THERAPEUTIC ADVANCES in
Reproductive Health

Original Research

Chlamydia trachomatis infections in Kenya – sexually transmitted and ocular infections: a scoping review

Ther Adv Reprod Health

2024, Vol. 18: 1–13

DOI: 10.1177/26334941241305825

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Abstract

Background: *Chlamydia trachomatis* (CT), a Gram-negative intracellular bacterium, is differentiated into three biovars associated with distinct clinical syndromes, ranging from trachoma, the world's cause of preventable blindness, to the most common sexually transmitted infection. This variability underscores CT's significant impact on public health, particularly in low-resource settings. In Kenya, where the demographic is predominantly younger, the burden of CT remains poorly understood and potentially underestimated.

Objectives: This study aimed to assess the prevalence of both sexually transmitted and ocular CT across various regions and populations within Kenya.

Eligibility criteria: Articles on CT population testing and laboratory detection, from 2014 to date, in English or Swahili only.

Sources of evidence: Electronic databases of PubMed and Google Scholar were used.

Design: A scoping review.

Charting methods: This study conducted a systematic scoping review, following Arksey and O'Malley's framework and adhering to PRISMA guidelines for scoping reviews (PRISMA-ScR).

Results: This study incorporates findings from 19 original studies on sexually transmitted CT and seven on ocular CT. CT prevalence for four identified populations: sexually active females 2%–13%, men who have sex with men 1.3%–51%, pregnant women 2.5%–14.9% and other population groups 2.8%–16.4%. By contrast, studies on ocular CT, all performed in rural settings, found prevalence surpassing the WHO's 10% threshold primarily amongst children and mothers.

Conclusion: The variability in CT prevalence across different demographics and geographical regions emphasizes the impact of socio-economic, environmental and diagnostic factors on disease transmission and detection. The insights gained here can serve as a foundation for evidence-based health policies and interventions aimed at mitigating the burden of CT in Kenya.

Keywords: chlamydia, diagnostics, epidemiology, Kenya, sexually transmitted infections, trachoma

Received: 30 April 2024; revised manuscript accepted: 21 November 2024.

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Introduction

Chlamydia trachomatis (CT), a Gram-negative, obligate intracellular bacterium, is differentiated into three biovars, subdivided into serovars, each linked to a distinct clinical spectrum. Serovars A to C are primarily associated with trachoma, the major cause of preventable blindness.[1] Serovars D to K are known for causing the most common bacterial sexually transmitted infections (STIs) worldwide, leading to severe female reproductive sequelae. The lymphogranuloma venereum (LGV) biovar encompassing the serovars L1 to L3 leads to invasive urogenital and anorectal infections.[2]

Table 1. The following terms and Boolean operators were used to screen for articles.

Sexually transmitted chlamydia	Ocular chlamydia
'Chlamydia trachomatis'[Title/Abstract] OR 'C. trachomatis'[Title/Abstract] OR 'Chlamydia'[Title/Abstract] OR 'genital Chlamydia'[Title/Abstract]) AND 'Kenya'[Title/Abstract] AND 'prevalence'[Title/Abstract]	'Ocular Chlamydia'[Title/Abstract] OR 'trachoma'[Title/Abstract]) AND 'Kenya'[Title/Abstract] AND 'prevalence'[Title/Abstract]

Although infections are relatively easily treatable with antibiotics, they largely remain asymptomatic, leading to treatment delays. If untreated, urogenital CT can lead to severe reproductive health issues such as pelvic inflammatory disease, ectopic pregnancy, tubal infertility in women and epididymitis in men.[3] Ocular infection can cause trachomatous trichiasis, where scarring of the inner surface of the eyelids can lead to impairment of vision or blindness.[4] Finally, the LGV biovar is the most virulent and invasive.[5]

Timely identification and accurate diagnosis of CT are critical for public health, especially in lower-income countries (LMICs) and resource-limited settings, where the epidemiology of STIs like CT remains poorly understood. Political and sociocultural factors in these regions often place STIs low on the public health agenda, resulting in inadequate surveillance and limited sexual health programs, despite the possibility of significant, yet undisclosed, disease burdens.[6] The largely asymptomatic nature of CT underscores the need for evidence-based guidelines to implement targeted screening programs.[3] Focusing on identifying high-risk groups such as sexually active adults, men who have sex with men (MSM) and pregnant women for chlamydial infections is therefore crucial, particularly in low- and middle-income countries where healthcare resources are stretched thin.[7]

