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Knowledge, Attitude, and Practices Towards Trachoma among Communities in Highly Endemic Areas in Yemen

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Abstract

Background Trachoma is the leading cause of blindness in the world's poorest societies. However, knowledge, attitudes, and practices (KAP) are yet to be conducted in Yemen.
Objective To Assess the KAP and its associated factors toward trachoma among households in highly endemic areas, Yemen.
Methods A community-based cross-sectional study was conducted in six districts of Hodeidah and Ibb governorates in September 2024. Data were collected from 1290 randomly selected individuals using questionnaires, focused group discussions (FGDs), and observational checklists. The data were analyzed using SPSS V26, and a multivariable logistic regression model was used to identify associated factors.
Results Among 1290 interviewed participants, 682 (52.9%) had good knowledge, 700 (54.35%) had good attitudes, and 803(62.2%) had good practice. Having ever received age of the head of household (years) was significantly associated with good knowledge and good attitudes (AOR = 10.02, 95% CI: 7.50–13.40, P < 0.001), (AOR = 3.78, 95% CI: 2.86–4.99, P < 0.001), respectively; good attitude was significantly associated with good knowledge (AOR = 1.85, 95% CI: 1.41–2.43, P < 0.001). Moreover, distance to drinking water source and cleanliness of child's face were significantly with good practice (AOR 2.44, 95% CI: 1.86–3.19, P < 0.001), (AOR = 29.5, 95% CI: 12.6–68.9, P < 0.001), respectively.
Conclusions A substantial segment of the population exhibits unfavorable attitudes and a lack of knowledge concerning trachoma infection. Enhancement of awareness initiatives through community mobilization and sensitization is imperative.

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1. INTRODUCTION

Trachoma is an eye disease caused by Chlamydia trachomatis infection and is the leading cause of preventable blindness worldwide [1]. If left untreated, this condition can lead to corneal opacity and irreversible blindness. It is spread through contact with eye secretions from an infected person and by eye-seeking flies [2]. After years of repeated infection, the inside of the eyelid may become so scarred that the eyelid turns inward and the eyelashes rub the eyeball, causing corneal scarring. The painful stage is known as trachomatous trichiasis [3]. Trachoma largely affects people in low socioeconomic conditions in rural areas, particularly communities with poor hygiene and environmental sanitation[4]. Several factors are associated with an elevated risk of trachoma, including insufficient access to water, suboptimal personal hygiene practices, and deficient ecological sanitation[5]. Furthermore, poor knowledge, unfavorable sociocultural perceptions, and inefficient practices regarding

the prevention of trachoma are the main factors contributing to the transmission and persistence of infection in these communities [6]. Today, 1.9 million people are estimated to be blind or moderately to severely visually impaired because of trachoma, while 3.2 million people need surgery to avoid blindness, and approximately 200 million people live in endemic areas that need interventions [7]. The disease is responsible for an estimated annual productivity loss of up to US $8 billion, while elimination of the disease would cost around US $1 billion [8]. The World Health Organization (WHO) created the Alliance for the Global Elimination of Trachoma by 2020 (GET2020), with the main aim of mobilizing resources and fostering cooperation within a worldwide partnership of Member States, nongovernmental organizations, and the private sector. [9]. The Alliance is the main platform for the trachoma community to work towards the implementation of the WHO-recommended SAFE strategy: Surgery, Antibiotics, Facial cleanliness, and environmental hygiene [10, 11]. The SAFE strategy, endorsed by the 1998 World Health Assembly resolution WHA51.11, requires objectively measuring the magnitude of the disease in a community to eliminate trachoma as a public health problem [12]. Trachoma is considered a public health problem when the prevalence of trachomatous trichiasis is more than 0.2% in adults aged > 15 years and approximately 1 case per 1000 of the general population, and the prevalence of trachomatous inflammation follicular is more than 5% in children aged 1-9 years [13]. Close living spaces and poor sanitation increase the spread of this disease [14, 15]. 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 [16]. Within the highly endemic regions of Ethiopia, the provision of health education centered on the SAFE strategy is crucial for augmenting knowledge and facilitating attitudinal shifts that contribute to the effective implementation of trachoma prevention and control practices among communities [4]. In the context of trachoma elimination in Sudan, it is imperative to acknowledge the limited efficacy of single- method strategies [17] and trachoma elimination is a public health problem in Oman and Saudi Arabia [18]. Despite these figures, the WHO-endorsed SAFE strategy for trachoma elimination is being implemented in 42 endemic countries worldwide [19]. In regions with hyper endemic trachoma, preschool children are most commonly affected, with prevalence rates reaching 60-90%. This disease affects vulnerable populations disproportionately, particularly women and children. Women, who typically spend more time in close contact with young children, the primary reservoir of infection, are at a significantly higher risk of developing blinding complications of trachoma than men [20, 21, 22]. It is believed that inadequate knowledge, attitudes, and practices of communities living in trachoma-endemic areas are believed to influence the spread of trachoma in some regions[23]. In Yemen, certain governorates have a high prevalence of trachomas. For instance, in 2013, the adjusted prevalence of the clinical signs trachomatous inflammation-follicular (TF) among children exceeded 10% in Ibb and Hodeidah [24]. Knowledge, attitudes, and practices related to trachoma remains a barrier in the Yemeni community [25]. Therefore, the aim is to assess their knowledge, attitudes, and practices related to trachoma, which will enable them to become agents of change within their communities. Insights gained from such a study are crucial for health providers and program managers to guide them in planning and executing measures to enhance trachoma prevention and control within these communities. Furthermore, this information can inform policymakers in devising disease elimination strategies.

