Prevalence and distribution patterns of meningitis cases in Diyala Province, Iraq.

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Abstract

The meninges, which cover the spinal cord and brain, are inflamed in meningitis. Around 20 cases per 100,000 individuals are reported annually, which can exceed limits and cause numerous deaths worldwide. This study investigates the disease's spread rate in Diyala Governorate, the most affected age groups and genders, and which health sectors had the most cases.

A cross-sectional research of 316 patients from January 1 to December 1, 2025, was conducted in Diyala province using primary health care facility patient records supplied to the Public Health Department/Surveillance Unit.

Rural cases dominated (61%). Young children (1–5 years old) were most affected, with 46% of instances. First-quarter case distribution soared. Between January and March, 50% of cases were recorded, with February (20%) being the most. October saw autumn instances reduce to 2%. Over half the cases were in Baquba 1 and 2. The greatest prevalence rate was 24.3 per 100,000 in Khanaqin. Total Diyala prevalence was 16.4. Most (39.4%) were viral.

In conclusion, women's cases were higher than men's. Viral meningitis caused most infections, affecting children under 5 years old, particularly in rural settings. Around half of the injuries occurred in Baqubah's first and second sectors.

Introduction

Meningitis is a serious disease that leads to inflammation of the meninges, which are layers surrounding the spinal cord and brain (Grandgirard & Leib, 2010). There are approximately 20 cases recorded for every 100,000 people annually, and this rate can exceed its usual limits, leading to many deaths worldwide (GBD 2019 Meningitis Antimicrobial Resistance Collaborators, 2023; Sáez-Llorens & McCracken, 2003). The causes or contributing factors of this disease are numerous; they can be viral, bacterial, parasitic, or fungal (Sáez-Llorens & McCracken, 2003).

The most common and frequently isolated pathogens are Streptococcus pneumoniae, Haemophilus influenzae, Neisseria meningitidis, and Listeria monocytogenes (Ouchenir et al., 2017; Zainel et al., 2021).

Complications can vary between viral and bacterial infections. Among the most important complications caused by viral meningitis are cytomegalovirus, enteroviruses, measles virus, and others. Even bacterial infections are no less dangerous than viral infections (McBride et al., 2022). Haemophilus influenzae, Streptococcus pneumoniae, and other major causes of infection (Mook-Kanamori et al., 2011) have been classified as such. Haemophilus influenzae, in particular, can be especially dangerous in children under 5 years old (Khattak & Anjum, 2021) and has been identified as responsible for 17% of deaths and 20% of disabilities among survivors (Parikh et al., 2020).

Therefore, meningitis is considered a serious problem that requires strict management, strong intervention, effective treatment, and well-planned strategies—especially in regions and countries where the disease is endemic (Mook-Kanamori et al., 2011), such as Africa, Sub-Saharan regions, and others (Khattak & Anjum, 2021). It should also be noted that infection rates vary across countries in Europe, Africa, North America, and South America (Parikh et al., 2020).

It should also be noted that many studies have shown the rate of variation in the incidence globally, as well as in the Middle East and neighboring countries, where one case per 100,000 people was recorded in Iran and Egypt, and in Oman, there were 3.6 cases per 100,000 (Thornórðardóttir et al., 2014; Namani et al., 2014).

This study aims to examine the manifestations of the disease's spread rate in Diyala Governorate, describe the most affected age groups and gender, and determine which health sectors recorded the highest number of cases in Diyala Governorate.

Methodology

A cross-sectional study including a sample of 316 patients was done in Diyala province from January 1, 2025, to December 1, 2025, following the acquisition of official approvals and ethical considerations. The data was collected from the patient records of primary health centers submitted to the Diyala Public Health Department/Surveillance Unit, encompassing information on all patients across all health sectors in Diyala province, including gender, age groups, and type of infection.

The data were statistically analyzed and displayed as frequencies and percentages using Excel 2019 and SPSS software.

