

Impact of Mass Azithromycin Administration on Trachoma Elimination

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INTRODUCTION

Trachoma is a chronic ocular infection caused by Chlamydia trachomatis and remains concentrated in low-socioeconomic settings (LSES). The WHO SAFE strategy underpins global control efforts, with azithromycin playing a key role; however, implementation in resource-limited regions is often hindered by infrastructure, logistical constraints, and community resistance. Understanding how these barriers influence treatment uptake and long-term disease control is critical to achieving the WHO targets for global trachoma elimination.

This review aimed to evaluate the impact of azithromycin mass drug administration (MDA) on trachoma control and identify implementation barriers.



Figure 1. Trachomatous inflammation—follicular (TF): ≥ 5 pale follicles (≥ 0.5 mm) on the upper tarsal conjunctiva, indicating active trachoma (International Trachoma Initiative, 2024).

RESULTS

Across the eight included studies, repeated azithromycin MDA led to substantial reductions in trachoma across several endemic regions. In multiple districts of Ethiopia, prevalence fell from high baseline levels to below elimination thresholds after consecutive annual MDA cycles. Similar declines were reported in other East African regions, with some areas achieving reductions of up to 70% in active trachoma signs following coordinated administration. Reviews examining ocular infection trends also showed consistent decreases, emphasising the importance of repeated rounds and continued surveillance to maintain low transmission levels. As shown in Figure 2, more frequent and sustained azithromycin MDA is associated with lower follow-up TF prevalence, particularly in high-burden settings, with 3–5 years of annual treatment achieving the greatest reductions compared to single or less consistent strategies.

