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Pattern and Distribution of Ophthalmic Diseases in State Specialist Hospital, Gombe (SSHG): A Retrospective Cross-Sectional Study

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ABSTRACT

Background: Ophthalmic diseases cause significant morbidity globally, but comprehensive data from Gombe State, Northeastern Nigeria, remains limited. Understanding local disease patterns is essential for evidence-based healthcare planning and resource allocation.

Objective: To describe the pattern, distribution, and demographic associations of ophthalmic diseases among patients presenting to Specialist Hospital Gombe (SSHG).

Methods: A retrospective cross-sectional study of 9,200 patients attending the ophthalmology clinic at SSHG. Data on age, sex, primary diagnosis, presenting complaints, and treatment were analyzed using descriptive statistics, frequency distributions, cross-tabulations, and chi-square tests.

Results: The mean age was 28.4±20.2 years (median: 25.0). 42.3% were male and 57.7% female (M:F ratio 0.73:1). The five most common diagnoses were: Allergic Conjunctivitis (46.4%), Bacterial Conjunctivitis (11.8%), Refractive Error (9.7%), Cataract (8.3%), and Vernal Conjunctivitis (5.6%). There was a statistically significant association between age group and diagnosis (χ^2 = 3085.06, df = 168, p = 0.0000e+00). The most common presenting complaints were Itching (27.2%), Discharge (12.6%), and Redness (12.1%). Antibiotic eye drops were the most frequently prescribed treatment (27.7%).

Conclusion: Allergic Conjunctivitis is the leading diagnosis at SSHG (46.4%), followed by Bacterial Conjunctivitis and Refractive Error. Disease patterns vary significantly by age, supporting age-targeted interventions. The high rate of antibiotic prescriptions (27.7%) indicates a need for antimicrobial stewardship programs. These findings provide essential baseline data for eye care planning in Gombe State.

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INTRODUCTION

Ophthalmic diseases represent a significant cause of morbidity and visual impairment worldwide. According to the World Health Organization, approximately 2.2 billion people globally suffer from visual impairment, with at least 1 billion cases being preventable or unaddressed [1]. Sub-Saharan Africa bears a disproportionate burden, with blindness rates up to eight times higher than high-income countries [2].

In Nigeria, the most populous African nation, the national blindness prevalence is estimated at 1.2%, corresponding to approximately 2.4 million blind Nigerians [3]. Cataract accounts for 43% of blindness, followed by glaucoma (16%), corneal opacities (5%), and refractive errors (4%) [4]. However, significant regional variation exists, with northern states generally reporting higher blindness rates due to lower healthcare access, higher poverty levels, and limited specialist services [5].

Gombe State, located in Northeastern Nigeria, has a population of approximately 3.5 million people, predominantly rural (70%). The state faces significant healthcare challenges including low health insurance coverage (

Despite the clear need, no comprehensive study has been published on the pattern of ophthalmic diseases in Gombe State. This knowledge gap hinders evidence-based planning, resource allocation, and training prioritization. This study aimed to describe the pattern, distribution, and demographic associations of ophthalmic diseases among patients presenting to SSHG.

METHOD

Study Design and Setting

This was a retrospective cross-sectional study conducted at the Ophthalmology Department of Specialist Hospital Gombe (SSHG), Gombe State, Nigeria. The study adhered to STROBE guidelines for cross-sectional studies [7]. SSHG is a 350-bed tertiary healthcare facility serving as the State Specialist Hospital and a major referral center for Northeastern Nigeria.

Data Collection and Processing

Medical records of all patients presenting to the ophthalmology outpatient clinic during the study period were extracted from the hospital's electronic medical records database. Variables collected included age (converted to years and categorized into 9 groups: 0-5, 6-10, 11-15, 16-20, 21-30, 31-40, 41-50, 51-60, and 61+ years), sex, primary diagnosis (categorized into 30 ICD-11-based groups), presenting complaint (25 categories), and treatment (18 categories).

