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Spatial and temporal trends of conjunctivitis, Uganda, 2020-2023: An analysis of Health Management Information System

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Summary

Background: Annually, an estimated 30 million people in Sub-Saharan Africa are affected by conjunctivitis. Little is known about the temporal and spatial trends of conjunctivitis in Uganda. We described the spatial and temporal trends of conjunctivitis, Uganda, 2020–2023.
Methods: We conducted a descriptive study using conjunctivitis surveillance data abstracted from the District Health Information System 2 (DHIS2), 2020-2023. As per DHIS2, conjunctivitis was defined as the aggregate of allergic, bacterial, and other forms of conjunctivitis cases. Data were abstracted monthly and incidence rates were calculated by sex, age, and year. We generated trends and tested the significance of trends using Man Kendall test.
Results: Up to 4,550,193 cases of conjunctivitis were reported over the 4-year period, with an overall incidence of 26/1,000 population. Children aged 0-4years were most affected with an average incidence rate of 74 /1,000 population. Males were more affected than females with an incidence rate of 27 /1,000 population. Annual seasonal spikes were observed throughout the study period in March and September. Allergic conjunctivitis was the most frequently reported type constituting almost half of the cases (48%). Annual incidence increased from 26 /1,000 population in 2020 to 27/1,000 population in 2023. However, this increase was not statistically significant (p=0.67).
Conclusion: The country experienced annual seasonal spikes in the months of March and September each year. Children aged 0-4 years and males were the high-risk groups. We recommend health education on avoiding allergens during the spike seasons to reduce on the incidence of allergic conjunctivitis, and surveillance for viral subtypes that are more likely to cause outbreaks

Introduction

Conjunctivitis is a common condition of the eye that occurs worldwide and affects all ages and social strata, affecting more than two percent of the population. It is caused by a variety of bacterial or viral pathogens but may also be caused by allergies, irritants or medications. Although the bacterial type of conjunctivitis characterized by swollen eyelids and puslike discharge are mainly seen at a young age, there is no age limit. Allergic conjunctivitis is common in children by contact with allergens such as pollen, dust, or pet dander. It presents with redness, itching, and watering of the eyes (1).

In Uganda, an outbreak of bacterial conjunctivitis was reported in 2017 in Gulu District by the Ministry of Health among prisoners(7). On the 7th of March, 2024, the Ugandan Ministry of Health issued a public health notice regarding an ongoing outbreak of conjunctivitis, also known as red eye, in schools and prisons within Kampala District. The outbreak had also been identified in eight prisons in other districts across the country. As of March 13, 2024, a total of 954 cases had been confirmed across Kampala and the affected prisons. Health officials actively conducted surveillance alongside the Kampala City Council Authority to respond to the outbreak(8). However, there remains limited data on the trends and distribution of conjunctivitis in Uganda. Prior to 2020, no data was reported on conjunctivitis and there are limited published studies in our setting on this. We established the spatial and temporal trends of conjunctivitis in Uganda from 2020–2023 and recommend evidence-based control measures that can be used for public health action.

Methods

We conducted a descriptive study using conjunctivitis surveillance data for the entire country abstracted from the District Health Information System 2 (DHIS2), 2020-2023. As per DHIS2, conjunctivitis was defined as the aggregate number of allergic, bacterial and other forms of conjunctivitis. Beginning in 2020, conjunctivitis was reported to the Ministry of Health in Uganda as a count of the number of cases per month from each of the health facilities in the 15 administrative health regions of the country.

We abstracted data about monthly reported conjunctivitis cases classified as allergic, bacterial, and other forms.

Data was summed to obtain the total number of conjunctivitis cases. We calculated the incidence rates by dividing the total number of conjunctivitis cases by the total populations at risk in the different districts per 1,000 in the districts from January 2020 to December 2023. We demonstrated the trends of incidence by age group and year using line graphs.

Data was imported into R software for analysis so as to determine the significance of the trends using Man Kendall test for trends and Sen's slope test for the direction of the trend.

