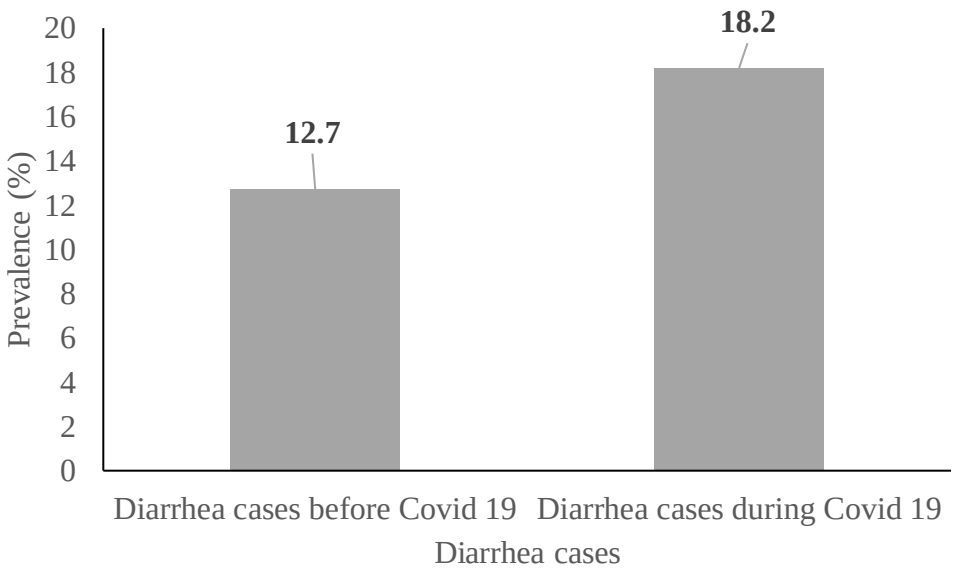

Figure 4. Diarrhoea Cases Before and During COVID-19 among Children <5 Years

Discussion

From our results, Sociodemographic and clinical outcomes of hospitalized children <5 years of age indicate that most of the hospitalized children belong to the age group 0 – 5 months. This is consistent with a study by Hugo et. al. in Tanzania where rates of hospitalization decreased with increasing age, with the youngest age group having the highest rate of hospitalization [14]. This is expected as the development of the microbiome begins soon after birth and matures by 2 years of age [15]. Unlike the Tanzanian study where 60.27% of the participants presented with fever and 88.36% were vomiting, 73.6% of our participants presented with fever while less than 50% reported vomiting though both studies used the same age range (0 to 59 months). This can be accounted for by the gaps of missing or incomplete data in our study.

30.9% of hospitalized children had diarrhoea with infants 0 – 5 months recording the highest rate (29.4%) when compared with the other age groups. A study in Mozambique showed an overall prevalence of 13.7% with the age group 0 – 11 months recording the highest rate (19.2%) [16]. This difference in overall prevalence should be because a sociopolitical crisis hit the Region of our study in 2016 and this had a direct bearing on the hygiene and health status of the communities affected by this strife. This also accounts for the fact that children aged 6 – 11 months, 12 – 18 months and 36 – 59 months recorded no diarrhoea-related hospitalization during this same time frame as residents avoided hospitals which were sporadically being burnt by rebel groups. The higher prevalence for 0 – 5 months can be accounted for by the fact that it is the most vulnerable age gap to diarrheal illness.

Concerning yearly trends in hospitalization before and during COVID-19, the peak seen in hospitalization during the COVID-19 period (2019 and 2020) is an indication of a drop in healthcare and standards of hygiene at the community level during the COVID-19 season. The lockdown measures instituted at that time did not make things easier for people as they had to keep at-home children who could have been attended to in the outpatient department until they got too sick and needed hospitalization. The sharp drop in hospitalization rates post-COVID-19 observed in our study (12.7% and13.8%) in 2021 and 2022 is in concordance with a Japan study of hospitalized pediatric patients from July 2019 to February 2021 where the number of patients with Rotavirus decreased markedly post-COVID-19 to 2.6% [17].

Although the difference in the diarrhoea prevalence before and during COVID-19 was not significant (z = 0.735; P = 0.391), the prevalence was higher during the COVID-19 season than before with an increase of 5.5%. This is at variance with a study in Ethiopia on the effect of the COVID-19 pandemic on the incidence of acute diarrheal disease and pneumonia among under 5 children where there was a 10% reduction during the COVID-19 season compared with before [18]. This could be because of poor hygiene during the COVID-19 period as observed in a study by Azene et al which revealed decreased adherence to the COVID-19 preventive actions that were advised [19]. This could cause the increased diarrhoea hospitalisation seen in our study. The effect of the massive immigration into the study area must have further accentuated the situation. Another factor that could have led to this increase in prevalence during the COVID-19 period might have been the COVID-19 virus itself. Diarrhea might be the earliest sign of COVID-19 infection as reported by Holshue et al. According to this study, the first COVID-19 patient in the United States presented with a fever and cough and developed diarrhoea within two days of hospital admission [20]. Another study found 14 articles reporting COVID-19-associated diarrhoea [21]. This further drives home the fact that the COVID-19 pandemic greatly contributed to the increase in the diarrhoea hospitalization rate in Fako Division.

This study had some limitations. We found no hospitalization data for 2016 and 2017 as this period marked the peak of the sociopolitical crisis that hit the region with some hospitals being burnt down. This caused residents to avoid going to hospitals. There were also cases of incomplete data which adversely affected our results, for instance, death during hospitalization was not found in the hospitalization record. This study was carried out during a sociopolitical conflict with a massive influx of internally displaced people into our study area. This exaggerated most of our results thus giving a false impression.

Conclusion

The rate of diarrhoea hospitalization in this study was higher during the COVID-19 season than before because diarrhoea caused by the COVID-19 virus plus the accentuating effect of population influx caused by the ongoing conflict in the study area greatly increased the rate of diarrhoea hospitalization.

Conflict of Interest

We received no conflict of interest.

Acknowledgement

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