Kenya, a country located in East Africa, with 54 million inhabitants, has a predominantly younger demographic with over 80% of the population currently under the age of 35.[8] In regard to sexual and reproductive health, there is a significant lack of awareness about STIs, other than HIV.[9] Public and media health campaigns seldom address other STIs or their link to reproductive issues such as infertility, which remains a health issue with the country's sub-fertility rate standing at 26.1%, predominantly due to tubal factor infertility.[9] Moreover, trachoma is endemic in Kenya's remote, arid regions, where several contributing factors exacerbate its prevalence. These include extreme poverty, scarce clean water, dusty environments, long travel times for healthcare and limited access to health information.[9]

Furthermore, the prevalence of CT and its burden among different risk groups in Kenya remain understudied.[10] This issue is compounded by the lack of insights on the strategies for diagnosis and management of CT in Kenyan healthcare settings.[11] This study aims to fill this gap by reviewing existing literature to assess the burden of both sexually transmitted and ocular CT across various regions and patient groups in Kenya. Our review will first focus on establishing the prevalence of the disease among different patient groups throughout the different regions of the country. Given that CT is the most common STI in the region,[12] this study underscores the significant public health burden of CT and emphasizes the urgent need for targeted interventions. It synthesizes research drawn from diverse geographic regions within the country. This data will help inform the development of best practices and potential evidence-based guidelines for the management of CT.

Materials and methods

This study utilized a comprehensive systematic scoping review, adhering to the framework outlined by Arksey and O'Malley,[13] which guided the research through five distinct stages. Furthermore, the review strictly followed the PRISMA guidelines for scoping reviews (PRISMA-ScR)[14] to ensure methodological rigor and transparency in the research process. A PRISMA guideline and checklist is included is also included as a Supplemental File.[14]

Identifying relevant studies

Extensive literature searches were conducted across multiple databases, primarily focusing on electronic sources to gather relevant articles. To achieve comprehensive coverage and minimize potential gaps, a combination of databases including PubMed and Google Scholar was used (Table 1). Specifically, Google Scholar was employed to search for publications not indexed in traditional databases.

Study selection

The titles and abstracts of all the references were carefully examined to efficiently manage the screening process and eliminate duplicates. This initial screening identified potentially relevant articles for further full-text reviews, aligned with the research question. Articles selected for full-text review were individually assessed by the authors to determine their alignment with the inclusion criteria. To ensure the identification of relevant studies, 'reverse snowballing' was used.[15] Given the scarcity of consistent data from Kenya, the literature search was expanded to encompass all patient groups at increased risk of infection or complications from CT.

Inclusion criteria for this review were as follows:	Exclusion criteria for this review are as follows:
• Articles must include population testing and describe laboratory techniques for detecting CT or typing of confirmed positive samples • The review focused on articles published from 2014 onwards to capture recent trends and developments in CT • Only articles published in English and Swahili were considered	• No population-level data • Geographical location does not focus on Kenya • Laboratory protocols • Serology and microscopy were used to assess the prevalence • Basic science analysis of established samples • Policy papers • Conference proceedings reporting CT prevalence

Charting the data

Data extracted from the full-text articles were systematically organized and recorded in a chart. This included key details such as the study title, evaluation location, study population and size, testing method, samples tested and prevalence rates. These categories were initially determined and subsequently refined throughout the review process to ensure data capture.

Results

The combined literature search yielded a total of 24 unique articles, with 17 articles focusing on sexually transmitted CT and 7 articles focusing on ocular CT; the details of the inclusion are summarized in Figure 1.

The literature review yielded that studies originated from diverse geographic locations across Kenya, with a focus on populous areas reflecting the country's high population density. Notably, a significant number of studies were conducted in Nairobi, the capital city, accounting for six studies, and Kisumu, the third largest city, with five studies. Regarding studies on sexually transmitted CT, a substantial 76% (13 out of 17) were carried out in urban settings. By contrast, all studies examining ocular CT were conducted in rural environments. The distribution of study locations and their respective populations are detailed in Figure 2.

