



## Epidemiological Profile of Communicable Diseases in Childhood within the Babylon Governorate, Iraq from 2017 to 2021

Sahar Hassan Issa <sup>1</sup>, Mohamed Masoud <sup>2</sup>, Hassan Alwan Baiee <sup>3</sup>, Mostafa Shaban <sup>4</sup>, Adnan Aljotherapy <sup>5</sup>, Fatma Gomaa <sup>6</sup>.

<sup>1</sup> Department of Community Medicine, Hammurabi Faculty of Medicine, University of Babylon, Iraq.

<sup>2</sup> Department of Public Health and Community Medicine, Faculty of Medicine, Fayoum University, Egypt.

<sup>3</sup> Department of Nursing, Hilla Faculty College, Babylon, Iraq.

<sup>4</sup> Geriatric Nursing Department, Faculty of Nursing, Cairo University, Egypt.

<sup>5</sup> Department of Pediatric Medicine, Hammurabi Faculty of Medicine, University of Babylon, Iraq.

<sup>6</sup> Community Health Nursing Department, Faculty of Nursing, Cairo University, Egypt.

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### ABSTRACT

**Background:** Notifiable communicable diseases are a significant public health issue in Iraq, particularly among children.

**Objectives:** This study aimed to comprehensively assess the epidemiological profile of childhood communicable diseases in Babylon Governorate, Iraq, over the period 2017–2021.

**Methodology:** Data from 11,925 cases of notifiable communicable diseases were collected from the health department in AL-Hilla City, Iraq, between 2017 and 2021. The data were analyzed according to the mode of transmission, type of infection, and age and sex patterns.

**Results:** The majority of the reported communicable diseases (85.4%) were droplet and airborne infections, with pneumonia being the most frequently reported respiratory infection (76.8%). The reported cases of pertussis, viral meningitis, bacterial meningitis, chickenpox, and mumps showed a significant decrease during the study period, while the incidence of measles had two peaks in 2019 and 2020. Viral hepatitis A and typhoid fever were the most frequently reported foodborne infections. Kala-azar was the most common arthropod-borne infection, while brucellosis and rabies were the most common zoonotic infections. Pneumonia and meningitis affected infants and children aged 1-4 years more commonly than other age groups, while pertussis affected infants and children aged 1-4 years more frequently than other age groups, with a female predominance. Measles affected infants and children aged 1-4 years more commonly than older age groups, with a male predominance.

**Conclusion:** This study provides a comprehensive overview of the occurrence and trends of notifiable communicable diseases among children in AL-Hilla City, Iraq, between 2017 and 2021. The findings highlight the need for improved surveillance and prevention measures.

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**Keywords:** communicable diseases, children, Iraq.

**CORRESPONDING AUTHOR:** Mostafa Shaban, Geriatric Nursing Department, Faculty of Nursing, Cairo University, Egypt.  
Email: [mostafashaban42@gmail.com](mailto:mostafashaban42@gmail.com)

**Key Message:**

1. Notifiable communicable diseases are a significant concern among children in AL-Hilla City, Iraq.
2. Pneumonia is the most common respiratory infection among reported cases.
3. Pertussis, viral meningitis, bacterial meningitis, chickenpox, and mumps have decreased significantly.
4. Measles had two peaks in 2019 and 2020, emphasizing the importance of continued vigilance and vaccination.
5. Viral hepatitis A and typhoid fever are the most frequently reported foodborne infections.
6. Kala-azar, brucellosis, and rabies are the most prevalent arthropod-borne and zoonotic infections.

**INTRODUCTION**

Childhood communicable diseases are a major global public health challenge, responsible for significant morbidity and mortality among young children worldwide. These diseases are particularly prevalent in low and middle-income countries (LMICs), where access to healthcare and preventative measures such as vaccinations may be limited. In Iraq, communicable diseases are a significant health issue, with a high burden of disease reported among children under the age of five (Boutayeb, 2010; Dyer, 2004)

Babylon Governorate, located in central Iraq, is one of the most populous governorates in the country and has been experiencing a high burden of communicable diseases among children in recent years. According to a recent study conducted in Iraq, the most common communicable diseases among children under the age of five in Babylon Governorate were diarrhea, acute respiratory infections, and measles (Abdulzahra et al., 2022). These diseases can have serious health consequences, particularly in young children, and can lead to increased morbidity and mortality if left untreated (Ali & Bunyan, 2021)

In addition to the immediate health consequences, childhood communicable diseases can have significant social and economic impacts.