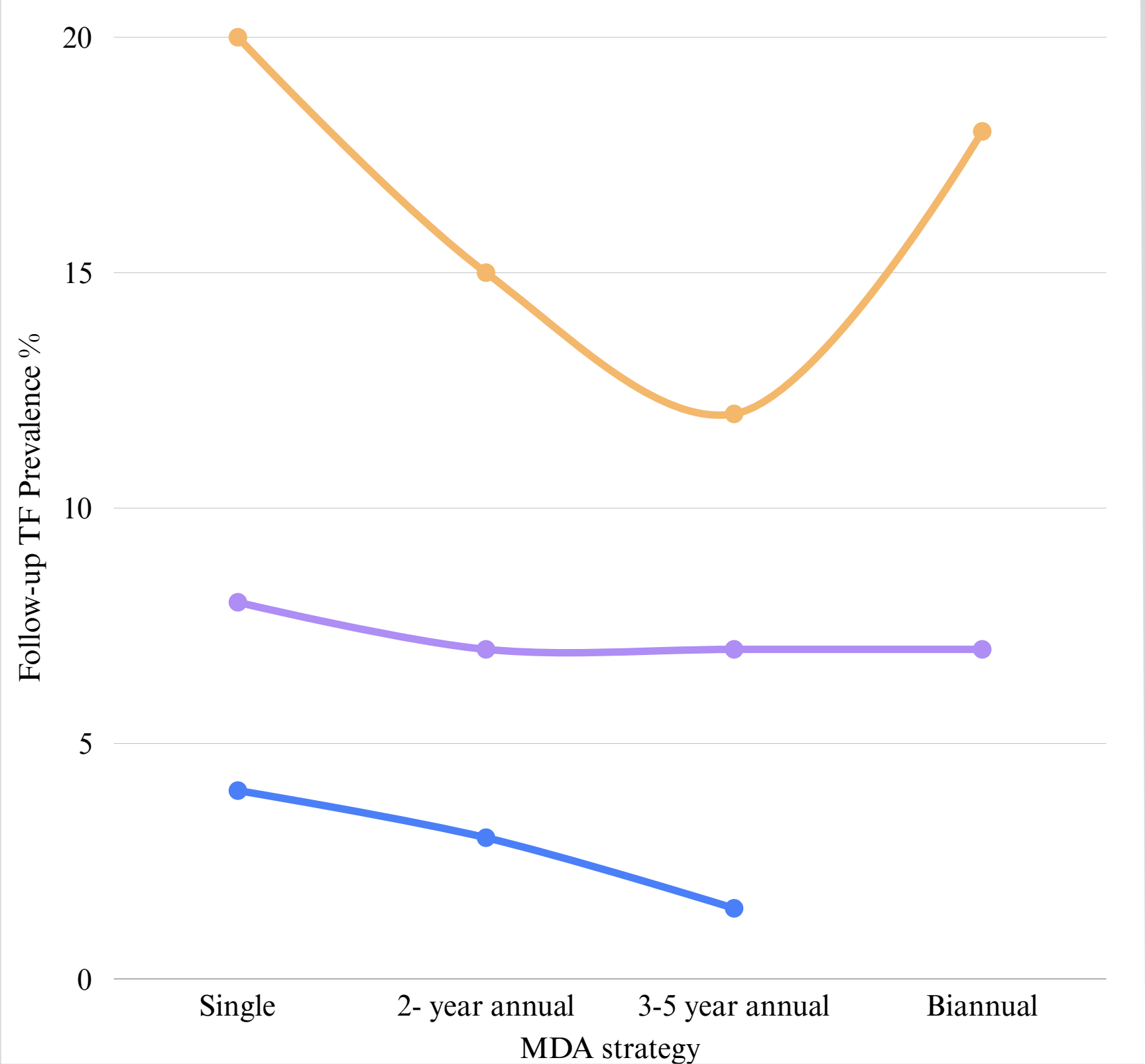


Figure 2. Effects of Azithromycin MDA Strategy on TF Prevalence by Baseline Severity. More sustained MDA strategies were associated with lower follow-up TF prevalence, particularly in high-burden settings. Values represent aggregated ranges across studies and are not pooled estimates. Created by *B. Halabi*.

SIGNIFICANCE AND GLOBAL BURDEN

SIGNIFICANCE, Why is it important?

Trachoma is the leading infectious cause of blindness worldwide, primarily affecting populations in low-socioeconomic settings with limited access to healthcare and sanitation. Repeated infection leads to scarring, trichiasis, and irreversible vision loss. Although azithromycin MDA under the WHO SAFE strategy reduces prevalence, its success depends on adequate coverage and addressing barriers to implementation.

GLOBAL BURDEN, How important is it?

Trachoma continues to affect millions globally, particularly in sub-Saharan Africa and other resource-limited regions. While repeated MDA can reduce prevalence by up to 70%, inconsistent coverage due to geographic and socio-economic barriers limits progress towards elimination. Sustainable control therefore requires both antibiotic treatment and improvements in infrastructure, education, and community engagement.

BARRIERS

However, several recurring barriers affected implementation. Participation was notably higher among individuals with greater education and health literacy.

Geographic isolation, difficult terrain, and limited transportation infrastructure restricted access to remote communities. In some regions, mistrust of health teams limited uptake, though culturally tailored communication using trusted local messengers improved acceptance.

Persistent deficiencies in water, sanitation, and hygiene (WASH) infrastructure also reduced the long-term sustainability of MDA outcomes. Socio-economic challenges, including poverty and limited community resources, further contributed to inconsistent coverage.