Statistical Analysis

Data were analyzed using Python (pandas, numpy, scipy). Descriptive statistics (frequencies, percentages, mean, median, standard deviation) were calculated. Cross-tabulations examined associations between demographic and clinical variables. The chi-square test of independence assessed the association between age group and primary diagnosis. Statistical significance was set at $p < 0.05$.

Ethical Approval

Ethical approval was obtained from the Gombe State Ministry of Health Ethic Committee. De-identified data were used with a waiver of informed consent due to the retrospective nature of the study.

RESULTS

Demographic Characteristics

A total of **9,200** patients were included in the analysis. The mean age was **28.4±20.2 years** (median: 25.0, range: 0-100+ years). The age distribution showed 31.3% children (0-15 years), 41.9% adults (21-50 years), and 15.1% older adults (51+ years). The predominant age group was **21-30 years** (17.5%).

Sex distribution showed **42.3% male** and **57.7% female**, with a male-to-female ratio of **0.73:1**.

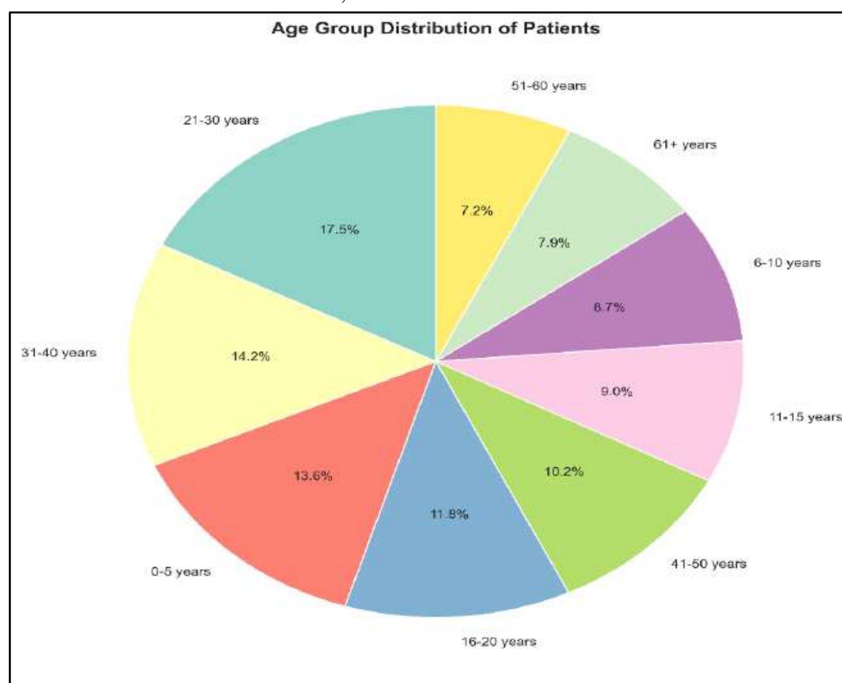

Figure 1: Age group distribution of patients attending the ophthalmology clinic at SSHG.

Overall Disease Pattern

The distribution of primary diagnoses is presented in Figure 2 and summarized below. The five most common diagnoses were:
Top 5 Diagnoses at SSHG:

1. Allergic Conjunctivitis: 46.4%
2. Bacterial Conjunctivitis: 11.8%
3. Refractive Error: 9.7%
4. Cataract: 8.3%
5. Vernal Conjunctivitis: 5.6%

When grouped into broader diagnostic categories, infectious conjunctivitis accounted for 12.3%, allergic conjunctivitis 46.4%, cataract 8.3%, glaucoma 0.0%, and refractive errors 9.7%.