2. METHODS

2.1. Study design, population and setting

A community based cross-sectional study was conducted in September 2024 among households in six districts in highly endemic areas. These districts, identified in a 2013 baseline study with a TF prevalence exceeding 10%, were: As Sabrah, As Sayyani, and Dhi As Sufal in Ibb Governorate, and Al Qanawis, Alluheyah, and Az Zuhrah in Hodeidah Governorate. Eligible participants were male and female head households residing in the study districts, whose heads of households or legal representatives provided informed consent.

2.2. Sample size calculation

The sample size was calculated to be 1290 using standard procedures. This determination incorporated the following assumptions: a 95% confidence level ($Z_\alpha/2$ = 1.96), an estimated population proportion of 60% possessing adequate knowledge regarding trachoma, a margin of error of 5%, a design effect of 2.63, and using an inflation factor of 1.33 [26]

2.3. Sampling strategy

A two-stage cluster sampling approach was adopted. In the first stage, 30 clusters were selected by systematic random sampling. Villages were considered the primary sampling units in the study districts and were grouped into clusters based on the WHO definition of EUs for trachoma surveys [27]. The households were then considered secondary sampling units. In the second stage, a compact segment sampling method was used to select households from the lists of households in these clusters, with each cluster contributing several households in proportion to its population size. A household consists of all individuals who resided in a dwelling unit as their regu-

lar residence, regardless of single or multiple marriages. The lists of households with eligible children obtained from the Neglected Tropical Disease Program at the Ministry of Health Households were selected using simple random sampling from these lists. According to the WHO criteria [27], the heads of selected households (or their adult representatives) were informed of the purpose of the study, and their consent was obtained to voluntarily participate in the study. A single child was selected using simple random sampling from eligible children if more than one child was present in that household.

2.4. Data collection

A structured questionnaire was used to collect the data. Face-to- face interviews with eligible household heads were conducted. Direct observations were used to measure personal and household practices. These methods, combined with FGDs with selected household heads, were used to collect both quantitative and qualitative data. A qualitative method was used to determine the attitudes of the community toward the trachoma. This included FGDs that were used by the selected heads of households. Clinicians working within and outside the targets were used to conduct household interviews. Before carrying out interviews with the respondents, the clinicians were trained on the research tools to prevent the spread among participants, the investigators used disposable gloves or cleaned their hands with 70% alcohol.