The Uganda ministry of health through the office of the Director General Health Services (DGHS) gave approval to access data from the DHIS-2. We stored the abstracted data set in a password protected computer and only shared it with the investigation team. In addition, the office of the Associate Director for Science, U.S. Centers for Disease Control and Prevention, determined that this study was not human subjects research with the primary intent of improving use of data to guide public health planning and practice.

Results

Proportion of conjunctivitis cases by etiology, Uganda, 2020-2023

Allergic conjunctivitis was the most frequently reported type constituting almost half of the cases (48%) followed by bacterial type of conjunctivitis (45%) in the 4year study period. Other forms of conjunctivitis were the least reported over the 4year period (7%).

Trends of conjunctivitis incidence by Sex, Uganda, 2020-2023

Both males and females were at risk for conjunctivitis with an incidence of 27/1,000 population and 25/1,000 population respectively. The incidence of conjunctivitis reduced over the years among both males and females from an average of 42/1,000 in 2021 to 26/1,000 in 2023. The overall incidence of conjunctivitis in the 4-year period was 26 cases/1,000 population. There was a gradual increase in the incidence of conjunctivitis from 26/1,000 population in 2022 to 27/1,000 population in 2023 [Figure 1].

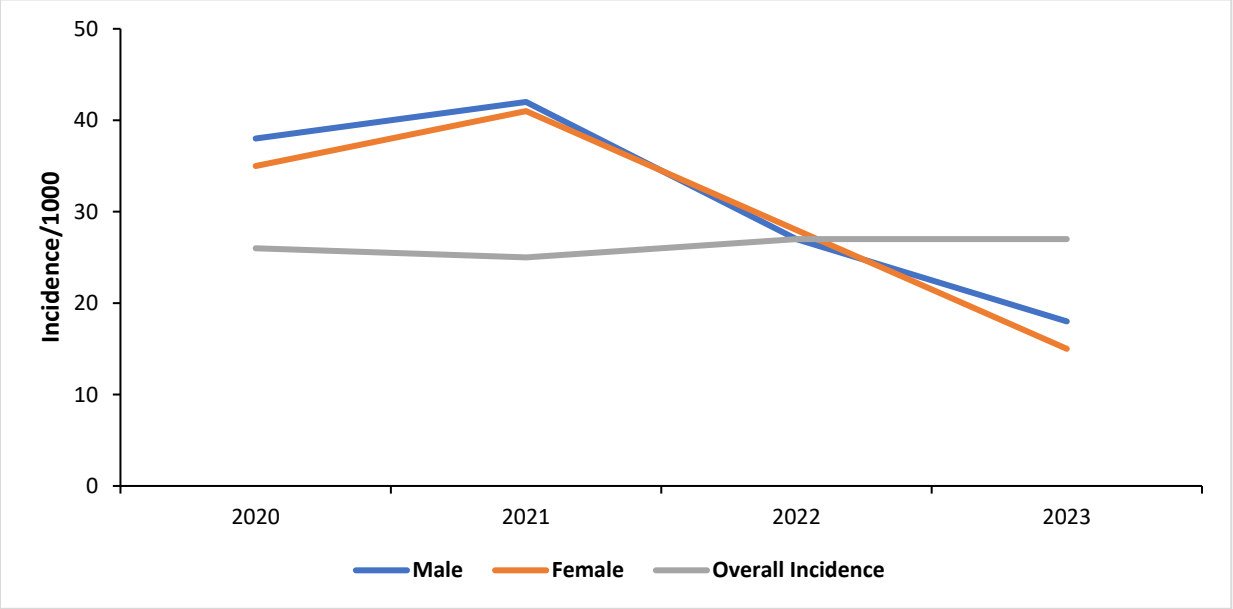

Figure 1: Trends of conjunctivitis incidence by Sex, Uganda, 2020-2023

Trends of conjunctivitis incidence by age group, Uganda, 2020-2023

Children aged 0-4 years were most affected compared to all the other age groups with an average incidence of 74/1,000 population. The incidence of conjunctivitis among this age group increased from 68/1,000 population in 2021 to 81/1,000 population in 2023. Similar increase was observed among age group of those over 5 years [Figure 2].