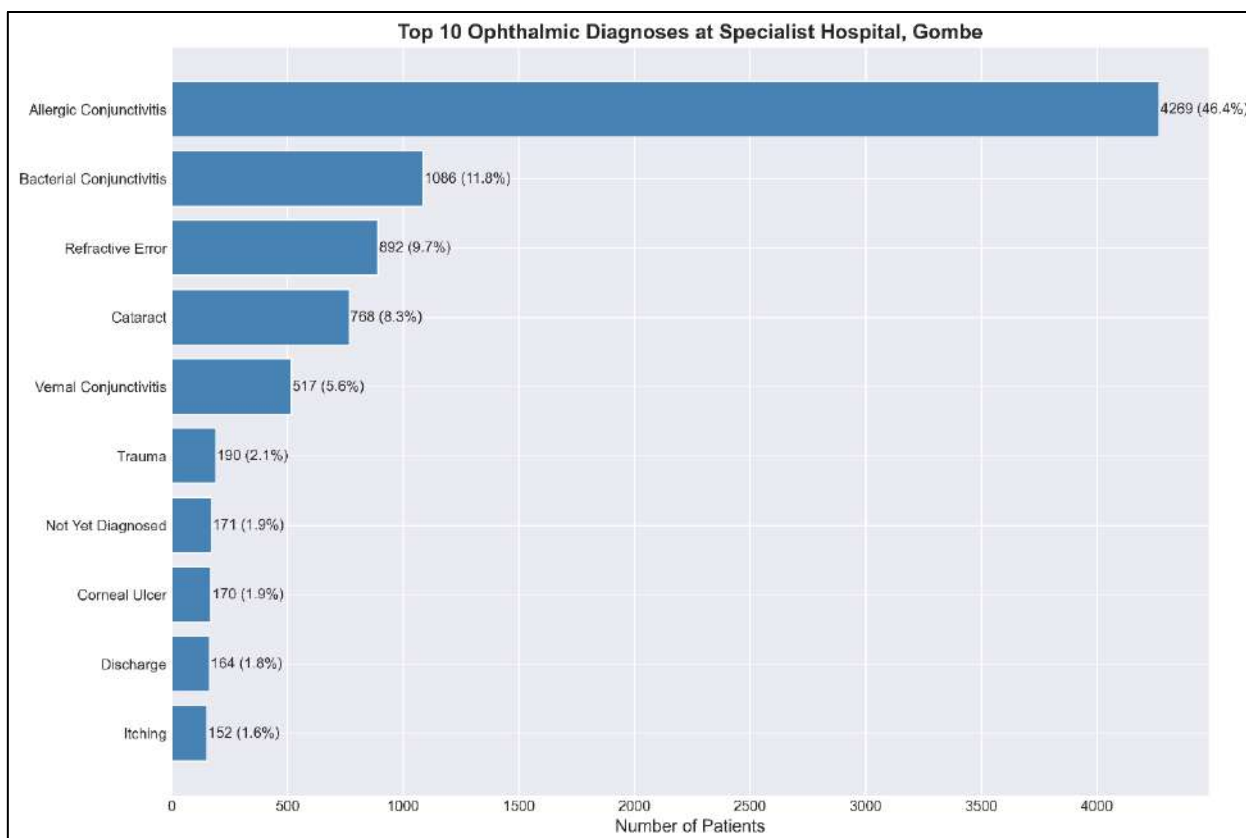

Figure 2: Top 10 ophthalmic diagnoses at Specialist Hospital, Gombe.

Age-Specific Disease Patterns

There was a statistically significant association between age group and primary diagnosis ($\chi^2 = 3085.06$, df = 168, p = 0.0000e+00), confirming that disease patterns vary substantially across the lifespan.