Sexually transmitted CT

Each study was assessed by its setting, study population, testing method, samples tested and CT prevalence. This section is subdivided based on distinct patient groups, as some were consistently recognizable and could be aggregated for analysis. A total of four patient groups could be identified as listed below

1. Sexually active females (SAF) recruited from medical centres or the general populace: 8 studies
2. MSM: 4 studies
3. Pregnant women: 3 studies
4. Other: 2 studies.

Sexually active females. This review identified SAF as the most common patient population, identifying eight pertinent studies, which are detailed in Table 2. These studies largely took place in urban environments ($n=7$), with the capital Nairobi being the central location for most of the research. The prevalence of CT was found to vary. The lowest prevalence, 2%,[18] was noted in Nairobi among SAF attending a reproductive health clinic at Kenyatta National Hospital, where nucleic acid amplification tests (NAATs) were conducted on endocervical samples. Conversely, the highest prevalence, 13%,[19] was found at a family planning clinic in Nairobi, where NAAT testing of endocervical samples was similarly employed. Notably, all but one of these studies used a consistent methodology involving NAAT, and six studies conducted tests on endocervical samples.

Men who have sex with men. Among the four studies reviewed, focusing specifically on MSM,

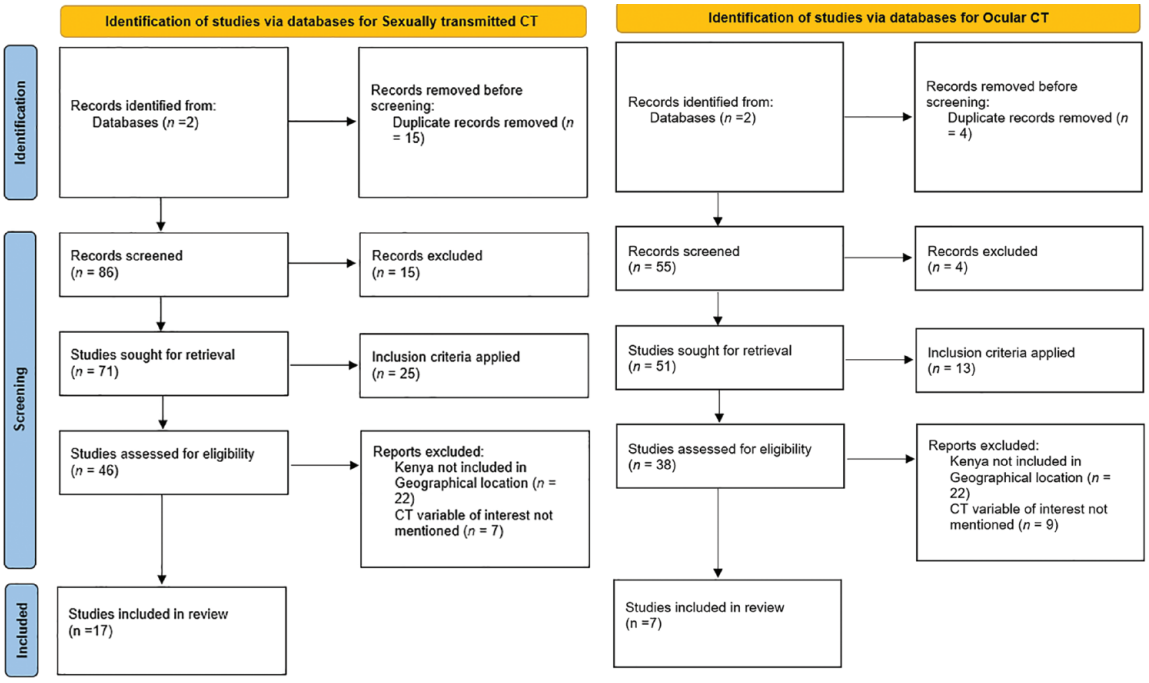

Figure 1. PRISMA-ScR flow diagram of the Literature Selection process.[16]
PRISMA-ScR, PRISMA guidelines for scoping reviews.