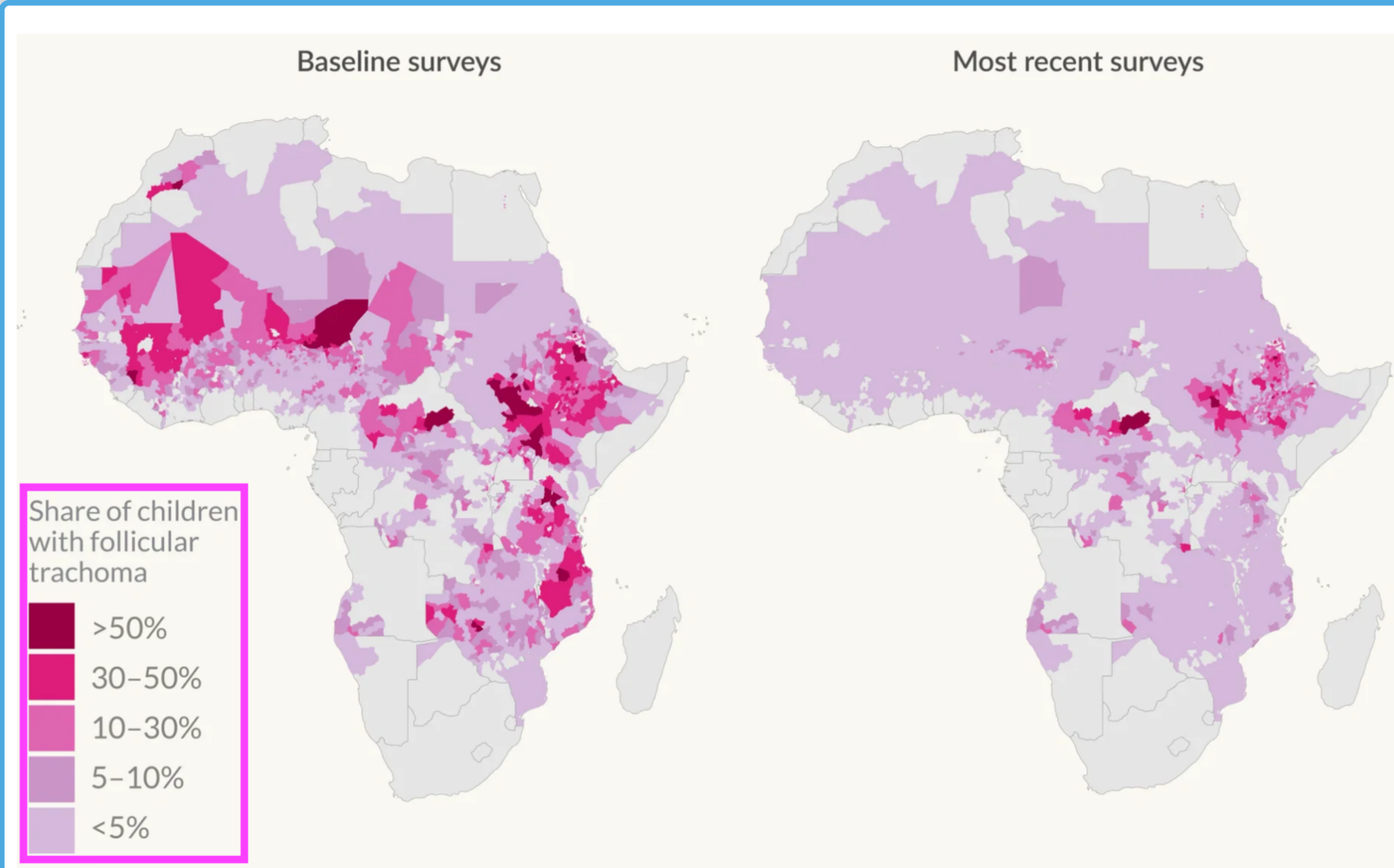


Figure 3. Prevalence of follicular trachoma among children aged 1–9 years across Africa, comparing baseline (1996–2021) and most recent surveys. Adapted from Our World in Data: Mapping the Decline of Trachoma (Renneker et al., 2022; The Lancet Global Health).

METHODOLOGY

A structured review was conducted using the PICO framework to evaluate the impact of azithromycin MDA on trachoma prevalence in high-risk communities. Searches were performed in PubMed and Scopus for studies published between 2018 and 2025, with inclusion of peer-reviewed field studies, clinical trials, and implementation analyses reporting post-MDA outcomes, and data were extracted and synthesised narratively. The PICO criteria was as follows...

- **Population:** Communities with high trachoma prevalence.
- **Intervention:** MDA of azithromycin under the SAFE strategy.
- **Comparison:** Communities receiving standard care or no mass administration.
- **Outcome:** Reduction in trachoma prevalence

Table 1. Inclusion and Exclusion Criteria (PICO Framework)

Topic	Inclusion	Exclusion
Population	Communities with high trachoma prevalence	Low-prevalence or non-endemic communities
Intervention	Mass drug administration (MDA) of azithromycin under the SAFE strategy	Non-MDA interventions only
Comparison	Standard care or no mass drug administration	Studies without a comparison group
Outcome	Reduction in trachoma prevalence	Outcomes not reporting prevalence changes

Table 2. Search Strategy (PICO Keywords and Synonyms)

PICO	Population	Intervention	Comparison	Outcome
Keyword	Trachoma / endemic communities	Azithromycin / MDA / SAFE strategy	Standard care / no MDA	Prevalence
Synonym	High-burden populations	Mass drug administration	Routine care	Disease reduction
Synonym	Affected communities	Antibiotic distribution programmes	Untreated communities	Decreased trachoma rates

