Global burden of trichiasis in women as compared to men: Findings from the Global Trachoma Mapping Project

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Trachomatous trichiasis is targeted for elimination by 2020. It is globally accepted that there is an excess risk of trachomatous trichiasis in women compared to men with many factors contributing to this finding. We sought to update previous work on the subject and to undertake some sub-analyses to help interpret the findings. This secondary data analysis used data collected through the Global Trachoma Mapping Project (GTMP), a large set of standardized population-based trachoma prevalence surveys from 2013-16. Our analysis included 693 evaluation units (EUs) in 16 countries with a total sample of 1,143,742 residents' age 15 years and above. RevMan 5 was used to generate an age-adjusted Mantel-Haenszel odds ratio and 95% confidence intervals (CI). Among the 498,317 men examined 3,566 had trichiasis. Among the 645,425 women examined 9,156 women had trichiasis. The overall excess burden of trichiasis in women compared to men was 1.87 (95% CI: 1.45, 2.42) while in the 503 EU with a prevalence of trachomatous trichiasis ≥ 0.2% (the WHO threshold for elimination) the excess burden of trichiasis in women compared to men was 2.01 (95% CI: 1.58, 2.55). There was considerable heterogeneity in the findings at the country level. Surveys in Ethiopia (24.9% of total participants) had an OR of 3.16 (95% CI 2.95, 3.39) while surveys in Nigeria (33.6% of total participants) had an OR of 1.59 (95% CI; 1.50, 1.69). At the EU level we did not find an association between the odds of trichiasis in women compared to men according to the prevalence of trichiasis. Our findings suggest that gender-specific excess varies considerably across Africa; in all settings however efforts are needed to reach women with trachoma management services.

Trachomatous trichiasis is the result of multiple infections from childhood with Chlamydia trachomatis, which causes recurrent chronic inflammation in the tarsal conjunctiva. This produces conjunctival scarring, entropion, trichiasis, and ultimately blinding corneal opacification. In areas where trachoma is endemic, active (inflammatory) trachoma is common among preschool-aged children, with prevalence rates which can be as high as 60–90%. Infection becomes less frequent and shorter in duration with increasing age. Infection is usually acquired when living in close proximity to others with active disease, and the family is the main setting for transmission. An individual's immune system can clear a single episode of infection, but in endemic communities, re-acquisition of the organism occurs frequently.

After years of repeated infection, the inside of the eyelid can become so severely scarred (trachomatous conjunctival scarring) that it turns inwards and causes the eyelashes to rub against the eyeball (trachomatous trichiasis), resulting in constant pain and light intolerance; this and other alterations of the eye can lead to scarring of the cornea. Left untreated, this condition leads to the formation of irreversible opacities, with resulting visual impairment or blindness. The age at which this occurs depends on several factors including local transmission intensity. In very highly endemic communities, it can occur in childhood, though onset of visual impairment between the ages of 30 and 40 years is more typical.

Visual impairment or blindness results in a worsening of the life experience of affected individuals and their families, who are normally

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already amongst the poorest of the poor. Women are blinded up to 4 times as often as men, probably due to their close contact with infected children and their resulting greater frequency of infection episodes. Environmental risk factors influencing the transmission of the disease include:

- inadequate hygiene
- crowded households
- inadequate access to water
- Inadequate access to and use of sanitation.

Trachoma is hyper endemic in many of the poorest and most rural areas of Africa, Central and South America, Asia, Australia and the Middle East. It is responsible for the blindness or visual impairment of about 1.9 million people. It causes about 1.4% of all blindness worldwide. Overall, Africa remains the most affected continent, and the one with the most intensive control efforts. As of 24 July 2020, 13 countries had reported achieving elimination goals. These countries are: Cambodia, China, Gambia, Ghana, Islamic Republic of Iran, Iraq, Lao People's Democratic Republic, Mexico, Morocco, Myanmar, Nepal, Oman and Togo. Nine of those countries – Cambodia, China, Islamic Republic of Iran, Lao People's Democratic Republic, Ghana, Mexico, Morocco, Nepal and Oman – had been validated by WHO as having eliminated trachoma as a public health problem.