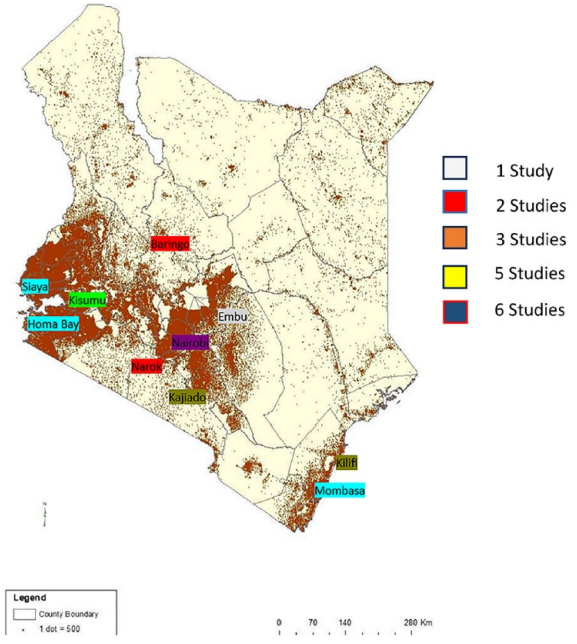

Figure 2. Geographical distribution of studies and population densities of the respective regions.[17]
Source: Permission to publish the map has been granted.

the prevalence of CT infection varied significantly. The lowest prevalence was observed at 1.3%[23] in Kisumu, Kenya's third largest city, where NAAT was used to test rectal swabs for anorectal CT. By contrast, the highest rate recorded was 51%,[24] utilizing NAAT to test urine, rectal and oropharyngeal swabs. This study pooled participants from universities and colleges in Nairobi. All the studies included in this review consistently tested rectal samples. These findings are detailed in Table 3.

Pregnant women. This review identified three studies that focused on pregnant women in smaller, non-urban towns, revealing a range of CT prevalence. The lowest prevalence, 2.5%,[27] was observed in Baringo, a rural county characterized by high poverty levels and a predominantly youthful population.[28] Here it was found that younger, unmarried women in new relationships were most likely to test positive for CT. On the other hand, the highest rate, 14.9%,[29] was recorded in Kilifi, one of Kenya's poorest counties. Here, CT was more prevalent among participants who were 24 years or younger, had fewer than three children, initiated sexual activity at 17 years or younger, used water for personal hygiene after using the toilet or had a genital ulcer or bacterial vaginosis. All studies utilized NAAT to diagnose CT, testing

Table 2. CT prevalence among sexually active females.

Citation	Location	Study population	Testing method	Samples tested	CT prevalence (%)
Nyakambi et al.[11]	Kisumu	SAF hospital attendees ($n=385$)	Rapid diagnostic test kit (Chinese commercial device)	Endocervical samples	7.5
Maina et al.[19]	Nairobi	SAF at the family planning clinic ($n=249$)	NAAT (GenoQuick CT)	Endocervical samples	13
Nzioka et al.[18]	Nairobi	SAF attending the reproductive clinic ($n=197$)	NAAT (Qiagen CT kit)	Endocervical samples	2
Lockhart et al.[38]	Nairobi	FSW attending clinic for follow-up of 2 years. ($n=348$)	NAAT (APTIMA COMBO2 assay)	Cervical samples	3.7
Kerubo et al.[20]	Siaya county	Young SAF living in rural communities ($n=510$)	NAAT (in-house)	Endocervical samples	3
Masese et al.[21]	Mombasa	SAF attending higher education ($n=451$)	NAAT (Hologic Aptima Detection System)	Urine samples	3.6
Oliver et al.[22]	Kisumu	General populace SAF using contraceptive intravaginal ring ($n=457$)	NAAT (COBAS AMPICLOR/COBAS)	Endocervical samples	4.6
Yuh et al.[12]	Nairobi	General populace SAF and girls with limited sexual experience ($n=373$)	NAAT (Gen-Probe APTIMA test)	Endocervical samples	11

CT, *Chlamydia trachomatis*; FSW, female sex worker; NAAT, nucleic acid amplification test; SAF, sexually active females.

Table 3. CT prevalence among MSM.

Citation	Location	Study population	Testing method	Samples tested	CT prevalence
Ngetsa et al.[25]	Kilifi	Clinic attendees who are MSM ($n=104$) at baseline Follow-up ($n=81$) after 6 months	NAAT (GeneXpert® CT/NG Assay)	Rectal swabs	13.5% (baseline) 14.8% (follow-up)
Otieno et al.[26]	Kisumu	General population MSM ($n=619$) at baseline Follow-up ($n=536$) after 6 months Follow-up ($n=564$) after 12 months	NAAT (Cobas Amplicor)	Urine samples and rectal swabs	9.9% (baseline) 5.6% (follow-up 6 months) 7.8% (follow-up 12 months)
Quilter et al.[23]	Kisumu	General population MSM ($n=698$)	NAAT (Abbott M2000 Realtime)	Rectal swabs	1.3%
Mwaniki et al.[24]	Nairobi	MSM ($n=248$) among tertiary students	NAAT (Rotor-Gene Q Thermocycler)	Urine, rectal and oropharyngeal swabs	51%

CT, *Chlamydia trachomatis*; MSM, men who have sex with men; NAAT, nucleic acid amplification test.

