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# Bacillary Dysentery Prevalence in Blue Nile State, Sudan, 2015-2022

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**ABSTRACT**

**Background:** Dysentery is an infectious clinical syndrome which can cause high morbidity and mortality, especially in developing countries.

**Objectives:** This study aimed to estimate the bacillary dysentery disease in Blue Nile State, 2015-2022.

**Materials and methods:** A descriptive cross sectional study health facility-based study. Data was collected from Blue Nile health facilities during the years 2015-2022.

**Results:** The overall mean prevalence of bacillary dysentery was found to be 1.8%. There was significant difference between mean of bacillary dysentery prevalence during the studied years, p=.000.The Year 2018 significantly showed high prevalence of typhoid fever 2.1 % while the year 2015 reported less bacillary dysentery prevalence 1.6% There was significant difference between the mean prevalence of the months of the studied years, p=.003. High prevalence of bacillary dysentery was significantly found during August 2.1% and July 2.1% of each studied year. There was no significant difference between weekly mean prevalence of the studied years,

p=.281.

**Conclusion:** The prevalence of bacillary dysentery is to some extent low compared to worldwide studies .In this regard, the authors recommend adopting educational programs and campaigns to raise awareness, especially among at risk groups. Furthermore, the inclusion of programs related to public health subjects and disease prevention within the educational system will constitute a solid base that can be relied upon in the future in fighting infectious and dangerous diseases.

**Keywords**: *Bacillary Dysentery, Blue Nile state, Sudan, 2015-2022*

**INTRODUCTION:**

Shigellosis is an infectious disease which is caused by the bacteria Shigella. Most patients with *shigellosis* have diarrhea, fever, and stomach cramps. Shigella causes an estimated 450,000 cases in the USA each year. (1) Shigella is a Gram- 1negative, non-motile bacillus belonging to the Enterobacteriaceae family. Until now, from the scientific literature four species of Shigella are known: *Shigella boydii*, *Shigella dysenteriae*, *Shigella flexneri*, and *Shigella sonnei*. (2) While *S. boydii* and *S. sonnei* most often generate a relatively mild clinical form of disease (watery or bloody diarrhea only), *S. flexneri* and *S. dysenteriae* are mostly responsible for shigellosis endemic and epidemic in developing countries, which associates high transmission rates and important case fatality rates (CFR). The severe clinical form of shigellosis is known as dysentery. Dysentery can occur through the oral uptake of the pathogen via contaminated water or food, also from poor personal hygiene when coming in contact with infectious material or infected persons. (3) Dysentery remains a serious public health problem worldwide, especially in developing countries. Annually, more than 165 million cases of dysentery are reported worldwide, of which 1.1 million deaths, with approximately 99% of cases occurring in developing countries. (4) Besides, about 50 million confirmed cases annually are notified related to the other infection causing dysentery – amebiasis (Entamoeba histolytica infection), of which 40,000 to 110,000 death cases. (4) The study of Ferrer *et al*. concluded that the socioeconomic factors followed by interpersonal contact were the most important drivers of dysentery occurrence, while factors regarding food preparation, the environment and the water, along with sanitation, played a secondary role. (5) Although many studies focus on sanitary and water supply as traditional factors of the dysentery incidence rate, some modern research in this field demonstrated that human behaviors have a considerable proportion in determining the incidence of this disease, and may sometimes outweigh the effect of the traditional factors. (6,7)

Dysentery control includes improved personal hygiene and avoiding contamination of food and water with infected feces. A survey carried out in the Volta region, Ghana, found that dysentery incidence can be reduced by 11% in children under 5 years if a clean water source is guaranteed.(8) Homemakers can play an essential role in limiting dysentery by providing a safe house environment to their families, especially children. In this regard, an educative and awareness program can play an active role in this

process. The purpose of this study is to estimate the prevalence of bacillary dysentery in Blue Nile State during the years 2015-2022.

## MATERIALS AND METHODS:

### Study design:

A descriptive cross sectional study health facility-based study.

