Public health approaches to addressing trachoma

A literature review

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ABSTRACT

INTRODUCTION

Trachoma is a neglected tropical disease (NTD) caused by infection with *Chlamydia trachomatis (C. trachomatis)* and is the leading cause of preventable blindness globally. It is a disease rooted in poverty and remains endemic in several low- and middle-income countries, predominantly in the tropics, where determinants of health—including poor hygiene, sanitation, and living conditions—favour disease transmission. This paper aims to critically appraise the public health approaches addressing trachoma, namely implementation of the WHO 'SAFE' strategy, with reference to trachoma control in Tanzania.

METHODS

Online databases were searched for literature containing relevant keywords. Literature sources included published data, peer-reviewed publications, and relevant grey literature.

RESULTS

The SAFE strategy has been highly effective in reducing the global prevalence of trachoma. However, it has failed to reach its target of global elimination by 2020. Strengths of this approach include the dual focus on preventative and curative aspects of trachoma management and the GET2020 Alliance to aid state implementation. Challenges in trachoma management include the political landscape influencing global health governance and funding, as well as a pressing need for an intersectoral 'Health in All Policies' approach to address the social determinants of health perpetuating trachoma transmission.

CONCLUSIONS

An integrated, multisectoral approach to trachoma management with NTDs is required to attain increased and sustainable progress across the spectrum of NTDs, reduce the risk of resurgence, and achieve the United Nations Sustainable Development Goals (SDGs). This progress can be achieved only by continuing to address the underlying determinants of health and utilising integrated management programs.

INTRODUCTION

Trachoma is a disease caused by repeated episodes of reinfection with the *C. trachomatis* bacterium. This causes conjunctival inflammation, leading to scarring and trichiasis and eventually results in blindness.[1,2] It is the leading cause of preventable blindness globally.[3] Trachoma is classified as a 'neglected tropical disease' (NTD) and is a prominent public health issue due to its high prevalence, morbidity, significant economic burden, and preventability. Addressing trachoma has been part of a concerted global effort to reduce the human, social, and economic burden of NTDs on the worlds most disadvantaged and vulnerable populations.[4]

In 1997, the World Health Organisation (WHO) established and partnered with the Global Alliance for the Elimination of Trachoma by 2020 (GET2020) to support state implementation of the WHO 1993 'SAFE' strategy.[5] This strategy has formed the basis of the global response to trachoma control and consists of four core components: **s**urgery for trachomatous trichiasis, **a**ntibiotics to treat ocular *C. trachomatis* infection, and **f**acial cleanliness and **e**nvironmental improvement to reduce *C. trachomatis* transmission.[6] Despite significant progress, trachoma remains endemic in 44 countries, which are predominantly low- and middle-income (LMIC), and many of these are in the tropics. Africa is the worst affected continent, harbouring 85% of all active cases globally, and Tanzania is one country where, despite implementation of SAFE since 1999, trachoma remains endemic.[3,6,7] The prevalence of trachoma is influenced by a multitude of health determinants, which interact to create an enabling environment that favours *C. trachomatis* transmission. These determinants and their relationship to relevant policy in Tanzania are outlined in Figure 1.[1,8-11] They illustrate the challenge in implementing trachoma control programs and the need for a broad and holistic approach.

This paper will critically appraise the global strategies to address trachoma, primarily through implementation of the SAFE strategy, with reference to trachoma control in Tanzania.