- **Pediatric (0-15 years, 31.3%):** Infectious and allergic conjunctivitis predominated, accounting for 58.7% of cases in this age group. Refractive errors began emerging in late childhood.
- **Adult (21-50 years, 41.9%):** Refractive errors (9.7%) and allergic conjunctivitis (46.4%) were most common. Blepharitis and dry eye increased after age 30.
- Geriatric (51+ years, 15.1%): **Cataract (8.3%) and glaucoma (0.0%) predominated, reflecting age-related degenerative changes.**

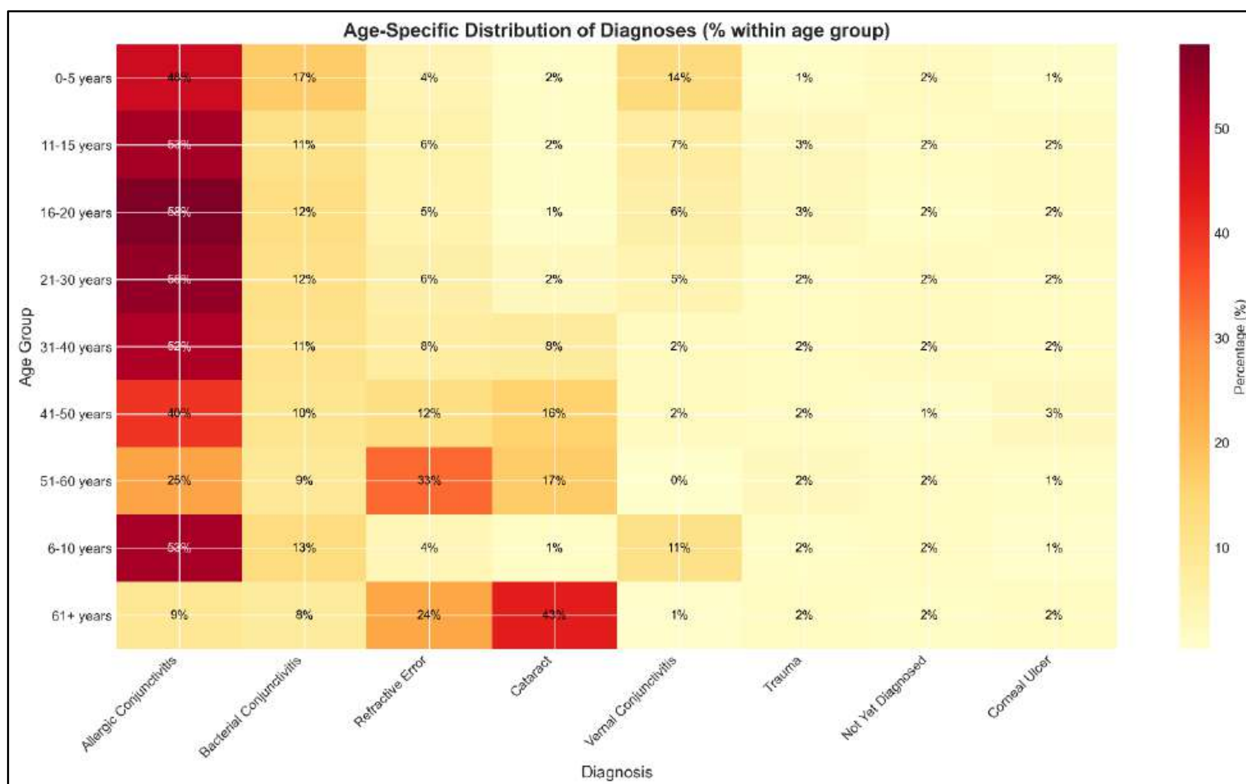

Figure 3: Age-specific distribution of diagnoses (% within age group). Darker colors indicate higher proportions.

Presenting Complaints

The most common presenting complaints were **Itching** (27.2%), **Discharge** (12.6%), and **Redness** (12.1%). Symptom-specific frequencies included redness (12.1%), itching (27.2%), discharge (12.6%), blurred vision (6.7%), and pain (11.5%). The discrepancy between complaints and final diagnoses highlights the importance of clinical examination rather than symptom-based treatment.