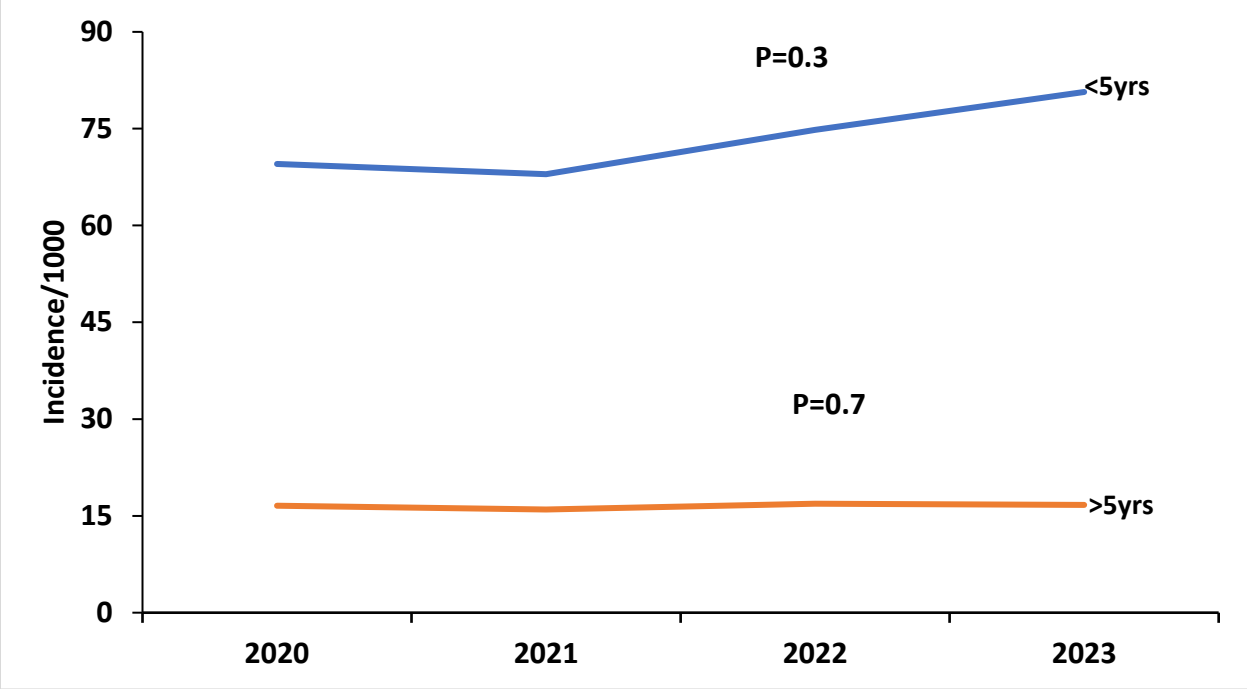

Figure 2: Trends of conjunctivitis incidence by age group, Uganda, 2020-2023

Trends of conjunctivitis cases by year, Uganda, 2020-2023

A total of 4,550,193 cases were reported in the 4-year period with an overall incidence of 26 cases/1000 population. We observed a significant gradual increase in cases reported p=0.002. The incidence rates were relatively low with the highest peak reported in 2020. Seasonal spikes were observed throughout the study period with the seasonal peaks in March and September each year. There was a distinct seasonal pattern each year, with cases peaking in March and or September each year (p=0.002 for seasonal trend) [Figure 3]. No outbreaks were detected throughout the 4-year period. The number of cases dropped in November 2023 (Figure 3).