METHODS

Keywords and search terms were developed using the PICO method: population (trachoma, Tanzania), intervention (SAFE strategy, public health), and outcome (epidemiology, prevalence, incidence, disease burden). Inclusion criteria included published data, peer-reviewed publications, and relevant grey literature (e.g., WHO, Global Burden of Disease, International Trachoma Initiative, Trachoma Atlas, and Tanzanian Health Policy) published within 1990-2020

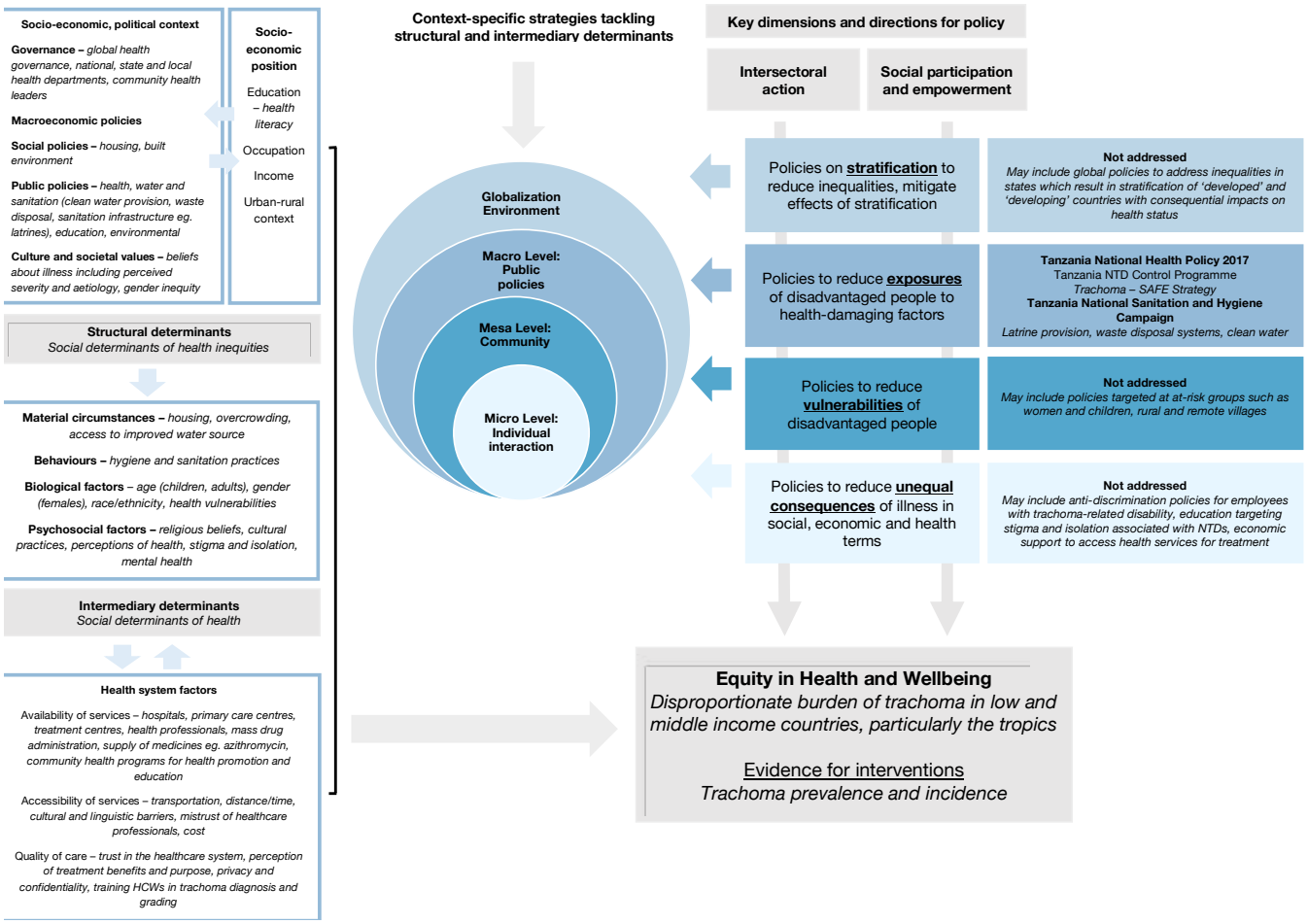

Figure 1. Modified WHO conceptual framework on the social determinants of health applied to trachoma, using Tanzania's implementation of the SAFE strategy as an example of policy intervention. [1, 8-11]

to account for literature prior to the implementation of the SAFE strategy. The literature was comprehensively reviewed using keyword searches in online databases, including Medline, PubMed, and Google Scholar, with further sources selected and evaluated via handsearching.