Results

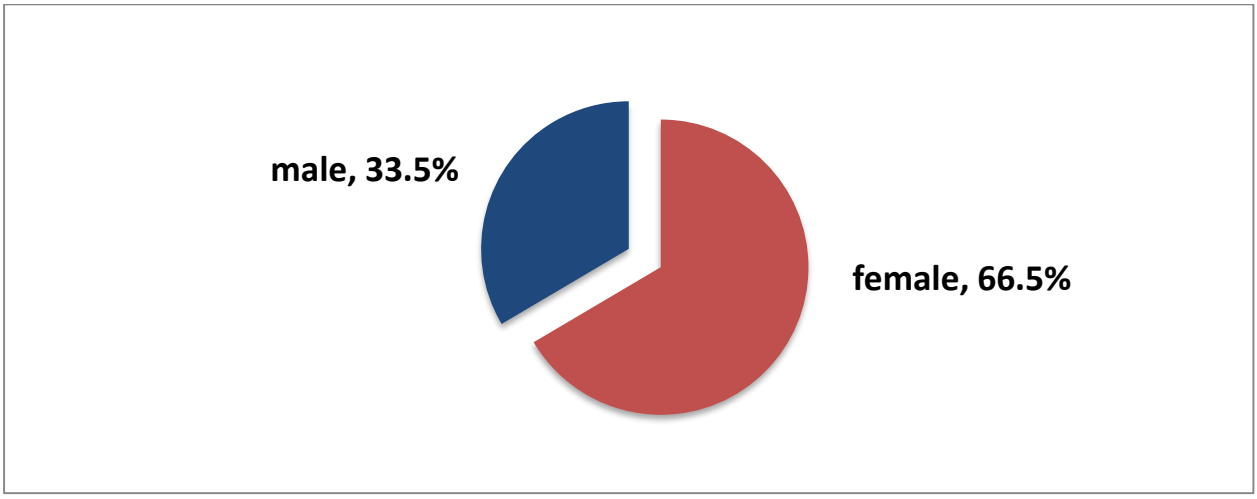


Figure (1): Frequencies according to sex.