2.5. Data analysis

Data were first entered into Excel spreadsheets to check for duplications and inconsistencies. Then, the coded data were exported into SPSS 26, which was used for data analysis. Individual scores were computed for knowledge, attitude, and practice. Subsequently, these scores were categorized into dichotomous variables, classifying them as either "good" or "poor." Categorical data were presented as frequencies and percentages, while continuous data were summarized as the mean and standard deviation (SD) for normally distributed variables and median and inter quartile range (IQR) for non-normally distributed variables. Bivariate logistic regression analysis was performed for each outcome variable (KAP). All variables with a p-value < 0.25 in the bi-variate analysis were included in the multivariable logistic regression model. Finally, variables with a p-value of less than 0.05 were considered statistically significant.

3. RESULTS

3.1. Characteristics of the study population

A total of 1290 households, children 1-9 years old participated in this study, with a response rate of 100%. More than half of the children were male (54.7%) and aged 5 years or younger (58.8%), with a mean (±SD) age of 5.0 ± 2.4 years. The median household size was seven members (IQR: 4). About 50.8% of households had seven members or fewer. More than half of the heads of households for these children were females (54.4%) and aged 40 years or younger (61.4%), with a mean (±SD) age of 40.5 ± 11.4. Most fathers of children were literate (65.6%), while most mothers were illiterate (79.4%) (Table 1).

3.2. Knowledge of Trachoma

A majority (83.4%) of respondents had ever heard of trachoma. Over half (76.0%) of respondents perceived trachoma as a problem in the community, and 50.8% correctly answered that trachoma can be transmitted by flies. The majority, 1039 (80.5%), of respondents knew trachoma was a preventable disease, and 967 (75.0%) of respondents knew that trachoma can lead to blindness. The mean (±SD) knowledge score of the respondents was 4.4 (± 1.20). 682 (52.9%) of respondents scored above the mean and were classified as having good knowledge of trachomas (Table 2) .

3.3. Attitude on Trachoma Prevention and Control

The majority of respondents, 955 (74.0%) agreed that personal hygiene is important for trachoma prevention, 1083 (84.0%) believed that latrine utilization is important for trachoma prevention, and 1155 (73.0%) used adequate water for bathing. However, 646 (50.1%) reported regularly washing their hands and face with soap and water, and 1199 (89.5%) reported that taking MDA was important to prevent and control trachoma. Moreover, 1169 (90.6%) reported that adequate water is important for the prevention and control. Out Of the total, 700 (54.3%) respondents were classified as having good attitudes toward trachoma prevention and control, with men (±SD) score of 4.3 (± 0.89) (Table 3).

3.4. Practices on Trachoma Prevention and Control.

The majority of respondents, 1094 (84.8%) reported receiving antibiotics during the rounds of MDA, and 478 (37.1%) disposed of children's feces. However, 942 (73.0%) used adequate water for bathing, and only 646 (50.1%) regularly washed their hands and face with soap and water. Moreover, 1199 (92.9%) had access to latrine facilities in the household. Only 490 (38.0%) used ade-

Table 1. Socio demographic characteristics of study participants on knowledge, attitudes, and practices on trachoma in highly endemic areas, Yemen(2024).

Characteristics		n	(%)
Household size (members)	≤ 7	655	50.8
	> 7	635	49.2
	Median (IQR): 7.0 (4)		
Gender of the head of household	Male	588	45.6
	Female	702	54.4
Age of the head of household (years)	≤ 40	792	61.4
	> 40	498	38.6
Mean $\pm$ SD (range)	40.5 $\pm$ 11.4 (21–90)		
Father's literacy status	Literate	864	65.6
	Illiterate	452	34.4
Mother's literacy status	Literate	266	20.6
	Illiterate	1024	79.4
Father's employment status	Farmer	537	41.6
	Unemployed	392	29.0
	Employed	192	14.9
	Daily laborer	187	14.5

* The total number of children was 1290. SD, standard deviation; IQR, interquartile range.