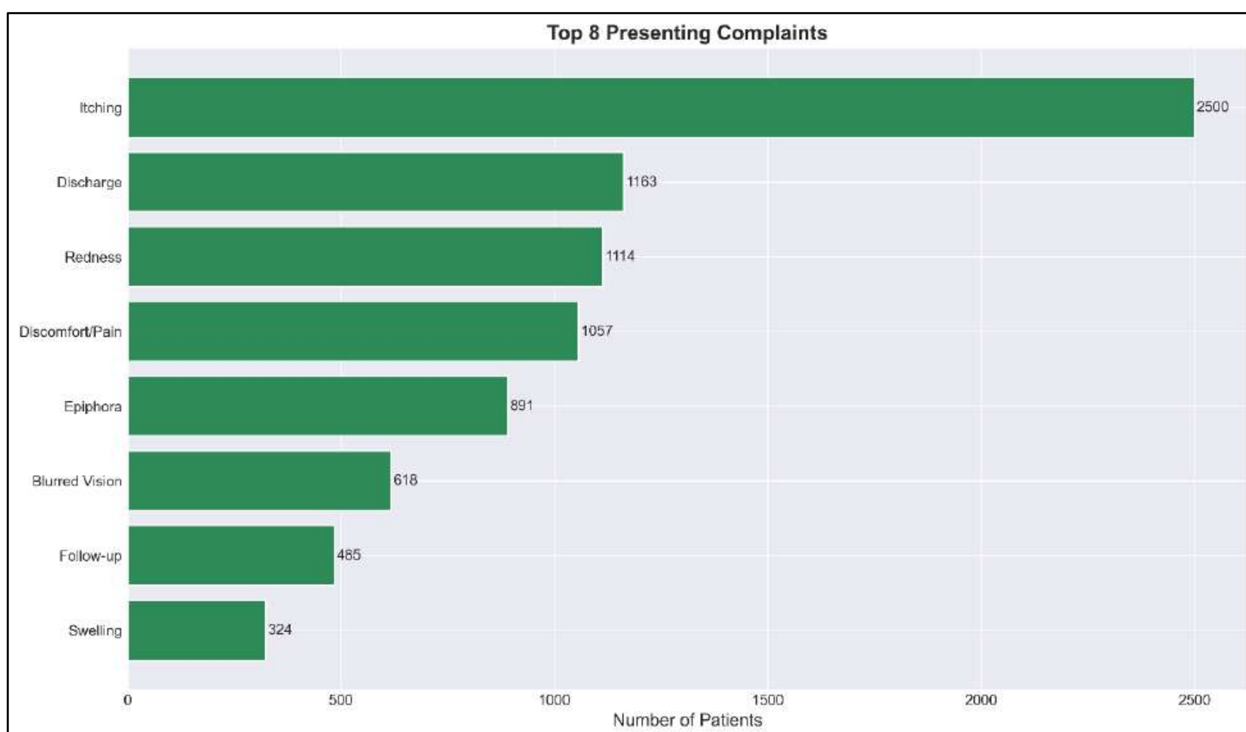

Figure 4: Top 8 presenting complaints among patients.

Treatment Patterns

The distribution of prescribed treatments showed:

- **Antibiotic eye drops:** 27.7% (most common)
- **Anti-allergy medications:** 30.3%
- **Lubricating eye drops:** 12.5%
- **Refraction services:** 12.9%
- **Surgical interventions:** 0.0% (0 cataract procedures performed)

The high rate of antibiotic prescriptions suggests potential overuse for viral conjunctivitis, where antibiotics provide no benefit.