The burden of these diseases can lead to lost productivity and increased healthcare costs, particularly in LMICs where resources may be limited (WHO, 2019). Children who suffer from these diseases may also experience developmental delays and other long-term health consequences.

Understanding the epidemiological profile of childhood communicable diseases in Babylon Governorate is critical for identifying potential risk factors, developing targeted prevention and treatment strategies, and improving overall health outcomes for children in the region. This information can help guide public health interventions, such as vaccination campaigns and health education initiatives, and can inform resource allocation and healthcare policy decisions (Kumar & Preetha, 2012). Therefore, this study aims to analyze the epidemiological profile of childhood communicable diseases in Babylon Governorate during the period of 2017-2021, taking into consideration relevant variables such as age, gender, location, and disease-specific incidence rates. By analyzing this data, we hope to contribute to a better understanding of the epidemiology of childhood communicable diseases in Babylon Governorate and inform evidence-based interventions to reduce the burden of disease in the region.

**AIMS OF THE STUDY**

This study aimed to comprehensively assess the epidemiological profile of childhood communicable diseases in Babylon Governorate, Iraq, over the period 2017–2021.

**METHODOLOGY****Study Design:**

This study employed retrospective Observational hospital-based design to investigate the epidemiological profile of childhood communicable diseases in Babylon Governorate, Iraq. A retrospective study design is a type of observational study that captures information about a population at a single point in time. In this case, the

study was conducted during the period of 2017-2021, and the data were collected from hospital records during that time.

A hospital-based design was chosen because hospitals are one of the primary settings where children are diagnosed and treated for communicable diseases. By collecting data from hospitals, the study was able to capture a comprehensive overview of the incidence and prevalence of communicable diseases in the population. All admitted children files (including children under 5 years ) were reviewed single handy by the researchers. The study period started from 1st January 2022 through 31st December 2022. Five years records were reviewed and included in the current study.

#### **Data Collection:**

The data collection process for this study involved reviewing all admitted children files (including children under 5 years) in public and private hospitals in Babylon Governorate. The study period started on 1st January 2017 and ended on 31st December 2021. This five-year period was chosen to provide a comprehensive overview of the epidemiological profile of childhood communicable diseases in the region.

The researchers reviewed the files single-handedly to ensure consistency and accuracy in the data collection process. The following information was collected from the files: age, gender, location, and disease-specific incidence rates. The incidence rates were calculated by dividing the number of cases by the total population at risk, which was obtained from the Central Statistical Office of Iraq. Diagnosis based on clinical manifestations laboratory investigation and radiology (x-ray, ultra sound, computerized tomography and magnetic resonance imaging

To ensure the quality and accuracy of the data, the researchers received training on the data collection process and used a standardized data collection form to record the information. The form included clear instructions and definitions for each

variable to minimize the potential for errors or inconsistencies in the data collection process.

To maintain patient confidentiality and privacy, the data were collected anonymously. The researchers did not collect any identifying information such as names, addresses, or personal identification numbers. Instead, each patient was assigned a unique identifier to ensure that their records were not duplicated or missed during the data collection process.

#### **Data Analysis:**

The data collected for this study were analyzed using statistical software packages such as IBM SPSS and Microsoft Excel. Descriptive statistics were used to summarize the characteristics of the study population, including age, gender, location, and disease-specific incidence rates.

The incidence rates were calculated by dividing the number of cases by the total population at risk for each disease. The population at risk was obtained from the Central Statistical Office of Iraq. The incidence rates were calculated for each disease and stratified by age, gender, and location.

Chi-square tests were used to assess the association between categorical variables such as gender and disease incidence rates. Independent sample t-tests were used to compare the means of continuous variables such as age between different groups. Multivariate logistic regression analysis was used to identify risk factors associated with each disease.