EVALUATION OF THE SAFE STRATEGY

The SAFE strategy has enabled significant progress towards GET2020's primary goal: the global elimination of trachoma. As of September 2020, 13 countries have successfully implemented the strategy and eliminated trachoma, 9 of which have been validated by WHO (Figure 2).[6] Furthermore, the number of people at risk of trachoma has reduced dramatically, from 1.5 billion in 2002 to 136.9 million in May 2020, reflecting the declining global prevalence.[2,6] The latest data estimates the total global burden of trachomatous trichiasis to be 2 million, more than a 60% reduction since 2002.[6] However, despite this progress, trachoma remains a public health problem in 44 countries, with only 13% of identified endemic countries achieving elimination, compared to the target of 100% by 2020.[2] Thus, WHO has set a revised date for the target of eliminating trachoma to 2030, as part of the NTD roadmap for 2021-2031 'Ending the neglect to attain the Sustainable Development Goals.'[4]

In Tanzania, despite a significant reduction in the prevalence of trachoma from 395.10 per 100,000 in 1999 to 145.45 per 100,000 in 2017, trachoma remains endemic in 4 regions following the introduction of the SAFE strategy (Figure 3).[7,12] The latest reports from 2017 indicated good progress, with only 18 out of 54 endemic councils having active trachomatous inflammation of ≥5% (the threshold for endemicity), and trachoma transmission was estimated to be interrupted in over 90% of endemic districts by 2020.[13,14] The progress made to eliminate trachoma over the past few decades clearly demonstrates that SAFE is an effective public health intervention, which the growing evidence-base supports. The evidence for individual components of the SAFE strategy and their implementation in Tanzania is outlined in Table 1 (available online).[1-4,6,9,11-35]

One of the major strengths of the SAFE strategy is the targeting of both medical or curative treatment (e.g., antibiotics and surgery) and key

determinants driving trachoma infection (e.g., facial cleanliness and environmental improvement) as part of an upstream approach to disease prevention. Secondly, the universal nature of the strategy provides a global framework by which nations can implement SAFE and allows for the global mapping and monitoring of progress. Furthermore, the partnership with GET2020 pushes for states to incorporate the strategy into national health policies and infrastructure, with disease mapping and monitoring primarily conducted by health professionals in local areas. This is a significant step towards health system strengthening and empowering states to take ownership over public health initiatives, and it has been re-emphasised as a priority in the 2021-2030 WHO NTD roadmap.[4] Another benefit of GET2020 as part of the public health approach was the development of the Global Trachoma Mapping Project (GTMP). This tool accurately mapped epidemiological data on global trachoma prevalence between 2012-2016 to guide SAFE implementation, particularly the delivery of mass drug administration (MDA), to areas most in need. This has played an integral role in guiding resource allocation for MDA and in monitoring and evaluation efforts.[36,37]

One of the key limitations of the SAFE strategy is the lack of specific targets and strategies to address its facial cleanliness and environmental improvement components and the lack of evidence-based research to guide these interventions. Increasing the evidence base and extending partnerships to improve delivery of these components to reduce trachoma transmission has been identified as a critical action to reach the 2030 trachoma targets.[4] The neglect of these interventions has led to an over-reliance on medical treatment, despite the fact that trachoma was eliminated as a cause of blindness in most of the developed world largely due to global improvements in water and sanitation in the early 1900s.[38] A reliance on 'siloed' or 'vertical' disease programs is likely to have perpetuated this, as these programs access funding specifically for antibiotic provision. For example, azithromycin (Zithromax®), the antibiotic of choice to treat trachoma, is largely donated by Pfizer, a multinational pharmaceutical company, through the International Trachoma Initiative.[4] Effecting critical change to basic conditions for health, including sanitation, requires a 'Health in All Policies' approach with multisectoral support, of which the support and integration of donor campaigns is more challenging.[39] A core education component is also needed and would be strengthened by a comprehensive NTD health promotion campaign, with materials to improve health literacy. Education is a vital strategy to empower individuals to understand disease aetiology and symptoms, learn how interventions prevent disease, and to build trust in healthcare providers. A recent study in northern Tanzania demonstrated that there was little understanding of trachoma aetiology and treatment, as well as the links between childhood infection and the development of blindness. This indicates that this is an area of ongoing need.[9] Improvements in hygiene, sanitation, and environmental conditions conducive to good health are all part of a broader need for health system strengthening. This is essential to producing sustainable change and mitigating the risk of recrudescence of infection in populations that have eliminated trachoma.[2]