CONCLUSION

Azithromycin MDA is highly effective in reducing trachoma prevalence, but sustainable elimination depends on overcoming implementation barriers. Strengthening WASH, improving health education, and building community trust are essential to support long-term success alongside antibiotic-based interventions. However, long-term elimination requires coordinated, sustained, and community-centred public health strategies, which will ensure durable reductions and prevent disease resurgence. Future efforts should prioritise integrated surveillance systems and local capacity-building to maintain gains and rapidly respond to re-emerging transmission.

REFERENCES

- Mengistu C, Jimenez D, Kebede D, Bai F, Tadese F, Kebede G, et al. Prevalence of trachoma after three rounds of antibiotic mass drug administration in 13 woredas of Gambella Region, Ethiopia. *Ophthalmic Epidemiol*. 2024;31(6):568–576.
- Feyisa T, Bekale D, Tura B, Aden A, Nugusa F. To eliminate trachoma: Azithromycin mass drug administration coverage and associated factors among adults in Goro district, Southeast Ethiopia. *PLoS Negl Trop Dis*. 2022;16(5):e0010069.
- Nash SD, Cherret A, Moncada J, Stewart AEP, Astale T, Saita E, et al. Ocular Chlamydia trachomatis infection and infectious load among pre-school aged children within trachoma hyperendemic districts receiving the SAFE strategy, Amhara region, Ethiopia. *PLoS Negl Trop Dis*. 2020;14(5):e0008226.
- Nash SD, Stewart AEP, Zerihun M, Saita E, Gieseke D, Medak B, et al. Ocular Chlamydia trachomatis infection under the SAFE strategy in Amhara, Ethiopia, 2011–2015. *Clin Infect Dis*. 2018;67(12):1840–1846.
- Sanders AM, Abdulla Z, Elshafie BE, Elanosi M, Nute AW, Aziz N, et al. Progress toward elimination of trachoma as a public health problem in seven localities in Sudan. *Am J Trop Med Hyg*. 2019;101(6):1286–1302.
- Trujillo-Trujillo J, Zamora SM, Bernal Lizarazu MC, Torres Perez ML, Bellido Cuellar OE, Araque CV, et al. Access barriers and facilitators to implement mass drug administration strategies for eliminating trachoma and onchocerciasis in Amazonas, Colombia. *PLoS One*. 2024;19(2):e0301043.
- Xiong T, Yue Y, Li W, Chonora I, Qazi S, Chen HJ, et al. Effectiveness of azithromycin mass drug administration on trachoma: a systematic review. *Chin Med J (Engl)*. 2021;134(24):2944–2953.
- Our World in Data. Mapping the Decline of Trachoma. Available at: <https://ourworldindata.org/trachoma> (accessed April 2026).
- International Trachoma Initiative. About Trachoma. Available at: <https://www.trachoma.org/about-trachoma> (accessed April 2026).

The reviewed studies jointly highlight that while azithromycin is highly effective in reducing trachoma prevalence when integrated within the WHO SAFE framework, multiple challenges arise in applying treatment guidelines to reach sustainable elimination. In Ethiopia, despite high reductions, resistance to participation and inadequate sanitation limited success. In addition, previous infection data were absent prior to the administration of MDA, which limited measurement accuracy. In Sudan, socio-economic barriers and poor access to remote areas hindered universal coverage, posing challenges in comparing prevalence across different localities. Similarly, one review study emphasised that repeated interventions were necessary to maintain low infection rates, indicating persistent reintroduction of infection in high-risk communities. Therefore, the effectiveness of azithromycin MDA appeared to be closely linked to baseline prevalence patterns, as global 2020 goals of WHO for eradication were not met.

A consistent theme across all studies is the mutual reliance between medical intervention and socio-environmental reform. Antibiotic administration alone cannot eradicate trachoma without parallel improvements in clean water supply, sanitation, and community engagement. Moreover, higher education levels and better awareness were linked to substantially greater participation, approximately 2–7 times higher, in treatment campaigns. Thus, transparent communication delivered through native speakers trusted by the community, about drug safety, is vital to counter misinformation and improve participation.