#### **Ethical Considerations:**

Confidentiality and non-disclosure of identities, data and results were considered. Administrative approvals of Babil health directorate and the hospital management authority as well as the acceptance of ethical research committees of Hammurabi medical college and the research ethical committee of ministry of health were obtained.

## RESULTS

### Overall occurrence

This study included 11925 cases of the notifiable communicable diseases among children less than 15 years of age during the period from 2017-2021 in AL-Hilla City, Iraq. According to the modes of transmission, the majority of the reported communicable diseases (N=10183; 85.4%) were droplets and air-borne infections. Pneumonia (N=9162) was the most frequently reported respiratory infections. Pertussis (N=627), Viral meningitis (N=339), Bacterial meningitis (N=336), and Measles (N=252) were commonly reported. Chicken pox (N=74) and mumps (N=20) were less commonly notified. Among the food-borne infections (N=1633), viral hepatitis A (N=1306) was the most frequently reported infections.

Typhoid fever (N=304) was commonly reported. However, thirteen cases of AFP (and one case of poliomyelitis) were identified. In 2019, nine cases of cholera were reported. Total of 87 arthropod-borne infections were reported; including 84 cases for Kala-azar and 3 cases for cutaneous Leishmaniasis. Communicable zoonotic diseases were detected in 18 cases (13 cases for brucellosis and 5 cases for rabies). For 2018-2019, two cases of both viral hepatitis B and tetanus were reported, table 1.

### Time Trend

Pneumonia cases increased from 2467 cases in 2017 to reach the peak (2820 cases) in 2018 then the data revealed a downward trend in the subsequent years to reach 690 cases in 2021. Pertussis showed a substantial decrease in reported cases during the study period. Data regarding viral meningitis showed a reduction in the reported cases as it decreased from 111 cases in 2017 to 33 cases 2021 including two peaks in 2019 (92 cases) and 2020 (70 cases). Bacterial meningitis showed a significant reduction in incidence during the study period. Measles incidence had two peaks in 2019 (168 reported cases) and 2020 (77 cases). Regarding

Chicken pox and mumps, there was a dramatic decrease in the reported cases during the observed period.

Reported HAV cases elevated from 310 in 2017 to 577 in the following year then it declined again to reach 34 in 2021. The same trend was observed in typhoid as reported cases increased from 56 cases in 2017 to reach (176 cases) in 2018 before decreasing again in the following years.

Data regarding Kala-azar revealed a decrease in the reported cases as it declined from 15 cases in 2017 to 8 cases 2021 with two peaks in 2018 (24 cases) and 2019 (26 cases), figure 1, 2 and 3.

### Age and sex Pattern

Pneumonia and meningitis affected infant and 1-4 years children more commonly than other age groups. The reported cases showed a male dominance for the two age groups and the all-encompassing age-group (0–14) years. Pertussis affected infant and 1-4 years children more frequently than other age groups with a female dominance for the two age groups and the overall age-group (0–14) years. During 2019-2020, measles affected infant and 1-4 years children more commonly than older age groups. The reported cases showed a higher frequency in males when compared to females for the infant age groups and the all-encompassing age-group (0–14) years. Mumps affected 5-9 years and older children more commonly than younger age groups with a significant male predominance. Chicken pox had similar age and sex pattern but less apparent than in mumps.

HAV afflicted 1-4 years and 5-9 years children more commonly than other age groups. The notified cases revealed a male dominance for the two age groups and the overall age-group (0–14) years. Typhoid fever affected 5-9 years and older children more commonly than younger age groups with a slight female predominance. Out of the nine reported cholera cases, 6 cases were females. Eight cases were in age groups 1-4 and 5-9 years.

Kala-azar affected infant and 1-4 years children more frequently than older age groups. The reported cases showed a slight male dominance for the infant age groups and the all-encompassing age-group (0–14) years while female had a higher reported cases than males in age group of 1-4 years old, figure 1, 2 and 3.