POLICY AND LEADERSHIP CHALLENGES

There are a multitude of policy and leadership challenges that impact planning and implementation of a public health intervention. Two primary challenges for addressing trachoma as a public health issue are governance and funding and intersectoral leadership challenges.

The approach to eliminate trachoma has required an intensive international effort, with the involvement of WHO, many NGOs, and public-private partnerships, such as the International Trachoma Initiative. The involvement of multiple stakeholders who provide technical and financial support creates an administrative and political challenge due to the reliance on donors to fund health interventions. This enhances their political influence and gives them undue power over the formation and implementation of program activities.[40] This has contributed to a focus on 'vertical' (disease-specific) programs, with donors funding specific interventions with short-term measurable progress (e.g., supplying MDA).[40]

However, this approach often neglects determinants that are harder to quantify, such as poverty and environmental conditions for hygiene. These programs also hinder integrated approaches to NTD management.[40] For example, in Tanzania, azithromycin donated by Pfizer is kept separate from the general pharmaceutical supply, 'earmarked' for MDA in trachoma-endemic districts.[6,16] However, a more effective approach would involve the integration of medicines into the national pharmaceutical supply chain. This would allow antibiotics to be used as part of an integrated approach for multiple NTDs requiring similar treatment, utilising existing primary health infrastructure. The need for multisectoral support is recognised by WHO, identifying that multisectoral action for NTDs across diagnostics, monitoring, and evaluation; access and logistics; and advocacy and funding are required to meet

targets for the SDGs and accelerate control and elimination.[4] In its 2021-2030 roadmap for NTD action, WHO has called for further integration of NTD programmes into national health systems by utilising existing health infrastructure and, thus, improving the sustainability and efficiency of interventions, with coordinated action across sectors.[4] Tanzania has recognised the importance of intersectoral collaboration and established a 'Sector Wide Approach' to facilitate coordination among health sector stakeholders for all health interventions.[13] This approach is important and seeks to maximise the impact to broader health outcomes, particularly in Tanzania, which has one of the highest NTD burdens in the world.[40]

Implementing an intersectoral approach to trachoma management which utilises the 'Health in All Policies' (HiAP) framework is another policy challenge. HiAP recognises the need for sectors outside of health to contribute to policies which seek to optimise co-benefits for health and minimise negative consequences.[39] This is pertinent to trachoma management, where intersectoral collaboration between stakeholders in health, environment and water, and built environment sectors is required to address the determinants of health driving trachoma, particularly hygiene and sanitation and vector control.[4] This challenge has been recognised in Tanzania, with the Ministry of Health reporting 60% of outpatient department diagnoses associated with poor sanitation and hygiene practices, the persistence of which is due to 'weak coordination among stakeholders'.[13] A specific objective of Tanzania's revised National Health Policy in 2017 focuses on 'intersectoral collaboration' for sustainable water safety, sanitation, and hygiene, all of which are linked to its efforts to improve primary health care services and are necessary to achieve long-term improvement.[13]