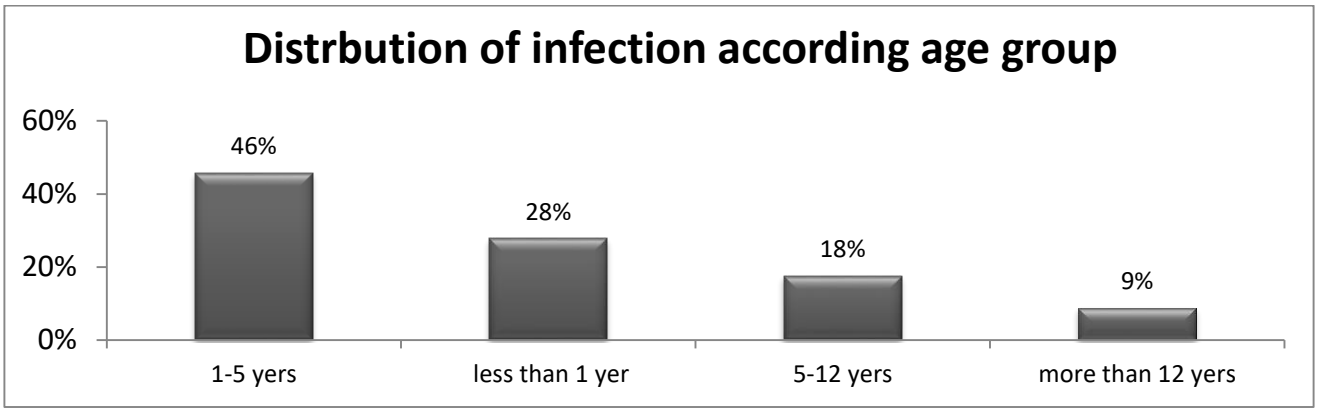


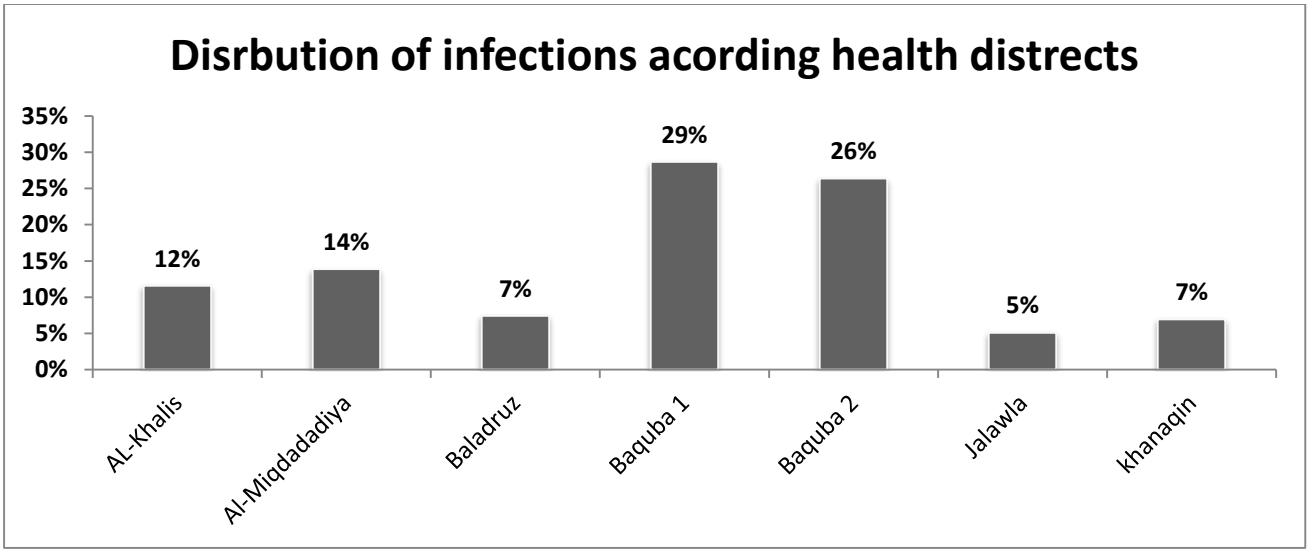
Figure 2 shows that about 46% of cases were from the 1-5 years age group

Table 1 shows that about 50% of cases were recorded during January to March.

Months	frequency	%
Jan	60	19%
Fab	63	20%
Mar	34	11%
Apr	25	8%
May	16	5%
June	15	5%
July	19	6%
Aug	25	8%
Sep	13	4%
Oct	6	2%
Nov	19	6%

Dec	21	7%
Total	316	100%

Figure 3: Shows that more than 50% of cases were recorded in the Baquba 1 and Baquba 2 sectors.



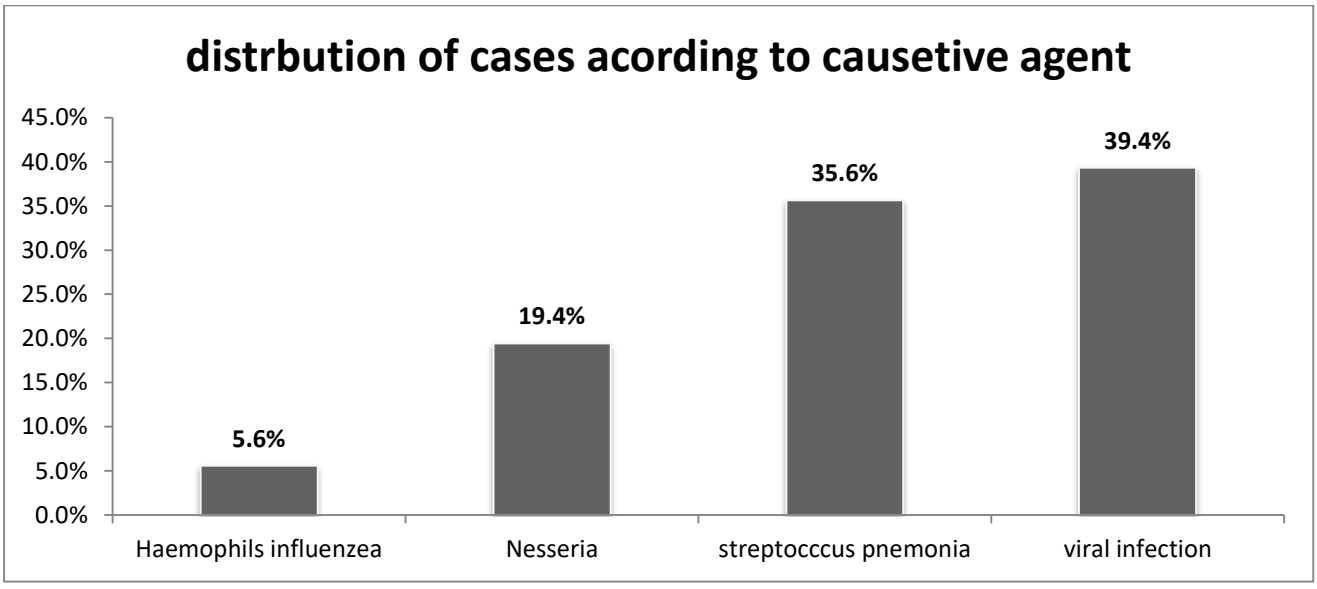


Figure 4 shows that about 39.4% of cases were viral infections.