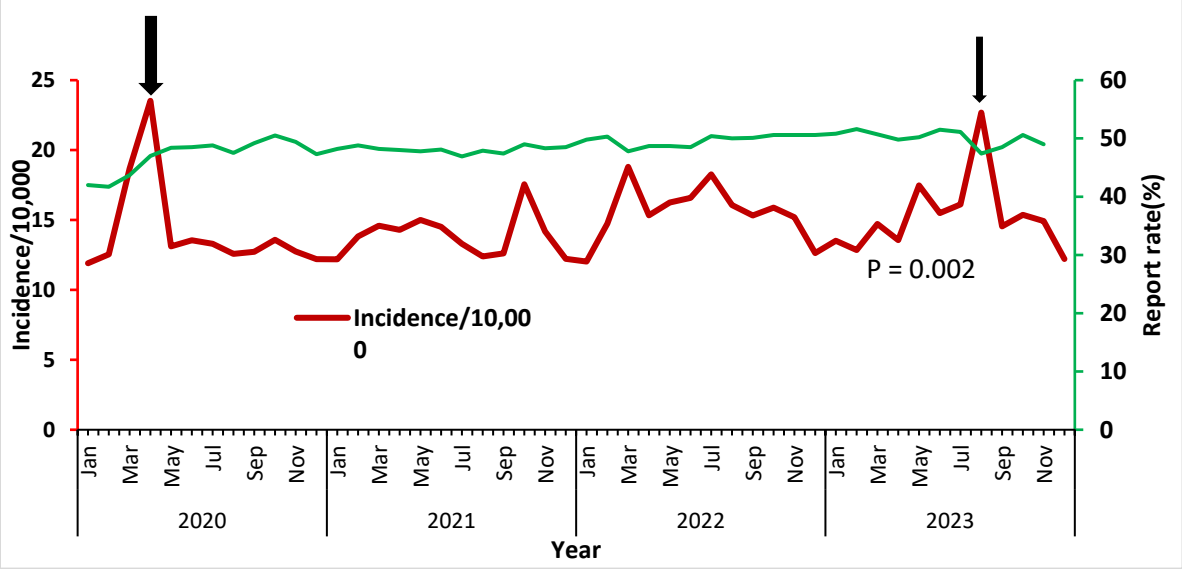

Figure 3: Trends of conjunctivitis cases by year, Uganda, 2020-2023

Spatial distribution of conjunctivitis cases, Uganda, 2020–2023

There was no difference in the incidence across the country within the 4-year period. Overall, Obongi and Adjumani districts had the highest burden of conjunctivitis throughout the four-year period with a mean annual incidence of 47/1,000 population and 38/1,000 population respectively (Figure 4).