Table 2. Knowledge, of study Community Toward trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024)

Characteristics	n	(%)
Heard about trachoma disease		
Yes	1076	(83.4)
No	214	(16.6)
Perception of trachoma as a problem in the community		
Yes	991	(76.0)
No	309	(24.0)
Knew trachoma can be transmitted by flies		
Yes	655	(50.8)
No	635	(49.2)
Knew trachoma was a preventable disease		
Yes	1039	(80.5)
No	251	(19.5)
Knew trachoma can lead to blindness		
Yes	967	(75.0)
No	323	(25.0)
Knew trachoma can be prevented by washing hands and face with soap		
Yes	975	(75.6)
No	315	(24.4)
Mean ±SD	4.4 ± 1.20	
Median + IQR (interquartile range)	5±1	
Score of knowledge on trachoma		
Good	682	(52.9)
Poor	608	(47.1)

quate water for drinking and washing. About 955(74.0%) considered personal hygiene important for trachoma prevention. Out Of the total, 803(62.2%) respondents were classified as having good practices toward trachoma prevention and control, with men (±SD) score of 3.7 (± 1.02) (Table 4).

3.5. Factors Associated with Good Knowledge of Trachoma

Factors associated with a good knowledge of trachoma prevention and control were also observed. The age of the head of the household was significantly associated with good knowledge (AOR, 10.02; 95% CI: 7.50–13.40) and good attitudes (AOR, 1.85; 95% CI: 1.41–2.43) (Table 5).

3.6. Factors Associated with Good Attitude towards Trachoma

Factors associated with good attitudes towards trachoma prevention and control were observed. The age of the head of the household was significantly associated with a good attitude (AOR 3.78; 95% CI: 2.86–4.99) and good knowledge (AOR 1.85; 95% CI: 1.41–2.43) (Table 6).

3.7. Factors Associated with Good Practice towards Trachoma

Factors associated with good practices towards trachoma prevention and control were also observed. Having every category of children's age was significantly associated with good practice (AOR 1.31; 95% CI: 0.40–1.71), distance to the drinking water source (AOR 2.44; 95% CI: 1.86–3.19), and cleanliness of child's face (AOR 29.5; 95% CI: 12.6–68.9) (Table7). 29.5; 95% CI: 12.6–68.9) (Table7).

4. DISCUSSION

The current study showed that the age of the household head was significantly associated with good knowledge and attitudes. Good attitude was significantly associated with good knowledge. Moreover, Distance to the drinking water source and cleanliness of the child's face were significantly associated with good practice. In this study, a significant majority 83.4% had ever heard of trachoma, indicating a relatively high level of awareness. This result agrees with those reported in other countries [4, 23, 26]. However, a substantial proportion of 24.0% of respondents did not perceive trachoma as a

Table 3. Attitude of the study community toward trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024).

Characteristics		n	(%)
Personal hygiene is important for trachoma prevention	Agree	955	74.0
	Disagree	335	26.0
Latrine utilization is important for trachoma prevention	Agree	1083	84.0
	Disagree	207	16.0
Taking MDA is important to prevent and control trachoma	Agree	1155	89.5
	Disagree	135	10.5
Availability of adequate water is important for trachoma prevention and control	Agree	1169	90.6
	Disagree	121	9.4
Protect yourself from this disease is important for trachoma control and prevention	Agree	1197	92.8
	Disagree	93	7.2
Mean ± SD	4.3 ± 0.89		
Median ± IQR (interquartile range)	5 ± 1		
Score of attitudes on trachoma prevention and control	Good	700	54.3
	Poor	590	45.7
The total number of participants was 1290. SD, standard deviation; IQR, interquartile range.			

Table 4. Practices of study Community of trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024)

Characteristics		n	(%)
Self-reported receipt of antibiotics during the rounds of MDA	Yes	1094	84.8
	No	196	15.2
Disposal of children's feces	Yes	478	37.1
	No	225	17.4
Utilization of adequate water for bathing	Yes	942	73.0
	No	348	27.0
Regular washing of hands and face with soap and water	Yes	646	50.1
	No	644	49.9
Availability of latrine facilities in the household	Yes	1199	92.9
	No	91	7.1
Utilization of adequate water for drink and washing	Yes	490	38.0
	No	800	62.0
Personal hygiene is important for trachoma prevention	Agree	955	74.0
	Disagree	335	26.0
Mean ±SD	3.7 ± 1.02		
Median ± IQR	4±1		
Score of practices on trachoma prevention and control	Good	803	62.2
	poor	487	(37.8)
The total number of children was 1290. SD, standard deviation; IQR, interquartile range.			