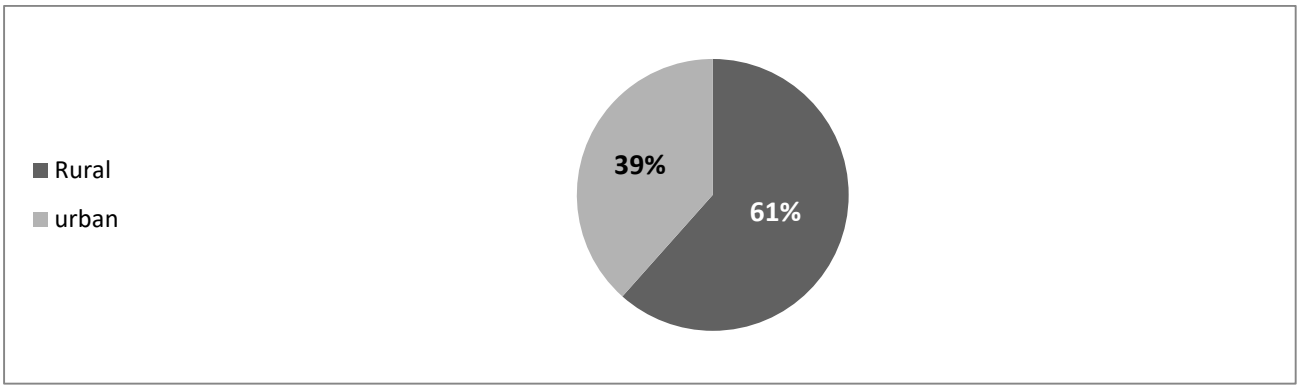


Figure 5 shows that about 61% of cases were from rural areas.

Table 2: Prevalence rates according to sectors

Sectors	Prevalence
Ba'qubaa 1	16.5
Ba'qubaa 2	21.8
Khanaqin	24.3
AL-khalis	11.8
AL-Muqdadiya	18.4
Jalawla	8.2
Baladruz	11.3
AL-Mansuria	23.8
Total Diyala	16.4

Discussion

This study showed that the prevalence in Diyala province was 16.4, while according to sectors, Khanqin holds the highest rate of prevalence. According to demographics, the infection rate among females was higher than that among males, accounting for 67% of the total cases. This result is consistent with a study conducted in Iraq 2021 (Al-Sanouri et al., 2021), and it is possible that this increase is due to the Arab society paying more attention to males than females, especially in rural areas. The study also revealed that the most affected age group was from 1 to 5 years, representing 46%. This result was

consistent with another study in the United States (Robinson et al., 2019), which showed that the group that was the most affected were under 15 years old. This may be because this age group is more susceptible to infection due to immunity-related factors. Moreover, the study indicated that most infections occurred during the winter season, with more than half of the cases recorded. This finding aligns with several studies conducted in 2009 (Palmgren, 2009) and in Italy in 2015 (Vescio et al., 2015) and may be attributed to cold weather. Also, the study found that most infections were bacterial in origin, with 39% of the cases caused by viruses. This result disagrees with another study conducted in 2019 (Peyrani et al., 2019), and this may be due to antibiotic resistance. Regarding prevalence rates, almost half the cases has been reported in Ba'qubaa city, which holds two health sectors and considered to be the highest populated city in the province, mostly urban, and this result aligns with a study done in Diyala 2025 (Mahmmod, 2025)

Conclusion

1- Most of the cases were in females compared to males.
2- Most of the injuries were caused by bacteria, and the most affected age group was under 5 years, especially in rural areas.
3- Almost half of the injuries were recorded in Baqubah’s first and second sectors.

Recommendation

1- Increase parents’ awareness, especially among families in rural areas, about the symptoms, signs, and dangers of meningitis, its modes of transmission, and the benefits of vaccines.
2- Increase training for healthcare personnel on how to handle cases, especially in the health sectors with the highest recorded incidence.

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