Table 4. CT prevalence among pregnant women.

Citation	Location	Study population	Testing method	Samples tested	CT prevalence (%)
Unger et al.[30]	Western Kenya (Nyanza County)	Pregnant and postpartum women ($n = 51$) for follow-up of 9 months	NAAT (APTIMA Combo 2 Assay)	Endocervical samples	12
Masha et al.[29]	Kilifi	Pregnant women ($n = 202$)	NAAT (GeneXpert® CT/NG Assay)	Urine samples	14.9
Mogaka et al.[27]	Baringo County	HIV-negative pregnant women ($n = 1276$)	NAAT (APTIMA Combo 2 Assay)	Endocervical samples	2.5

CT, *Chlamydia trachomatis*; NAAT, nucleic acid amplification test.

Table 5. CT prevalence among other study populations.

Citation	Location	Study population	Testing method	Samples tested	CT prevalence (%)
Otieno et al.[31]	Kisumu	Sexually active healthy adults ($n = 846$)	PCR (COBAS® AMPLICOR) NAAT	Endocervical and urine samples	2.8
Mulakoli[32]	Nairobi	General medical clinic attendees ($n = 1228$)	PCR (in-house) NAAT	Urine samples	16

CT, *Chlamydia trachomatis*; NAAT, nucleic acid amplification test.

either endocervical or urine samples. The findings are detailed in Table 4.

Other population groups. The studies, detailed in Table 5, investigated different populations. The 2015 study by Otieno et al.[31] assessed healthy adults in Kisumu, utilizing NAAT on endocervical and urine samples. They reported a CT prevalence of 2.8%. The majority of participants who tested positive for a sexually transmitted disease (STD) were divorced, widowed or separated women. The study by Mulakoli,[32] which examined general hospital attendees in Nairobi using NAAT on urine samples, found a CT prevalence of 16% within the population. Notably, a majority of those tested were men (63.6%), who also showed a higher prevalence of CT compared to women.

Ocular CT

The review included seven studies that investigated the prevalence of ocular CT. These studies, detailed in Table 6, were conducted in settings ranging from small non-urban towns to rural communities. Notably, the lowest prevalence of ocular CT, under 0.2%,[1] was recorded in two studies: one surveyed individuals aged 15 and older in Kajiado County, involving 46,203 participants, while the other focused on a similar age group in Embu and Kitui Counties,[4] examining 18,987 individuals. Chweya et al. (2024) reported a 53% prevalence of clinical trachoma among a rural pastoralist community in the arid region of Kajiado County.[33] Their methodology differed from other studies by not testing for CT but for trachoma.

In studies by Ilako et al.[1] and others published in 2023,[4] a consistent methodology was applied. Firstly, area segmentation with surveys was carried out. Followed by a two-stage cluster selection method, where villages were systematically selected from each area based on the probability of the population size of the village. The second stage involves selecting households by compact

Table 6. Trachoma prevalence.

Citation	Location	Study population	Testing method	Prevalence (%)
Ilako et al.[1]	Kajiado County	Children aged 1–9 (n = 70,143) and aged ⩾15 (n = 46,203) from 2017 to 2019	Cluster sampling, clinical examination and questionnaires	⩾5 (1–9 years) ⩾0.2 (⩾15 years)
Ilako et al.[4]	Central Kenya (Embu and Kitui)	Individuals aged ⩾15 years (n = 18,987)	Cluster sampling, clinical examination and questionnaires	⩾0.2
Wangui et al.[35]	Baringo County	Rural communities (n = 405)	NAAT of eye swabs	14.1
Karimurio et al.[36]	Narok County	Children aged 1–9 years (n = 1348)	Sequential sampling, clinic examination and questionnaires	30.5
Nasieku al.[37]	Kajiado County	Mothers and their children aged 1–9 years (n = 345)	Sequential sampling, clinic examination and questionnaires	15.7
Celestine et al.[38]	Narok County	Children aged 1–9 years (n = 157)	Cluster sampling and questionnaires	27

NAAT, nucleic acid amplification tests.

segment sampling. Eligible participants were examined for signs of trachoma using a WHO simplified trachoma grading system.[34] Lastly, questionnaires were employed to gather information from each household.