### Study area:

Blue Nile State lied in southern part of the country bordering from southeast Ethiopia, southwest of South Sudan and north is Sinner state. With an area of 38,000 km square and 1,250.00 populations. Blue Nile River is crossing the state from south to north fed by numbers of streams and tributes. This gives unique feature for agricultural and live stocks herding activities. Rainy season starts early in June and ends in late October. Elroseres High Dam famous hydro-electric project that supplies country with electricity and irrigation water sources, particularly Aljazeera agriculture scheme and it is rich of mechanized agriculture in Al Tadamon locality. BNS is served by number of (160) health facilities (HFs). The population at Blue Nile State depends on different water sources. Water from network, which covers approximately (25%) of the population; The other sources are out network e.g., Hand pumps, water yards, dug wells (open/closed), river, seasonal streams, open sources (shallow wells, hafeers).

### Study population:

Blue Nile State community.

**Inclusion criteria**:

All health facilities in Blue Nile State.

**Exclusion criteria**:

Patients not diagnosed as bacillary dysentery.

**Sample size and sampling technique**:

All reported bacillary dysentery registered in Blue Nile health facilities during the years 2015-2022.

### Data collection:

Data was collected from all health facilities according to health facilities registration in Blue Nile State.

**Data analysis**:

Data was analyzed using SPSS version 24.0. Descriptive statistics was used. Analysis of variance was used. P-value considered significant at less than 0.05 levels.

**RESULTS:**

Table 1 and figure shows that there was significant difference between mean of bacillary dysentery prevalence during the studied years, p=.000.

The Year 2018 significantly showed high prevalence of typhoid fever 2.1 % while the year 2015 reported less bacillary dysentery prevalence 1.6% with overall mean prevalence of 1.8%.

Table 2 and figure 2 indicates that there was significant difference between the mean prevalence of the months of the studied years, p=.003.

High prevalence of bacillary dysentery was significantly found during August 2.1% and July 2.1% of each studied year.

Figure 3 shows that there was no significant difference between weekly mean prevalence of the studied years, p=.281



**Table 1**. Mean prevalence of bacillary dysentery during the period from the year 2015 to the year 2022 in Blue Nile State

| Year | Mean | SD | 95% Confidence Interval for Mean | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| 2015 | 1.6 | .4 | 1.0 | 2.4 |
| 2016 | 1.9 | .4 | .4 | 3.1 |
| 2017 | 1.9 | .4 | 1.1 | 3.2 |
| 2018 | 2.1 | .6 | 1.2 | 4.0 |
| 2019 | 1.8 | .7 | .0 | 4.8 |
| 2020 | 2.0 | .4 | .9 | 3.1 |
| 2021 | 1.7 | .4 | .6 | 2.6 |
| 2022 | 1.7 | .4 | .6 | 2.6 |
| **Total** | **1.8** | **.5** | **.7** | **4.8** |
| **P-value** | | | **.000*** | |

***P-value considered significant at less than 0.05 levels***

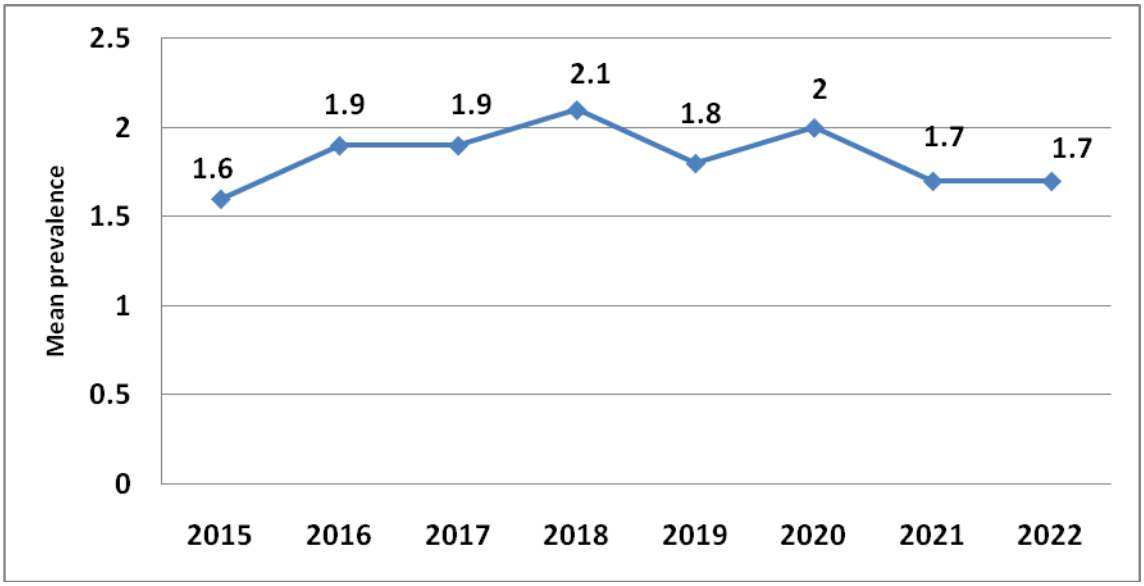


**Fig. 1**. Mean prevalence of bacillary dysentery during the period from the year 2015 to the year 2022 in Blue Nile State