Trachoma is the commonest infectious cause of blindness in the world. It is caused by a bacterium called Chlamydia trachomatis. This infection causes inflammation and scarring of the surface of the eye, which results in the

eyelid turning in (entropion) so that the eyelashes touch the eyeball. This is known as trachomatous trichiasis. The lashes can scratch the corneal surface, leading directly or indirectly (from secondary infections) to corneal opacity. Sur

gery to correct the eyelid deformity is the main treatment for the late stages of the disease. Most cases of trachomatous trichiasis occur in sub-Saharan Africa. They are generally treated by nurses with limited surgical training. Unfortunately the results of the surgery can be quite variable, with frequent post-operative trichiasis reported. Therefore, we wanted to find out what types of surgery and other interventions give the best results in treating this condition. Trachoma is an infectious disease caused by bacterium Chlamydia trachomatis. The infection causes a roughening of the inner surface of the eyelids. This roughening can lead to pain in the eyes, breakdown of the outer surface or cornea of the eyes, and eventual blindness. Untreated, repeated trachoma infections can result in a form of permanent blindness when the eyelids turn inward. The bacteria that cause the disease can be spread by both direct and indirect contact with an affected person's eyes or nose. Indirect contact includes through clothing or flies that have come into contact with an affected person's eyes or nose. Children spread the disease more often than adults. Poor sanitation, crowded living conditions, and not enough clean water and toilets also increase spread.

Efforts to prevent the disease include improving access to clean water and treatment with antibiotics to decrease the number of people infected with the bacterium. This may include treating, all at once, whole groups of people in whom the disease is known to be common. Washing, by itself, is not enough to prevent disease, but may be useful with other measures. Treatment options include oral

azithromycin and topical tetracycline. Azithromycin is preferred because it can be used as a single oral dose. After scarring of the eyelid has occurred, surgery may be required to correct the position of the eyelashes and prevent blindness. Globally, about 80 million people have an active infection. In some areas,

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infectio ns may be present in as many as 60–90% of children. Among adults, it more commonly affects women than men – likely due to their closer contact with children. The disease is the cause of decreased vision in 2.2 million people, of whom 1.2 million are completely blind. It commonly occurs in 53 countries of Africa, Asia, and Central and South America, with about 230 million people at risk. It results in US$8 billion of economic losses a year. It belongs to a group of diseases known as neglected tropical diseases. The bacterium has an incubation period of 6 to 12 days, after which the affected individual experiences symptoms of conjunctivitis, or irritation similar to "pink eye". Blinding endemic trachoma results from multiple episodes of reinfection that maintains the intense inflammation in the conjunctiva. Without reinfection, the inflammation gradually subsides. The conjunctival inflammation is called "active trachoma" and usually is seen in children, especially preschool children. It is characterized by white lumps in the undersurface of the upper eyelid (conjunctival follicles or lymphoid germinal centers) and by nonspecific inflammation and thickening often associated with papillae. Follicles may also appear at the junction of the cornea and the sclera (limbal follicles). Active trachoma often can be irritating and have a watery discharge. Bacterial secondary infection may occur and cause a purulent discharge. The later structural changes of trachoma are referred to as "cicatricial trachoma". These include scarring in the eyelid

(tarsal conjunctiva) that leads to distortion of the eyelid with buckling of the lid (tarsus) so the lashes rub on the eye (trichiasis). These lashes can lead to corneal opacities and scarring and then to blindness. Linear scar present in the sulcus subtarsalis is called Arlt's line (named after Carl Ferdinand von Arlt). In addition, blood vessels and scar tissue can invade the upp er cornea (pannus). Resolved limbal follicles may leave small gaps in the pannus (Herbert's pits).

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