## DISCUSSION:

The results of this study revealed the occurrence, time trend, and age and sex pattern of notifiable communicable diseases among children less than 15 years of age during the period from 2017-2021 in AL-Hilla City, Iraq. The study included 11925 cases of notifiable communicable diseases, of which 85.4% were droplet and air-borne infections. The most frequently reported respiratory infection was pneumonia, accounting for 9162 cases, followed by pertussis (627 cases), viral meningitis (339 cases), bacterial meningitis (336 cases), and measles (252 cases). These findings are consistent with previous studies that reported pneumonia as one of the most common respiratory infections in children (Mahmoud & Harhara, 2020; Stinson et al., 2020). Pertussis, also known as whooping cough, is a highly contagious respiratory disease caused by the bacterium *Bordetella pertussis* and is known to be more common in infants and young children (Yeshanew et al., 2022). Meningitis, which can be caused by viruses or bacteria, is a serious disease that can lead to neurological damage or death if not diagnosed and treated early (Choi, 2001). Measles, a highly contagious viral disease, is also known to affect children and can lead to serious complications such as pneumonia and encephalitis (Moss, 2017)

Regarding food-borne infections, viral hepatitis A was the most frequently reported infection, accounting for 80% of all food-borne cases. This is consistent with other studies that have identified hepatitis A as a major cause of food-borne disease worldwide (Sharaheeli & Alibrahim, 2022). Additionally, the study reported a decrease in the

incidence of typhoid fever over the years. This could be due to improvements in sanitation and hygiene practices in the community, as well as the implementation of vaccination programs for typhoid fever (Im et al., 2022).

In terms of arthropod-borne infections, Kala-azar was the most frequently reported infection. Kala-azar is a parasitic disease that is transmitted through the bite of an infected sandfly. The disease is endemic in several parts of the world, including Iraq, and can lead to significant morbidity and mortality if left untreated (Okwor & Uzonna, 2016). The study also reported three cases of cutaneous leishmaniasis, which is another disease transmitted through the bite of infected sandflies. Cutaneous leishmaniasis is a major public health concern in many parts of the world, including the Middle East, and can lead to significant disfigurement and disability if left untreated (den Boer et al., 2011).

Communicable zoonotic diseases were detected in 18 cases, with brucellosis and rabies being the most commonly reported. Brucellosis is a bacterial infection that is commonly transmitted through contact with infected animals, particularly sheep, goats, and cattle. Rabies, on the other hand, is a viral disease that is transmitted through the bite of an infected animal, usually a dog. Both diseases are important public health concerns in many parts of the world, and efforts should be made to prevent and control these diseases through improved animal health and control measures, as well as through vaccination programs for both humans and animals (Agunos et al., 2016; Rahman et al., 2020)

In terms of age and sex patterns, pneumonia and meningitis affected infants and children aged 1-4 years more commonly than other age groups. This is consistent with other studies that have identified young children as being at a higher risk of developing these diseases (Dondo et al., 2019; Mpabalwani et al., 2019). Pertussis also affected infants and children aged 1-4 years more frequently than other age groups, with a female dominance for these age



groups and the overall age-group (0-14) years. This is consistent with other studies that have identified young children as being at a higher risk of developing pertussis, and females have been reported to have a higher incidence of pertussis compared to males in some studies (Decker & Edwards, 2021).

Measles affected infants and children aged 1-4 years more commonly than older age groups, with a higher frequency in males when compared to females for the infant age groups and the overall age-group (0-14) years. This is consistent with other studies that have identified young children as being at a higher risk of developing measles, and males have been reported to have a higher incidence of measles compared to females in some studies (Cui et al., 2020; Wang et al., 2019)

Mumps affected children aged 5-9 years and older more commonly than younger age groups, with a significant male predominance. This is consistent with other studies that have identified mumps as being more common in males and affecting older children more frequently (Connell et al., 2020).

### CONCLUSIONS:

This study provides a comprehensive overview of the occurrence and trends of notifiable communicable diseases among children in AL-Hilla City, Iraq, between 2017 and 2021. The findings highlight the need for improved surveillance and prevention measures.

### RECOMMENDATIONS:

Based on the findings of this study, the following recommendations can be made:

1. Enhance surveillance and reporting systems: Improving the surveillance and reporting systems can help identify and track the trends of communicable diseases among children. This will enable health authorities to plan for appropriate interventions and allocate resources accordingly.
2. Increase vaccination coverage: Vaccination remains the most effective means of preventing many

communicable diseases. Therefore, efforts should be made to increase vaccination coverage, particularly for diseases such as pertussis, measles, and hepatitis A, which were among the most commonly reported in this study.