**Table 2**. Mean prevalence of bacillary dysentery by months in Blue Nile State

| Year | Mean | SD | 95% Confidence Interval for Mean | |
|---|---|---|---|---|
| | | | Lower Bound | Upper Bound |
| January | 1.8 | .3 | 1.0 | 2.3 |
| February | 1.7 | .3 | 1.1 | 2.5 |
| March | 1.7 | .4 | 1.1 | 2.5 |
| April | 1.8 | .4 | 1.0 | 3.1 |
| May | 1.6 | .4 | .9 | 2.5 |
| June | 1.9 | .8 | .0 | 4.0 |
| July | 2.0 | .6 | .6 | 3.4 |
| August | 2.1 | .7 | 1.2 | 4.8 |
| September | 1.8 | .5 | .4 | 2.9 |
| October | 1.8 | .4 | 1.0 | 2.9 |
| November | 1.8 | .4 | 1.2 | 3.1 |
| December | 1.9 | .4 | .9 | 2.6 |
| **Total** | **1.8** | **.5** | **.7** | **4.8** |
| **P-value** | | | **.003*** | |

***P-value considered significant at less than 0.05 levels***

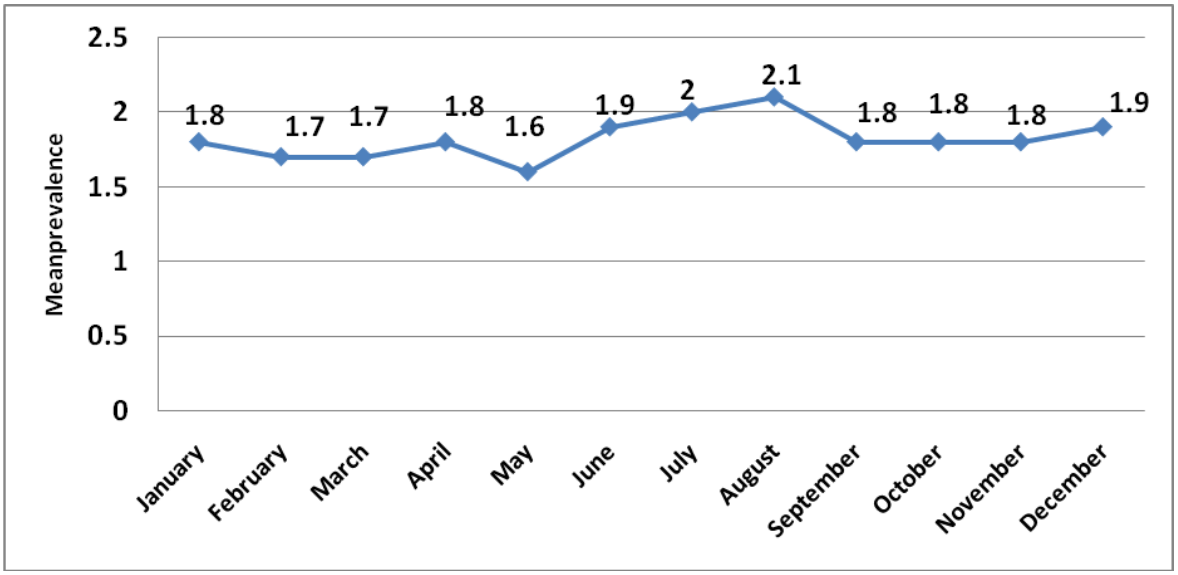


**Fig. 2**. Mean prevalence of bacillary dysentery by months in Blue Nile State

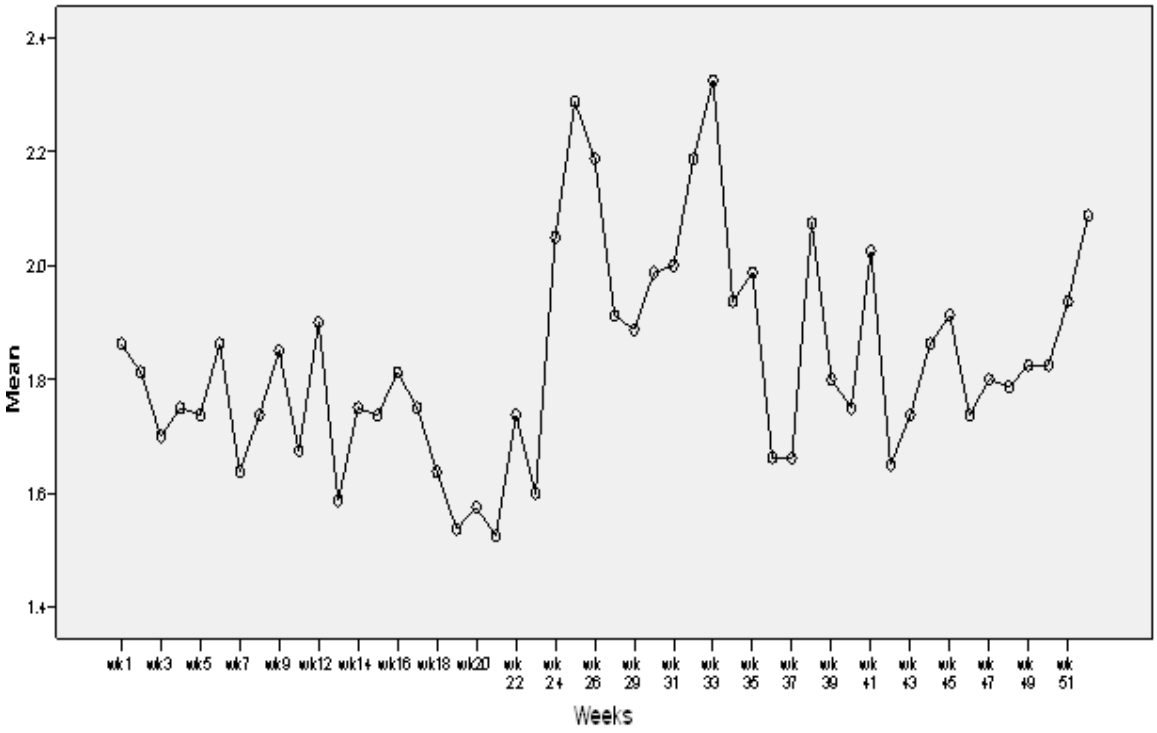


**Fig. 2**. Mean plot prevalence of bacillary dysentery by weeks in Blue Nile State

*P-value=.281 (Not significant)*

## DISCUSSION:

This study aimed to estimate the prevalence of bacillary dysentery in Blue Nile State, 2015-2022. This study showed that the overall mean prevalence of 1.8%. This prevalence is lower than in the

incidence in China 11.24 per 100,000 person-years (9) and in accordance to that reported in developed countries, such as the USA, Australia, England and France, where the incidence of bacillary dysentery reported was 1.8–6.5 cases per 100,000 person-years (7). The study revealed that the high prevalence of bacillary dysentery was significantly found during August 2.1% and July 2.1% of each studied year. This may be attributed to rainy season where the *Musca domestica* invasion is high due to a huge quantity of domestic waste and availability of organic matters due to difficulties facing domestic waste transportation during rainy season months. According to Nazari *et al*., *Musca domestica* play an essential role in transmitting many disease causative agents, especially those that cause dysentery. (10) Greenberg mentioned some examples from different world regions, where he confirmed that the dysentery's spread peak always coincides with the height of the Musca domestica spread peak. (11) Besides, the study by Farag *et al*. in Mirzapur, Bangladesh, shows a positive correlation between *Musca domestica* population density and shigellosis incidence. (16) Besides, cockroaches Blattella germanica (abundant in the study country) can be a vector of many intestinal parasitic protozoa, especially Entamoeba histolytica. (12,13,14)

## CONCLUSION:

The prevalence of bacillary dysentery is to some extent low compared to worldwide studies .In this regard, the authors recommend adopting educational programs and campaigns to raise awareness, especially among at risk groups. Furthermore, the inclusion of programs related to public health subjects and disease prevention within the educational system will constitute a solid base that can be relied upon in the future in fighting infectious and dangerous diseases.

## DECLARATION OF COMPETING INTEREST:

The authors declared that there is no conflict of interest.

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