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Highlights

- About 40% of respondents showed good knowledge and practices on filariasis
- Knowledge and practices were significantly higher in test sites than control areas
- Knowledge and practices showed a strong positive correlation
- Education, income, and age influenced knowledge, while age and education influenced practices
- Higher vector abundance and zoonotic potential were found in BF-positive areas

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Knowledge and Practices Related to Brugian Filariasis among Communities in Filariasis-Affected and Control Areas of Puttalam District, Sri Lanka

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Abstract

Brugian Filariasis (BF), previously eliminated in Sri Lanka by 1967 through vector control targeting *Mansonia* mosquitoes, has re-emerged in Puttalam District with 109 cases reported between 2005 and 2021, the highest being 51 cases in Puttalam. This study investigated the socio-demographic and environmental factors associated with BF transmission and community knowledge and practices. A community-based cross-sectional study was conducted from December 2021 to March 2022 across three test sites, Puruduwella, Nelumpokuna, and Thummodara, and one control site, Karavitagara. A total of 320 individuals were surveyed using an interviewer-administered questionnaire. Of the respondents, 40.3% (n=129) demonstrated good knowledge and 40% (n=128) exhibited good practices related to filariasis infection and control. Knowledge (8.8±0.2) and practices (2.3±0.1) were significantly higher in test sites than the control ($p<0.001$), with strong positive correlation ($r=0.348$; $p<0.001$). Education level ($p=0.011$), income ($p=0.002$), and age ($p=0.032$) were significantly associated with good knowledge, while good practices were significantly associated with lower education ($p=0.029$) and younger age groups ($p<0.001$). Notably, respondents without formal education ($p=0.011$) and those earning <20,000 LKR/month ($p=0.002$) showed significantly better knowledge. Residents with BF cases in the household had significantly higher knowledge ($r=0.138$; $p=0.013$), though practice was not correlated ($p=0.470$). A rise in the number of reservoir hosts, such as dogs and cattle, in BF-positive areas, together with high mosquito densities observed during entomological surveys, suggests the potential for zoonotic transmission. These findings underscore the need for targeted and inclusive health education and vector control strategies across socio-economic strata to sustain filariasis elimination in endemic regions.

Keywords: Brugian filariasis; Knowledge and practices; Socio-economic factors; Vector abundance; Zoonotic transmission

INTRODUCTION

Both *Wuchereria bancrofti* and *Brugia malayi* infections were prevalent in Sri Lanka in the past, and successful vector control activities targeted at *Mansonia* mosquitoes resulted in complete clearance of Brugian Filariasis (BF) by 1967 (Schweinfurth, 1983). Sri Lanka was awarded WHO validation in 2016 for eliminating lymphatic filariasis (LF) as a public health problem. However, AFC-SL statistics showed that there were 109 BF case records in Sri Lanka from 2005 up to 2021 and the highest number of BF patients i.e. 51cases were reported in Puttalam District (AFC, 2021, 2023). They were reported from 9 out of the 13 MOH (MOH area is the basic geographic subdivision in the preventive health care system of Ministry of Health, Sri Lanka) areas in Puttalam district. BF positive cases were reported in Madampe (17 cases), Dankotuwa (10 cases), Mahawewa (9 cases), Nattandiya (7 cases), Arachchikattuwa, Mundel, and Puttlam with 2 cases each and Chilaw and Kalpitiya with 1 case each (AFU, 2021). Furthermore, on a smaller geographical scale, for example, within Grama Niladhari (GN) divisions, BF cases were reported in some GN divisions, while other GN divisions within the same MOH area had no positive BF cases. There were reports to suggest that in GN divisions which were negative for BF cases, the mosquitoes were found to be positive for *B. malayi*. e.g: In Jayarathnagama, Siththampalamwatta, Issanmadilla, and Galahitiyawa GN divisions of Madampe MOH area (AFU, 2021). Such observations suggested that occurrence of BF

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cases in the community may not be always related to the prevalence and abundance of mosquito vectors, and that there may be yet other factors causing the transmission of BF in Puttlam district.

Studies around the world have identified various contributing factors unique to each environment and its associated human population; knowledge of the disease, practices pertaining to vector breeding, exposure to the vector and even some socio-economic characters increasing the risk of exposure to the vector. Observations on zoonotic filarial infections suggests dogs and cats as potential reservoirs for human dirofilariasis and BF in Sri Lanka (Mallawarachchi et al., 2018). Thus, to analyze the occurrence of BF in the Puttalam District, it was considered appropriate to include investigations into community knowledge of human BF infections, mosquito vectors, and community practices that may influence BF transmission, such as mosquito control methods and the rearing of reservoir hosts, which are potential risk factors for BF in Sri Lanka.

Despite the elimination status, evidence on behavioural and ecological determinants of residual transmission in the post-elimination phase remains limited. The current study addresses this gap by identifying community-level risk factors that can support risk-based surveillance and targeted interventions under Sri Lanka's Anti-Filariasis Campaign. The findings also provide insights for sustaining lymphatic filariasis elimination and preventing resurgence in other endemic countries.