Discussion

This review provides the first overview of CT prevalence in Kenya, examining both sexually transmitted and ocular forms of the infection. This study reviewed 19 unique studies on sexually transmitted CT and seven studies focusing on ocular CT. Findings from sexually transmitted CT are categorized across various demographics, including SAF, MSM, pregnant women and broader groups residing in both urban and rural settings. It was found that younger, sexually active individuals, particularly those who are uninformed and live in urban centres or tourism-heavy areas, are at a higher risk of contracting CT. By contrast, ocular CT primarily affects children and mothers in rural, non-urban settings.

These studies highlight variations in CT prevalence rates, likely reflecting differences in testing locations, population characteristics and diagnostic methods. These findings not only point out notable disparities influenced by demographic and geographic factors but also establish a critical foundation for understanding the epidemiology of CT in Kenya, which is essential for developing effective health policies and interventions.

Sexually active females

It was noted that the prevalence of CT varied across the first population group of SAF, sampled from either clinical settings or the general populace. This variation could be attributed to differences in geographical location, age and population risk characteristics. Notably, studies consistently highlight that women who had multiple sexual partners[11] in the preceding months exhibited a higher prevalence of CT compared to those with fewer or no partners. This reveals the importance of identifying high-risk behaviours among key populations. Raising youth and adolescents' awareness of STIs including CT is therefore of prime importance.[11]

One surprising finding by Lockhart et al.[39] was a relatively low prevalence of CT among female sex

workers (FSW) in Nairobi, despite their high vulnerability and exposure to STIs. This observation aligns with findings from a review in sub-Saharan Africa,[40] which reported a chlamydia prevalence of only 5.5% among FSWs in clinic settings. The low rates may be attributed to the FSWs' experiential knowledge about STIs and the successful efforts of civil society organizations on empowerment and promoting prevention strategies.[41] Additionally, selection bias may have also played a role, as it may not be easy to recruit self-identified sex workers into a study.[40]

A significant number of studies showcase a high prevalence of asymptomatic individuals testing positive for CT.[19] In Kenya, where laboratory infrastructure is limited, the syndromic management approach remains predominant.[18] However, the national diagnostic algorithm used in Kenya, which aims to detect *Neisseria gonorrhoeae* (NG) and CT, has shown a sensitivity of only 42% and a specificity of 63%.[42] This level of diagnostic accuracy is insufficient for effectively distinguishing infected individuals. Additionally, the reliance on syndromic treatment, particularly in the context of rising antimicrobial resistance,[43] may worsen the situation, specifically in treating NG.

Female genital mutilation (FGM) is recognized as a form of violence and a cultural practice involving severe modifications to the female genitalia, ranging from the excision of the prepuce to the removal of the clitoris and labia, and even the stitching and narrowing of the vaginal orifice.[44] Despite being illegal in Kenya since 2011, data from 2022 show that 15% of women aged 15–49 have undergone FGM.[45]

FGM is linked to a heightened risk of health complications, including STIs such as CT.[45] This increased risk is due to several factors. Firstly, FGM can damage the vaginal epithelium, making it more susceptible to infections. Secondly, the reuse of instruments in FGM procedures can facilitate the transmission of infections. Lastly, the significant bleeding caused by FGM often requires blood transfusions, which could expose women to infected blood.[45] Despite these biological links, there is limited epidemiological data directly connecting FGM to an increased risk of CT and therefore further research focused on exploring this relationship is necessary.

Men who have sex with men

Globally, gay, bisexual and other MSM experience higher rates of STIs like CT compared to the general population.[26] This is particularly true in Kenya, where structural challenges such as the criminalization of homosexuality, societal stigma and discrimination significantly hinder healthcare access for prevention, screening and treatment. A study by Mwaniki et al.[24] reported an alarmingly high rate of CT among tertiary students, with the prevalence being almost double that observed among MSM in South Africa – 26%,[46] and six times that observed among MSM in Nigeria – 8.5%.[47] This high rate was attributed to behaviours such as early sexual initiation, seeking casual sex partners online, condomless sex and participation in sex work.