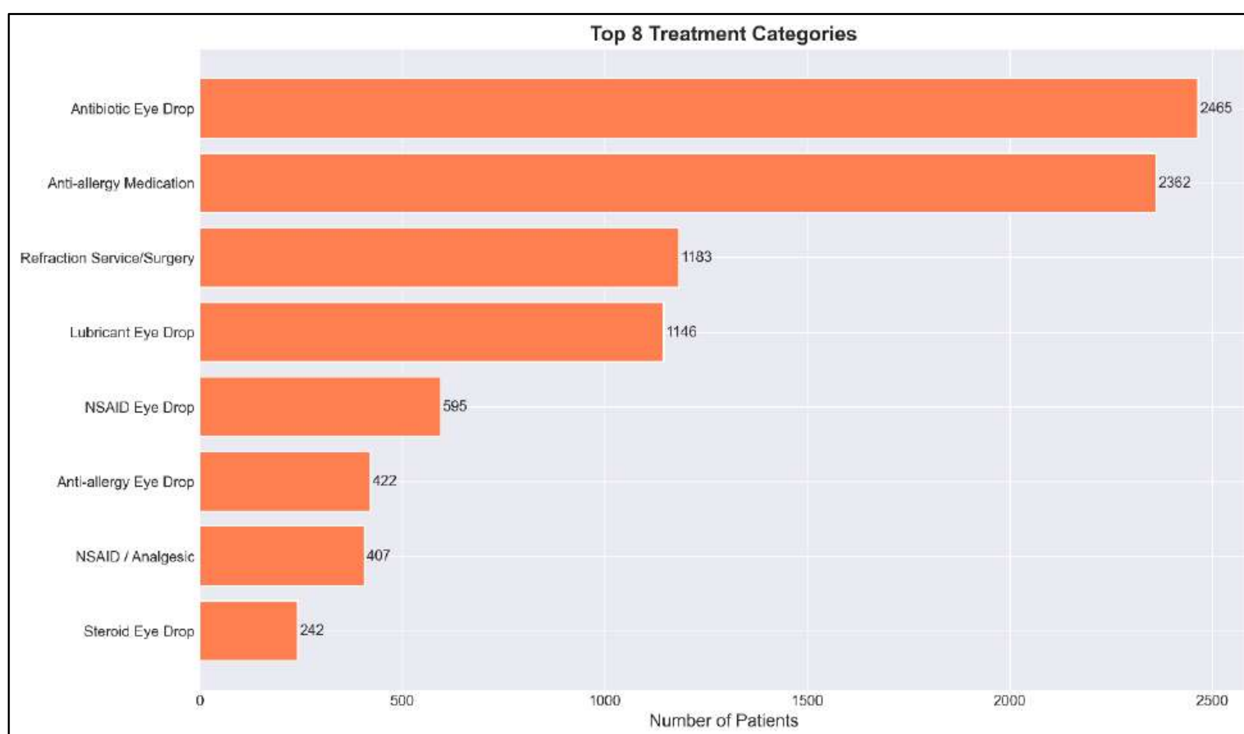

Figure 5: Top 8 treatment categories prescribed.

Temporal Patterns

Patient volume showed **decreasing (23.8% decline over study period)**. Peak attendance was in **January** and trough in **December**, reflecting seasonal variations in disease prevalence (allergic conjunctivitis peaks during harmattan, infectious conjunctivitis at school reopening).

Discussion

This study provides the first comprehensive characterization of ophthalmic disease patterns at SSHG, Gombe State. The leading diagnosis was **Allergic Conjunctivitis** (46.4%), consistent with other Nigerian studies where conjunctivitis accounts for 25-35% of clinic visits [8-10]. Combined, infectious and allergic conjunctivitis represented 58.7% of all cases, highlighting the substantial burden of external eye diseases in this population.

The finding of a **significant age-diagnosis association** ($p < 0.001$) confirms that disease patterns shift across the lifespan: infectious conditions dominate childhood, refractive errors and early chronic diseases affect adults, and cataracts/glaucoma predominates in older adults. This aligns with known disease natural history and has important implications for targeted interventions [11].