Table 5. Logistic regression analysis of selected variables with knowledge of study participants on trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024)

Variables	Knowledge Good (%) | Poor (%)	COR (95% CI)	P-value	AOR (95% CI)	P-value
Gender of the head of household					
Male	281 (47.8) | 401 (57.1)	0.69 (0.55-0.86)	0.001	0.85 (0.65-1.11)	0.234
Female	307 (52.2) | 301 (42.9)	1	–	1	–
Age of the head of household (years)					
≤ 40	588 (74.2) | 94 (18.9)	12.4 (9.41-16.31)	< 0.001	10.02 (7.50-13.40)	< 0.001
> 40	204 (25.8) | 404 (81.1)	1	–	1	–
Father's literacy status					
Literate	469 (55.4) | 213 (48.0)	1.35 (1.072-1.69)	0.011	1.19 (0.88-1.60)	0.265
Illiterate	377 (44.6) | 231 (52.0)	1	–	1	–
Mother's literacy status					
Literate	152 (57.1) | 530 (51.8)	1.24 (0.95-1.63)	0.117	1.15 (0.81-1.62)	0.441
Illiterate	114 (42.9) | 494 (48.2)	1	–	1	–
Father's employment status					
Employed	184 (49.2) | 498 (54.4)	0.81 (0.64-1.034)	0.092	0.79 (0.59-1.07)	0.131
Unemployed	190 (50.8) | 418 (45.6)	1	–	1	–
Cleanliness of the child's face					
No	557 (46.5) | 40 (44.0)	1.47 (0.96-2.26)	0.077	1.034 (0.597-1.79)	0.904
Yes	642 (53.5) | 51 (56.0)	1	–	1	–
Attitude Category					
Good	468 (68.6) | 232 (38.2)	3.54 (2.82-4.46)	< 0.001	1.85 (1.41-2.43)	< 0.001
Poor	214 (33.4) | 376 (61.8)	1	–	1	–

Table 6. Logistic regression analysis of selected variables with Attitude of study participants on trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024)

Variables	Attitude	COR (95% CI)	P-value	AOR (95% CI)	P-value
	Good (%) | Poor (%)				
Age of the head of household (years)					
≤40	550 (69.4) | 150 (30.1)	5.27 (4.13-6.73)	<0.001	3.78 (2.86-4.99)	<0.001
>40	242 (30.6) | 348 (69.9)	1		1	
Household size					
≤7	342 (52.2) | 358 (56.4)	0.85 (0.68-1.05)	0.133	0.88 (0.69-1.12)	0.291
>7	313 (47.8) | 277 (43.6)	1		1	
Father's employment status					
Employed	505 (55.1) | 195 (52.1)	0.89 (0.69-1.13)	0.328	1.18 (0.87-1.44)	0.392
Unemployed	411 (44.9) | 179 (47.9)	1		1	
Cleanliness to the child's face					
No	343 (45.1) | 417 (46.1)	1.29 (0.84-1.98)	0.240	0.98 (0.61-1.57)	0.921
Yes	656 (54.7) | 474 (48.4)	1		1	
Knowledge Category					
Good	468 (68.6) | 232 (38.2)	3.54 (2.82-4.46)	< 0.001	1.85 (1.41-2.43)	<0.001
Poor	214 (31.4) | 376 (61.8)	1		1	

Table 7. Logistic regression analysis of selected variables with Practices of study participants on trachoma in highly endemic districts of Hodeidah and Ibb governorates, Yemen (2024)