Research by Otieno et al.[26] indicated that increasing age and condom use were protective against both rectal and urogenital CT. Intriguingly, the study also found that men who reported a receptive or versatile sexual role had a higher risk of urethral CT than those who were exclusively insertive, a finding that diverges from other studies.

Importantly, focusing on MSM is crucial not only for their health but also for the broader population. MSM who engage in sexual relationships with both men and women act as a bridging population,[26] potentially transmitting CT to female partners who may then pass it to males in the general population, thereby exacerbating the spread of CT.

Pregnant women

Pregnant women face significant risks from CT infections. CT during pregnancy is associated with severe adverse outcomes, including intrauterine foetal death, premature rupture of membranes, preterm birth low birth weight and small-for-gestational-age infants.[27] The risk of preterm birth is particularly concerning due to the high rates of neonatal morbidity and mortality linked to prematurity in this region. Untreated CT infection can lead to neonatal morbidity due to pneumonia and neonatal chlamydial conjunctivitis in newborns.[48,49]

Additionally, Kenya faces a high incidence of teenage pregnancy, with roughly one in every five

girls aged 15–19 having been pregnant or having had a live birth.[50] The issue is exacerbated by the sexual exploitation of young women, often in exchange for goods or money. A 2017 study by Masha et al.[29] highlighted the prevalence of CT among pregnant women in Kilifi, a coastal town identified by both the government and international organizations as an area impacted by sex tourism,[51] including concerns of child exploitation.

Other population groups

A study by Otieno et al.[31] focused on healthy adults in Kisumu and found that the majority of participants who tested positive for any STD were women who were divorced, widowed or separated. This group is identified as particularly vulnerable. In Kenya, transactional sex is a common approach among women facing economic hardships who lack other formal or informal means to cope. It is suggested that women engaged in transactional sex could potentially decrease their risky sexual behaviours – and thereby curb the spread of CT – if their children and dependents were granted subsidized access to public services.[52]

A study by Mulakoli[32] examined general hospital attendees in Nairobi, predominantly testing men who exhibited a higher prevalence of CT compared to women. This finding suggests that CT may often be asymptomatic in men, highlighting a potential gap in symptom-based screening approaches.

Ocular CT

Trachoma, caused by an ocular infection with CT, stands as the leading infectious cause of blindness globally. This disease can spread through direct contact with the eyes or nose of an infected person, or indirectly through contact with contaminated clothing or flies. Additionally, trachoma can be horizontally transmitted from child to child.[35] As a neglected tropical disease, trachoma is most prevalent in regions with poor sanitation, crowded living conditions and inadequate access to clean water. Environments with low rainfall and indoor smoke exposure are also associated with higher rates of trachoma.[1] Young children, especially those under 15 years, are the primary reservoirs for the infection. Women, who often serve as caregivers, are three to four times more likely to contract trachoma and suffer blindness. The proximity of cattle to homes also fosters breeding grounds for eye-seeking flies, contributing further to the disease's spread.[35]

The World Health Organization's SAFE strategy – comprising Surgery, Antibiotics, Facial cleanliness and Environmental improvement – aims to eliminate trachoma. This approach includes surgery to correct trichiasis, antibiotics to clear the infection, promoting facial cleanliness to reduce transmission and environmental improvements to enhance sanitation.[4]

In Kenya, trachoma is a major health concern, accounting for 19%[35] of all blindness and ranking as the second leading cause of avoidable blindness. It is endemic in six of the country's 47 counties,[35] which are characterized by extreme poverty, scarce water resources, dusty conditions and limited public health information. This review indicates that trachoma prevalence in these rural areas often exceeds the WHO's threshold of 10%, highlighting the disease's significant impact. Contributing factors include inadequate Water, Sanitation and Hygiene (WASH) infrastructure, which impedes effective prevention and control,[38] and delayed health-seeking behaviour paired with the use of traditional medicine, which often postpones early diagnosis and treatment, thereby increasing the risk of trachoma within the community.[35]