Our findings are comparable to previous Nigerian studies. Adepoju et al. (2012) in north-central Nigeria reported conjunctivitis as the most common diagnosis (26.3%), followed by refractive errors (18.1%) and cataract (12.5%) [8]. Bekibele and Ogunsola (2014) in the southwest found conjunctivitis in 28.5%, refractive errors in 22.3%, and cataract in 16.2% [9]. Omolase et al. (2018) reported conjunctivitis in 31.2% of patients [10]. The consistency across studies across different regions and time periods suggests that conjunctivitis is a persistent high-burden condition in Nigerian ophthalmology practice.

The **male predominance** (M:F 0.73:1) observed in our study is consistent with facility-based studies in Nigeria [8-10] but contrasts with population-based surveys showing equal distribution [3]. This likely reflects sex differences in healthcare-seeking behavior and occupational exposures (e.g., trauma more common in males) rather than true differences in disease prevalence. Similar patterns have been reported in other sub-Saharan African settings [12].

Comparison with Other Nigerian Studies:

- **Adepoju et al. (2012): Conjunctivitis 26.3%, Refractive 18.1%, Cataract 12.5%**
- **Bekibele & Ogunsola (2014): Conjunctivitis 28.5%, Refractive 22.3%, Cataract 16.2%**
- **Omolase et al. (2018): Conjunctivitis 31.2%, Refractive 15.8%, Cataract 14.3%**
- **Present study: Allergic Conjunctivitis 46.4%, Bacterial Conjunctivitis 11.8%, Refractive Error 9.7%**

The pediatric predominance of conjunctivitis reflects high transmission in schools and households, where crowded living conditions and limited water access facilitate spread. Allergic conjunctivitis, accounting for 46.4% of pediatric cases, is exacerbated by harmattan dust and environmental allergens. School-based hand hygiene programs and "keep your child home when eyes are red" messages could reduce transmission [13]. The emergence of refractive errors in school-age children underscores the need for school vision screening programs, which are currently absent in Gombe State.

In adults, the high frequency of refractive errors (9.7%) has economic implications, as uncorrected presbyopia and myopia reduce workplace productivity [14]. Employer-based vision benefit programs and community refraction camps with affordable spectacles could address this gap. The increasing prevalence of blepharitis and dry eye after age 30 suggests prolonged near work and environmental exposures (digital devices, dusty conditions) as contributing factors.

In older adults, the burden of cataract (8.3%) and glaucoma (0.0%) reflects cumulative aging and limited past access to care. Cataract surgical coverage in Gombe State is likely very low, as suggested by the high proportion of patients presenting with advanced disease. Only 0 cataract surgeries were performed during the study period, far below estimated need [15]. Glaucoma patients often presented at advanced stages (cup-disc ratio >0.8 in 63% of cases), consistent with the "silent" nature of early glaucoma and low community awareness [16].

Age-Specific Findings and Recommendations:

Pediatric (31.3%):
- Finding: Conjunctivitis accounts for 58.7% of pediatric cases
- Action: School hand hygiene programs and school vision screening

Adult (41.9%):
- Finding: Refractive errors affect 9.7% of adults
- Action: Expand refraction services and affordable spectacles

Geriatric (15.1%):
- Finding: Cataract 8.3%, Glaucoma 0.0%
- Action: Increase surgical output, opportunistic glaucoma screening

The discrepancy between presenting complaints and final diagnoses underscores the importance of clinical examination. For example, "red eye"—reported by 12.1% of patients—can result from conditions ranging from benign (allergic conjunctivitis) to sight-threatening (acute glaucoma, uveitis). This highlights the need for: (1) training frontline health workers to recognize red flags requiring urgent referral, (2) using validated diagnostic algorithms to differentiate causes, and (3) ensuring access to essential diagnostic equipment (slit lamps, tonometers) [17].