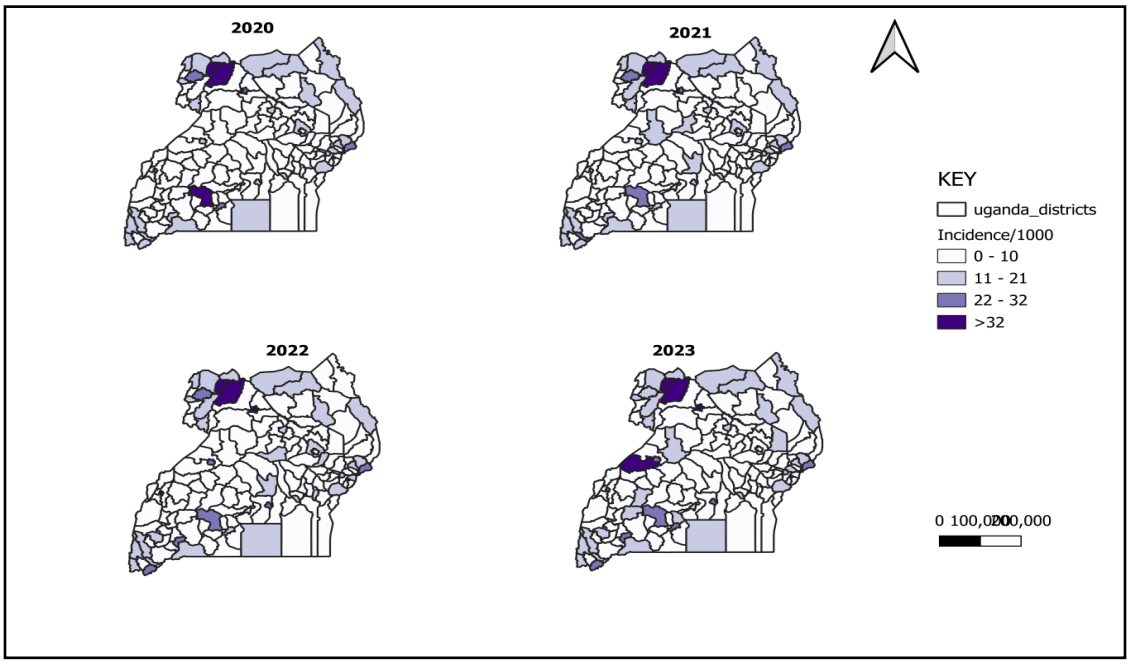

Figure 4: Spatial distribution of conjunctivitis cases, Uganda, 2020–2023

Discussion

In this study conducted to describe the trends and distribution of conjunctivitis in Uganda, children aged 0-4years were most affected and there was no difference in the incidence among females and males. Cases of conjunctivitis peaked in the months of March and September in the reporting period of the 4 years.

Children 0-4 years were more affected compared to those above 5years. Our findings are consistent with findings from a study on risk factors for conjunctivitis among children that revealed that conjunctivitis occurs mostly in children aged > 3 years, and continues until puberty(9). This could be explained by the fact that these children play outdoors where its dusty, have other allergens such as pollen grains, and are likely to wipe their eyes using the dirty arms, hence introducing foreign substances to the conjunctiva.

There was no significant gender difference observed in the incidence between males and females. However, males may have had a slightly higher incidence compared to their female counter parts due to the difference in lifestyle and hygiene habits as suggested by other studies(10). Males are hyperactive or have poor hygiene awareness and are engaged in different types of occupational labor unlike females.

Relevant reports point out that conjunctivitis is a seasonal infectious disease which occurs mostly in summer/dry season(12) . Our study also found that the onset season of conjunctivitis in Uganda was mainly concentrated in March and September, with the highest incidence in March. The incidence trend of conjunctivitis was significant showing a distinct seasonal pattern each year with cases peaking in March and September each year. This means that conjunctivitis outbreaks are likely to take place in particular seasons throughout the year since there were notable peaks in the months of March and September which follow dry spells across the country. This information is useful to intensify preparedness in institutions such as schools and prison settings where the disease easily breaks out. The consistency of the seasonal pattern implicates environmental risk factors, and we hypothesize that seasonal allergies from pollen and other allergens may ultimately be responsible, although this is subjective.

Study limitations

This analysis had some limitations. The DHIS2 national-level surveillance data only provides information on cases of conjunctivitis reported at the out-patient departments for all available health facilities in the country. This data may be subject to the constraints of administrative data such as some missing information especially from private health facilities which equally serve a significant proportion of the population. The incidence estimates herein are certainly an underestimate of the true incidence of conjunctivitis in Uganda.

Conclusion

The country experienced annual seasonal spikes in the months of March and September each year with children aged 0-4 years being the prime high-risk group. There was no difference in the incidence of conjunctivitis among males and females.

We further recommend routine surveillance and monitoring of surveillance data to aid in early detection of epidemics specially to detect seasonal spikes in the months of the year. Lastly, we recommend heightened health education during the peak seasons on avoidance of allergens especially among children.

Conflict of interest
The authors declare no conflict of interest.

Author Contributions
GA, DK, BK, and RM wrote the protocol of the study. GA and RM analyzed and interpreted the data. GA drafted the initial bulletin. BK, HN, and AA contributed to the first draft and all authors read and approved the final bulletin. Permission to publish the article was obtained from all the authors.

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