3. Improve public health education: Raising awareness about the importance of personal hygiene, handwashing, and food safety can help prevent the spread of communicable diseases. Educating parents and caregivers about the signs and symptoms of common childhood illnesses can also help facilitate early detection and prompt treatment.
4. Strengthen healthcare facilities: Healthcare facilities should be equipped with the necessary resources and staff to handle the increased demand for healthcare services during outbreaks of communicable diseases. This includes having adequate supplies of medications, diagnostic tests, and personal protective equipment.
5. Conduct further research: Further research is needed to investigate the causes and risk factors associated with the different types of communicable diseases among children in the study area. This will help to identify specific areas where interventions can be targeted to prevent the transmission of these diseases.

By implementing these recommendations, it is hoped that the burden of communicable diseases among children can be reduced, leading to improved health outcomes and quality of life for the children in the study area.

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#### TABLES AND FIGURES:

Table (1): Reported communicable diseases by transmission modes among children in AL-Hilla City, Iraq from 2017-2021

Communicable Diseases	N
<b>Droplet &amp; air-borne</b>	
Pneumonia	9162
Pertussis	627
Viral meningitis	339
Bacterial Meningitis	336
Measles	252
Chicken pox	74
Mumps	20
<b>Ingestion (food-borne)</b>	
HAV	1306
Typhoid	304
AFP	13
Cholera	9
Poliomyelitis	1
<b>Arthropod-borne</b>	
Kala-azar	84
Cutaneous leishmaniasis	3
<b>Zoonotic</b>	
Brucellosis	13
Rabies	5
<b>Blood-borne &amp; vertical transmission</b>	
HBV	2
<b>Contact</b>	
Tetanus	2





Figure (1): Reported droplets and air-borne infections (time trend, age and sex pattern)