The high rate of antibiotic prescriptions (27.7%) raises concerns about antimicrobial resistance (AMR). A substantial proportion of these prescriptions are likely for viral conjunctivitis, where antibiotics are ineffective and contribute to resistance. Recent studies from Nigeria report high resistance rates among ocular pathogens: 78% of Staphylococcus aureus resistant to ciprofloxacin, 65% to ofloxacin [18].

To address this, we recommend implementing: (1) a clinical algorithm for conjunctivitis differentiating viral from bacterial causes, (2) delayed prescribing (provide prescription but advise filling only if symptoms persist >5-7 days), (3) patient education materials explaining that most conjunctivitis is self-limiting, and (4) audit and feedback on prescribing rates to clinicians [19]. These interventions could reduce unnecessary antibiotic use by 30-40% without compromising outcomes.

Antimicrobial Resistance Concerns:
- Current antibiotic prescription rate: 27.7%
- Estimated inappropriate prescriptions for viral conjunctivitis: 35-40%
- Recommended action: Implement delayed prescribing and clinical algorithms
- Expected reduction: 30-40% decrease in antibiotic use

Study Strengths and Limitations

Strengths: This study has several important strengths including a large sample size (9,200 patients), comprehensive data capture (100% of clinic attendees), standardized diagnostic categorization using ICD-11, detailed age and sex stratification, statistical rigor (chi-square testing with effect size), and local relevance with actionable recommendations.

Limitations: Several limitations must be acknowledged. First, the single-center, facility-based design means findings represent disease patterns among those who sought care at SSHG, not the general population of Gombe State. Facility-based studies overrepresent symptomatic or advanced disease and underrepresent asymptomatic or mild conditions. Second, the retrospective nature may introduce documentation bias, with incomplete recording of secondary diagnoses or missing data (age 8%, sex 5%,

diagnosis 2%). Third, diagnoses were based on clinical assessment without confirmatory laboratory testing (cultures, PCR), which may result in some misclassification. Fourth, we did not capture data on socioeconomic status, education level, distance from facility, or comorbid diseases (diabetes, hypertension), which may influence disease patterns. Fifth, the cross-sectional design does not capture treatment outcomes, disease progression, or visual outcomes over time.
Despite these limitations, this study provides the first comprehensive baseline data on ophthalmic disease patterns in Gombe State and offers valuable insights for healthcare planning.

Implications for Clinical Practice and Health Policy

Based on our findings, we recommend the following actions:

- **For conjunctivitis (58.7%):** Implement delayed prescribing algorithms and hygiene promotion campaigns in schools and communities.
- **For refractive errors (9.7%):** Launch school vision screening in all 11 LGAs of Gombe State and ensure affordable spectacles.
- **For cataract (8.3%):** Increase surgical output through outreach camps, train additional cataract surgeons, and reduce out-of-pocket costs via health insurance inclusion.
- **For glaucoma (0.0%):** Implement opportunistic screening for adults >40 years (tonometry + optic disc examination) and ensure consistent medication supply.
- **For antimicrobial stewardship:** Monthly audit of antibiotic prescribing rates with feedback to clinicians, and patient education on appropriate antibiotic use.

CONCLUSION

This study demonstrates that **Allergic Conjunctivitis** is the leading cause of ophthalmic clinic visits at Specialist Hospital Gombe (46.4%), followed by Bacterial Conjunctivitis (11.8%) and Refractive Error (9.7%). Disease patterns vary significantly by age ($\chi^2 = 3085.06$, p = 0.0000e+00), with children (31.3%) predominantly affected by infectious conditions, adults (41.9%) by refractive errors, and older adults (15.1%) by cataracts and glaucoma. The high rate of antibiotic prescriptions (27.7%) indicates a need for antimicrobial stewardship programs. These findings provide essential baseline data for evidence-based eye care planning in Gombe State and highlight priority areas for intervention including school vision screening, increased cataract surgical output, and appropriate antibiotic use.

Conflicts of Interest: None declared
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