ETHICAL CONSIDERATIONS

Resource allocation is a pertinent ethical consideration in trachoma and NTD management. Whilst trachoma and NTDs cause significant morbidity in LMICs globally, from an epidemiological perspective, other illnesses such as non-communicable diseases are responsible for a greater morbidity and mortality burden, leading to ethical dilemmas around funding priorities. Advocacy for investment into targeting trachoma and NTDs may be considered from a human rights based approach, supporting the right of all humans to an environment that supports health.[41] This approach seeks to advocate for health equity and social justice and is particularly pertinent to NTDs, which largely result from global inequities in social and environmental determinants of health. An ethical consideration in implementation of SAFE is gaining consent for treatments such as antibiotics. A recent study highlighted the lack of understanding of the purpose of azithromycin in treating trachoma, with some believing the drug was being given to terminate pregnancy.[9] This raises some serious ethical concerns about informed consent and educating patients about the interventions.

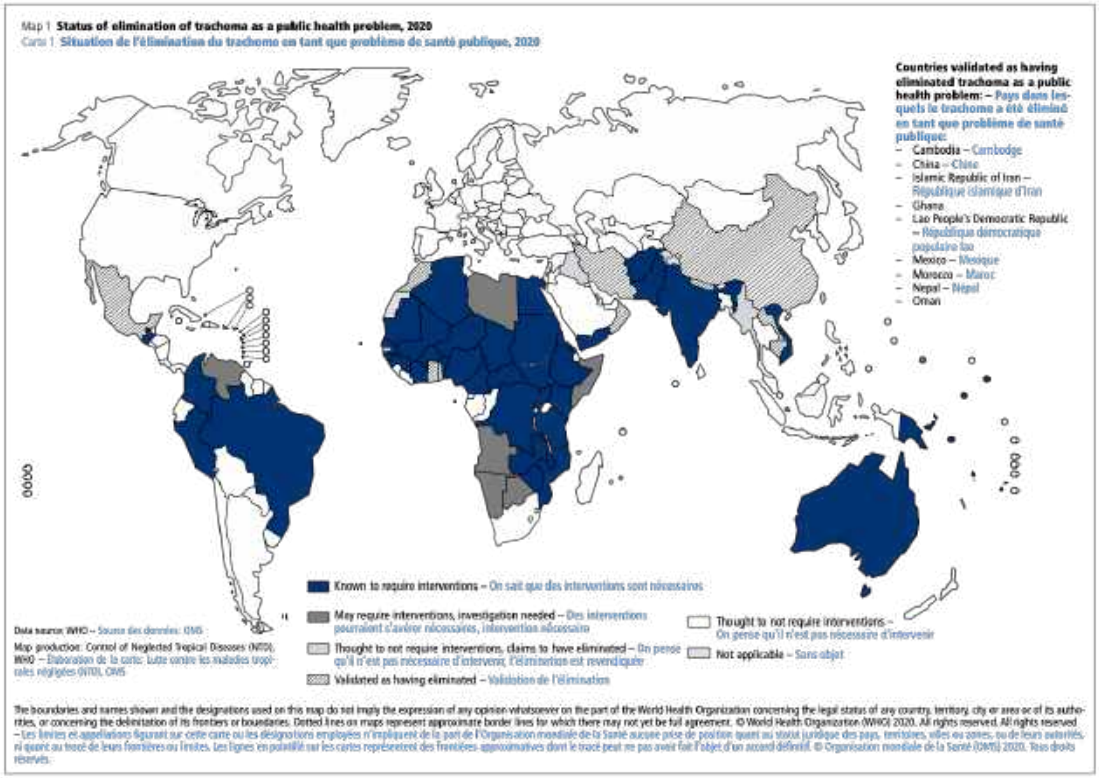

Figure 2. Status of elimination of trachoma as a public health problem, 2019.[6]