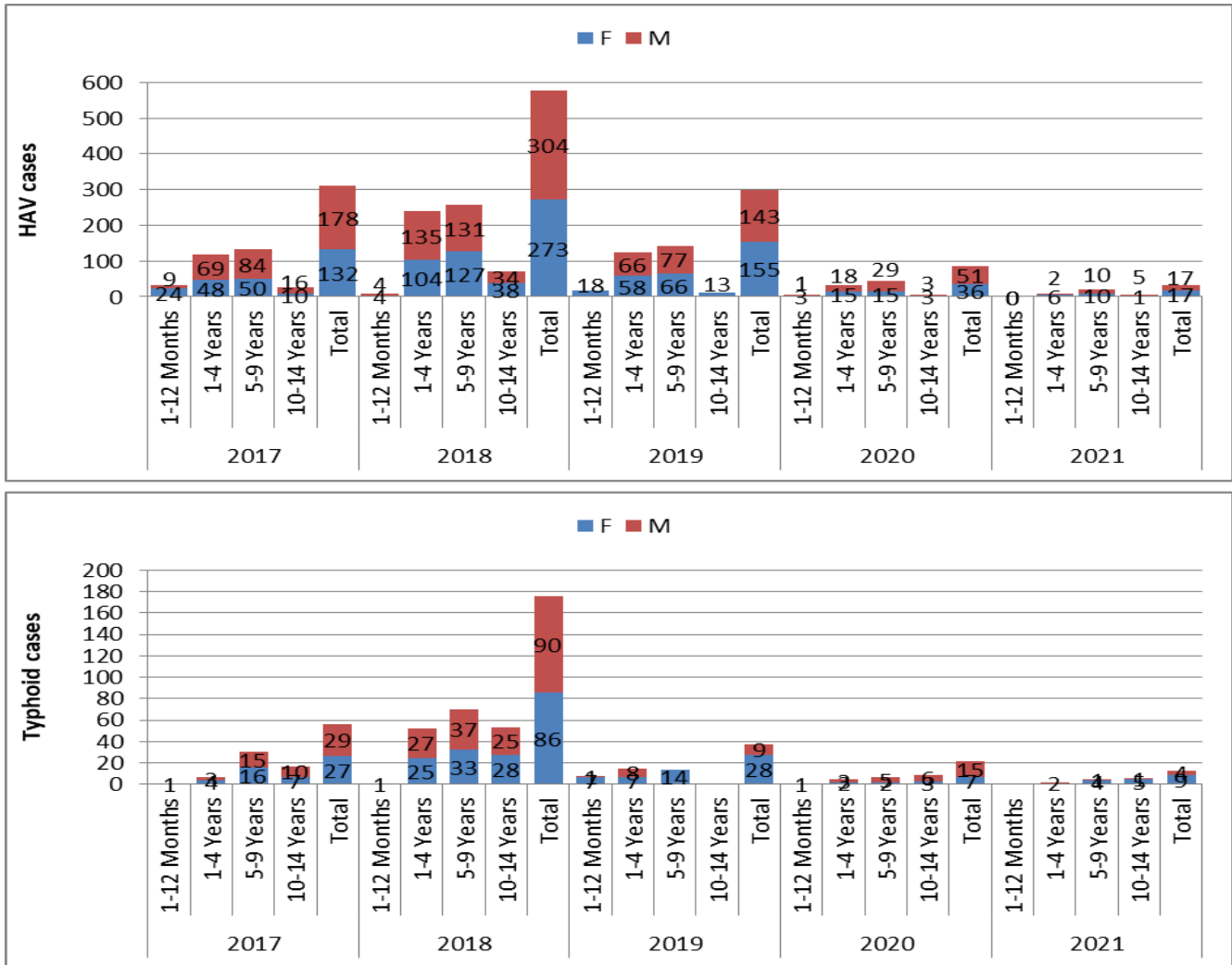


Figure (2): Reported Food born infections (time trend, age and sex pattern)

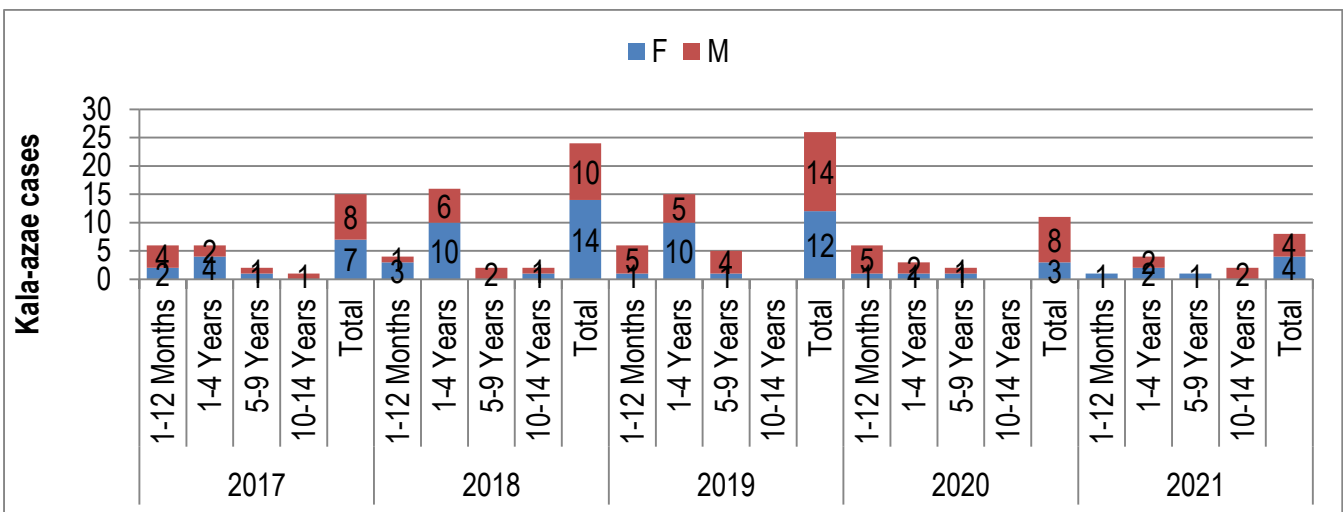


Figure (3): Reported Kala-azar cases (time trend, age and sex pattern)