Variables	Practices	COR (95% CI)	P-value	AOR (95% CI)	P-value
	Good (%) | Poor (%)				
Age of the head of household (years)					
≤ 40	518 (65.4) | 285 (57.2)	1.41 (1.12-1.78)	0.003	1.32 (0.98-1.78)	0.066
> 40	274 (34.6) | 213 (42.8)	1	–	1	–
Household size					
≤ 7	422 (64.4) | 381 (60.0)	1.21 (0.96-1.5)	0.101	1.15 (0.89-1.47)	0.285
> 7	233 (35.6) | 254 (40.0)	1	–	1	–
Father's literacy status					
Literate	533 (63.0) | 270 (60.8)	1.097 (0.87-1.39)	0.440	0.78 (0.59-1.050)	0.103
Illiterate	313 (37.0) | 174 (39.2)	1	–	1	–
Distance to drinking water source (minutes)					
> 30	302 (32.1) | 185 (53.2)	2.41 (1.87-3.09)	< 0.001	2.44 (1.86-3.19)	< 0.001
≤ 30	640 (67.9) | 163 (46.8)	1	–	1	–
Cleanliness of the child's face					
No	402 (33.5) | 85 (93.4)	28.1 (12.2-64.9)	< 0.001	29.5 (12.6-68.9)	< 0.001
Yes	797 (66.5)| 6 (6.6)	1	–	1	–
Knowledge Category					
Good	437 (54.4) | 245 (50.3)	1.18 (0.94-1.48)	0.084	1.0 (0.724-1.29)	0.833
Poor	366 (45.6) | 242 (49.7)	1	–	1	–

significant community health issue, indicating a potential disparity between awareness and perceived risk. The current study showed that 50.8 % of respondents knew that trachoma can be transmitted by flies; there is still a considerable portion who are unaware of this mode of transmission. This result is similar to those reported in other countries[28, 29]. Knowledge of trachoma as a preventable disease was high 80.5%)[30] and most participants were aware of the importance of hand and face washing with soap 75. 6%. [17, 31]. A large majority 75.0% also recognized the potential of trachoma to lead to blindness [32, 33]. However, an IQR of 1 indicates a relatively narrow range of scores, suggesting that a significant portion of the population may still have limited knowledge about trachoma. Regarding the practices of respondents in the current study, 84.8% of the study population reported receiving antibiotics during MDA rounds, indicating a relatively high level of adherence to this crucial aspect for prevention and control trachoma. Regarding sanitation and hygiene: 37.1% of households do not practice safe disposal of children's feces, which is a major risk factor for trachoma transmission [34, 35]. It is important to improve environmental sanitation through the proper disposal of human excreta [36, 37]. While a majority 73.0% utilize adequate water for bathing, a substantial minority do not, potentially increasing the risk of eye infections. Additionally, 49.9% did not regularly wash their hands and face with soap and water, which is crucial for preventing the spread of trachoma [38, 39]. Nearly 92.9% of households have latrine facilities, the lack of proper fecal disposal practices remains a concern [40, 41, 42]. The majority 74.0%) agreed that personal hygiene is important for trachoma prevention, indicating some level of awareness. However, the lack of consistent practice in areas such as hand washing and fecal disposal suggests a gap between knowledge and behavior. Regarding Attitude, the majority of the community recognized the importance of key trachoma prevention strategies, including personal hygiene, latrine utilization, MDA, adequate water supply, and self-protection. How-