CONCLUSION

Overall, the SAFE strategy has been successful in aiding the elimination of trachoma, however progress has been slower than initially anticipated. Continued implementation of all SAFE components in trachoma-endemic regions is required, with an enhanced focus on delivery of facial cleanliness and environmental improvement and further research to support these interventions. As begun in Tanzania, approaches to trachoma control must move away from vertical disease programs, which are driven by donor-specified outcome targets, and be integrated into national NTD policies and programs. NTDs often share many underlying determinants and have similar treatments, epidemiology, and geographic distribution. Thus, integrated approaches are likely to have beneficial and sustainable effects on reducing trachoma prevalence, whilst also reducing the burden of other NTDs and the risk of re-emergence. Furthermore, this approach will enhance the efficiency and cost-effectiveness of intervention programs.[40,42] A critical aspect of this will be the ability of LMICs to invest in sustainable health systems, which are less reliant on the political influence of external donors. A continued push for greater accountability and transparency for organisations and NGOs in the global health sphere will greatly aid this approach. The effect of this will extend far beyond trachoma control and have a lasting impact on several NTDs and associated diseases of poverty.

Sally is a medical student based in Sydney, NSW. She is passionate about social justice and health, both of which have led her into advocacy for global and rural health issues. She has a particular interest in women's and children's health, being two groups which often suffer a disproportionate health disadvantage.

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Conflicts of Interest
The author declares no conflicts of interest in the publication of this article.

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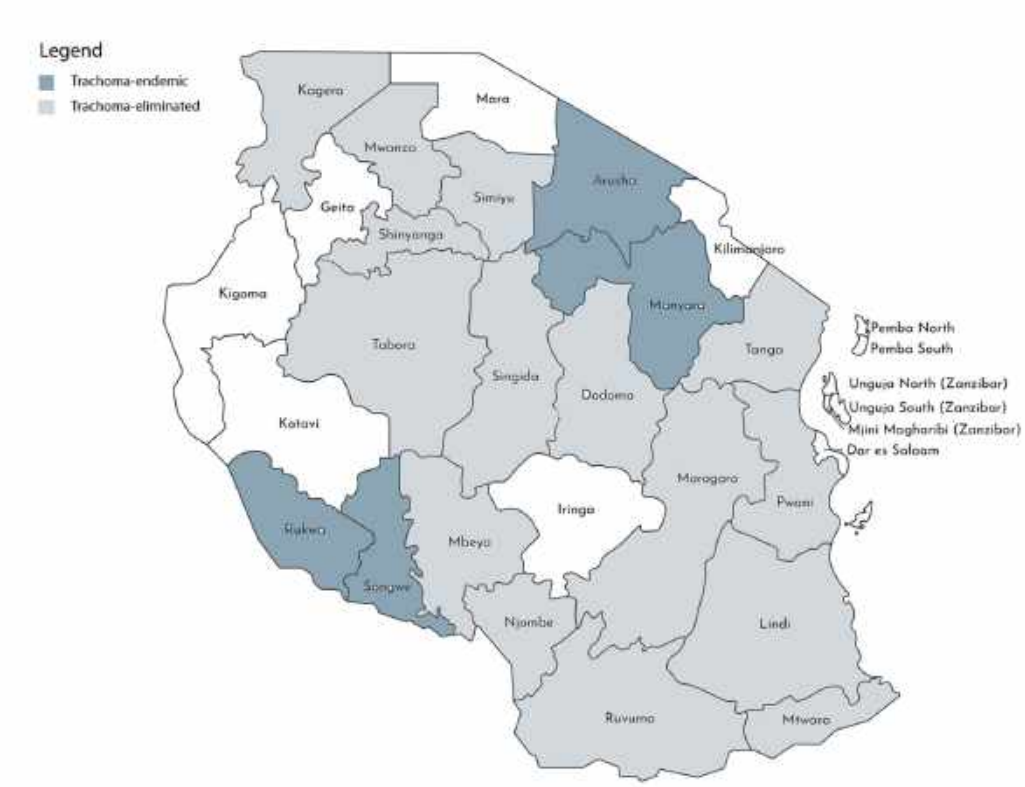

Figure 3. Map of Tanzania illustrating trachoma-endemic districts and districts where trachoma has been eliminated. Image created using data obtained from the Global Trachoma Atlas.[7]

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