Diagnostics

The reliability and validity of diagnostic techniques for identifying pathogens in healthcare settings are crucial for STI management. Multiple laboratory tests are available for detecting CT, but not all are recommended for routine use due to differences in performance. Direct detection of these pathogens can be achieved through both culture methods and non-culture methods. Currently, NAAT is considered the gold standard[53] for detecting CT in human subjects, favoured for its sensitivity, specificity and rapid diagnostic capabilities in both symptomatic and asymptomatic cases.[54] It is noteworthy that the majority of studies reviewed here utilized NAAT testing, with most opting for commercially validated NAAT assays over in-house tests. Commercial NAAT kits are grounded in evidence-based guidelines and are acknowledged for their consistent and reliable specificity and sensitivity.[3] Notably, Nyakambi et al. utilized a novel rapid antigen test to detect CT. While this method

is more convenient and cost-effective than traditional NAAT, it is significantly less sensitive and specific.[11]

While NAAT testing is favoured for its sensitivity and accuracy, it comes with drawbacks, including its resource-intensive nature, high costs, risk of cross-contamination, inability to differentiate between live and dead bacterial cells, susceptibility to inhibitory substances and the requirement for skilled technicians.[55] These limitations make NAAT less suitable for use in rural areas of Kenya. Consequently, there is a pressing need to develop alternative diagnostic approaches. Low-cost, easy-to-use, point-of-care methods that can quickly detect CT infections within a timely manner are crucial. Such advancements would significantly enhance the prescription of narrow-spectrum antibiotics and improve reproductive and sexual health not only in Kenya but globally.[56]

Limitations

The present study should be viewed in light of some limitations. Firstly, the reliance on a systematic scoping review may result in an incomplete understanding of the complex dynamics of CT in Kenya. The quantity and quality of available data varied across regions and populations, with many studies concentrating on specific urban areas, potentially neglecting other at-risk populations or regions. Factors that may have contributed to differences in CT rates across studies include sampling variation and potential selection bias, along with the diverse diagnostic methods used across studies, which could introduce detection bias. These could potentially impact the accuracy of the study's conclusions. This study excluded research that utilized serology and microscopy as diagnostic methods. While serology can indicate exposure to the organism, it is poorly correlated with active CT infections. However, by excluding these studies, we may have overlooked data that explicitly report prevalence, particularly in regions where information on this topic is scarce.

Future directions

This study highlights the disproportionate impact of CT across various regions and populations in Kenya. A major challenge identified is the scarcity of data on different populations and geographic areas within the country. There is a noticeable disparity in the focus of studies, with rural areas receiving less attention compared to urban ones, especially in research on sexually transmitted CT. Furthermore, future research should also evaluate the testing and diagnostic methods used to determine CT prevalence, as these methods vary in their suitability and effectiveness within the Kenyan context.

The current government guidelines in Kenya rely on a syndromic management[42] approach, which is often imprecise and impedes the accurate collection of data regarding CT prevalence. Consequently, there is a critical need for more high-quality research designs across the country to facilitate the development of evidence-based strategies for managing and controlling CT. This would also support grassroots initiatives and promote data ownership among African researchers.

Conclusion

This review is the first attempt to systematically review the prevalence of CT across Kenya. The studies included for analysis differed based on research methodology, patient populations and diagnostic tests, highlighting a need for standardization and clear guidelines. The prevalence of the disease across regions and patient groups has been shown to vary significantly, suggesting the influential role of a wide range of factors such as diagnostics and possibly the differences in the behaviour of the varying populations within Kenya. Sustaining progress and mitigating the impact of CT will require the establishment of data-gathering systems. Further studies such as this are crucial, as they will form the foundation for informed policymaking.

Declarations

Ethics approval and consent to participate

This study did not involve human participants, animals, or any procedures requiring ethical approval.

Consent for publication

Not applicable.

Author contributions

Aarman Sohaili: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing.

Servaas A. Morre: Conceptualization; Formal analysis; Methodology; Project administration; Resources; Supervision; Validation; Visualization; Writing – review & editing.

Pierre P. M. Thomas: Conceptualization; Data curation; Formal analysis; Investigation; Project administration; Supervision; Validation; Visualization; Writing – review & editing.

AI statement

The authors would like to disclose that generative AI was used during the compilation of this paper. Chat GPT4.0 was used, for assistance in language and phrasing. The research team would like to state that no AI-direct content was used in the final body of text, as it was used to point out areas of improvement in the written structure.

Acknowledgements

None.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Competing interests

The authors declare that there is no conflict of interest.

Availability of data and materials

All data stated in this review are available in the references cited.

ORCID iD

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Supplemental material

Supplemental material for this article is available online.

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