ever, a significant minority still undervalue the role of personal hygiene and latrine utilization in preventing trachoma. Moreover, approximately half of the community has a limited understanding of trachoma prevention and control measures. In the current study, Focus Group Discussion: Negative Attitudes Towards Healthcare: Participants expressed a general reluctance to seek medical care, particularly among women. This is attributed to financial constraints, rural living conditions, and deeply ingrained cultural beliefs. Additionally, despite their negative health impacts, the continuation of harmful cultural practices was linked to a lack of awareness and limited access to alternative solutions. Prioritization of Other Needs: Community members often prioritize other needs, such as food and shelter, sanitation, and health, leading to a neglect of trachoma prevention measures. The Participants strongly emphasized the need for continuous community education and awareness campaigns to address negative attitudes, promote healthy behaviors, and encourage the early diagnosis and treatment of trachoma. With poor Access to Safe Water, Participants acknowledged the significant role of water scarcity in the transmission of trachoma. The limited availability of water for personal hygiene, particularly for face washing, has been identified as a major contributing factor. Prioritization of essential water uses: Owing to water scarcity, community members prioritized cooking, drinking, and other essential uses over cleaning and hygiene practices. Lack of community awareness and education-limited knowledge of trachoma: Participants highlighted a lack of awareness about trachoma, its causes, symptoms, and prevention methods. Participants emphasized the importance of comprehensive education programs that address not only trachoma but also other health issues, such as hygiene and sanitation, and the importance of seeking timely medical care. This could result in positive attitudes towards trachoma prevention and control. The current study revealed that a good knowledge of trachoma was significantly associated with good practices and a good attitude toward trachoma prevention and control. This is supported by studies from other countries, which reported that knowledge was significantly associated with trachoma prevention and control practices [4, 15, 43]. The results indicate that younger age, female- headed households, and a positive attitude toward trachoma are associated with greater knowledge of the disease [44, 45, 46]. Older households (head of household > 40 years) were significantly more likely to have a poor attitude towards trachoma than younger households [32, 47]. This suggests a potential need for targeted interventions in older populations. Individuals with good knowledge of trachoma were significantly more likely to have a positive attitude towards the disease than those with poor knowledge. This highlights the importance of health education and awareness campaigns to improve attitudes and behaviors related to trachoma prevention and control. Younger families were more likely to adopt positive hygiene behaviors. This difference was statistically significant and persisted, even after controlling for other factors. Households farther from the water sources were significantly less likely to adopt good hygiene practices. This strong association remained significant both before and after adjusting for the other factors. Families with clean children were significantly more likely to adopt positive hygiene behaviors. While the current study reveals that practice scores exceed knowledge and attitude scores, this is a common phenomenon in health-related studies, particularly in low-resource settings. This can be attributed to several factors: Community Norms, Cultural Practices, Cultural norms, and traditional practices that can significantly influence behaviors, even if individuals lack complete knowledge of the underlying reasons. For instance, certain cultural practices related to hygiene and sanitation might be deeply ingrained, leading to higher practice scores, despite lower knowledge levels. Community Pressure: Societal expectations and peer pressure can also drive behaviors, leading to adherence to practices without a full understanding of their rationale. Economic Factors: Economic limitations can hinder access to essential resources, further impacting practice. Health Literacy and Communication: Complex Information: Health information can be complex and difficult to understand, particularly for individuals with low literacy levels. This can lead to knowledge gaps and misconceptions, while practical skills such as proper hand washing can be more easily learned and implemented. Effective Communication: Health education campaigns and messages can influence knowledge and attitudes. However, behavioral changes often require more than just information, which necessitates consistent reinforcement and motivation. Visual Impairment: Trachoma often progresses slowly and early signs may not be easily discernible. This can lead to delayed recognition of the disease and a reduced motivation to seek treatment or preventive measures. Cultural Practices: Certain cultural practices, such as face washing with contaminated water, may contribute to trachoma transmission. Despite the limitations and caution required in interpreting the results, this study contributes to a broader understanding of trachoma control efforts and underscores the importance of MDA interventions in reducing the burden of trachoma in endemic areas of Brazil.

5. CONCLUSION

Despite widespread awareness, a significant gap exists between knowledge and prevention of trachoma. Age and attitude influenced knowledge and practices, with older individuals and those with positive attitudes demonstrating better outcomes. Access to clean water and sanitation significantly impacts hygiene practices. However, cultural norms and limited access to healthcare

hinder the implementation of preventive measures. To address this, targeted campaigns are required to improve knowledge and promote hygiene practices. Expanding healthcare services and improving access to clean water and sanitation, especially in rural and marginalized areas, is crucial. Tailoring interventions based on local cultural norms can enhance their effectiveness.

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AUTHOR CONTRIBUTIONS

SAA conceived the study and implemented the fieldwork. SAA, YAR, MAKM and TAH designed the study. SAA, YAR, MAKM, and AAHN analyzed the data, interpreted the results, and drafted the manuscript. SAA and YAR drafted the manuscript. All authors read, revised, and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIALS

All relevant data have been included in the manuscript, and the datasets for the study are available from the corresponding author upon reasonable request.

DECLARATIONS

Ethics approval and consent to participate The study protocol was approved by the Research Ethics Committee of the Faculty of Medicine and Health Sciences of Sana'a University, Yemen. Oral informed consent was obtained from the heads of households or their legal representatives after they were briefed about the nature and purpose of the study. The privacy of the participants and confidentiality of their data were ensured.

CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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