MATERIALS AND METHODS

Study design and Ethics approval

The methodology of the study involved collecting information from the community residing in study sites. Ethical approval was obtained from the Ethics Review Committee of the Institute of Biology, Sri Lanka (Registration No: ERC IOBSI. 254 11 2021).

Study Site and Study Implementation

Since the study was on investigating factors involved in BF case distribution, it was conducted over a four-month period from December 2021 to March 2022 in areas where BF cases were reported, and the findings were compared with an area where BF cases had not been reported in the Puttalam district. Accordingly, 3 GN divisions in Puttalam district, namely Puruduwella (70 28' N 790 52' E), Nelumpokuna (70 48'N 790 84' E) and Thummodara (70 23' N 790 51'E), where recent BF patients were reported (AFC, 2020) were selected and were considered as test sites. A control site in Karavitagara (Weerakelewatta) GN (70 55' N 790 E) division where no BF cases were reported (2005-2020) was selected for the study (Figure 1).

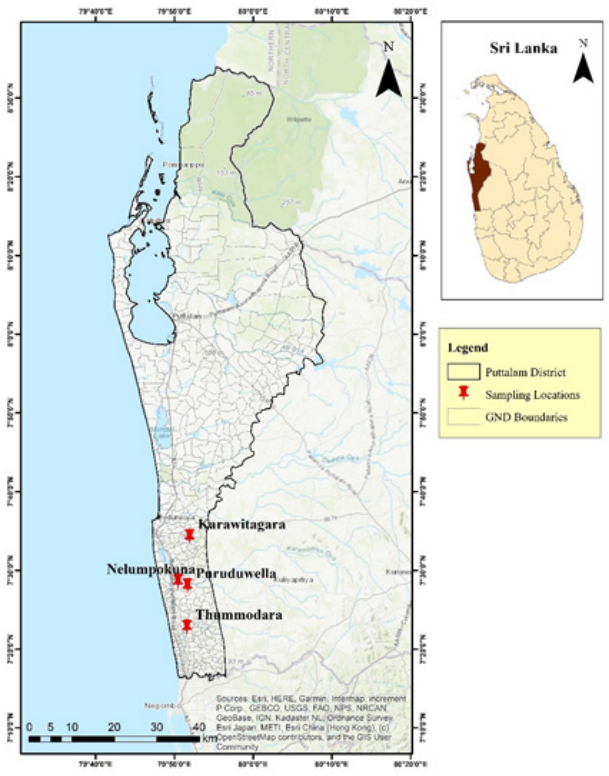

Figure 1: Sampling locations for the three test sites Nelumpokuna, Puruduwella, Thummodara and the control site Karawitagara in Sri Lanka

Study participants for the community survey

Eighty individuals from each study site were interviewed at their residencies from the selected GN divisions. Residences were selected within a 1 km radius of previously recorded *Brugia* filariasis (BF) patient locations in the intervention sites. For the control site, households were selected within a 1 km radius of a known potential breeding habitat of vector mosquitoes, Karavitagara Wewa. The 1 km radius was determined based on the reported minimum flight range of *Mansonia* mosquitoes, as described by Gass et al. (1983).

Sample size

This community-based survey was conducted parallel to the entomological assessment of BF vectors in three test sites and one control site to enable integrated evaluation of vector density and human behavioural risk factors. As transmission of BF is influenced by both ecological and socio-behavioural determinants, concurrent data collection allowed contextual interpretation of vector findings. Three test sites with identified vector presence and one control site were included to permit comparative analysis and strengthen internal validity. Eighty individuals per site were interviewed to ensure balanced representation and enable statistically meaningful site-wise comparisons. The sample size was calculated using the single population proportion formula, $n = Z^2(1-p)/d^2$n, assuming a 95% confidence level (Z = 1.96), a 5% margin of error, and a conservative expected proportion of 50% due to the absence of prior

community-based estimates. The initial sample size was 384. Considering field feasibility, resource constraints, and the clustered multi-site design, a total sample of 320 households was selected, which still provides adequate precision for community-based analysis.

Study instrument for the community survey

The questionnaire was developed based on previously published and validated instruments used in filariasis and vector-borne disease knowledge, attitude, and practice (KAP) studies. Items were adapted to suit the local context of Sri Lanka while retaining the core constructs measured in earlier research. Content validity was ensured through review by subject experts in parasitology and public health. Although formal reliability testing (e.g., Cronbach's alpha) was not performed, the use of established questions and expert evaluation supports the appropriateness and consistency of the instrument for the study population. Knowledge and practice of lymphatic filariasis with reference to prevention was measured on a single adult (>18 years) respondent in each household using a interviewer-administered questionnaire, preferably the head of the household or any family member known to provide health responses. Because the household was the unit of analysis, and because preventive practices (participation in mass drug administration; use of vector control) are typically carried out at the level of household, we assumed one key informant could represent knowledge and practice within a household. This method is in line with conventional KAP survey modus operandi and limits intra-household response correlation. Prior to the information collection, informed written consent was obtained from the respondents.

Data analysis

Data were analysed using SPSS statistical software (version 22.0). Two analytical approaches were used. The first model considered their knowledge and preventive practices of BF as the dependent variables with socio-demographic features (age, sex, education, occupation) environmental factors (proximity to water bodies and aquatic vegetation) and site type (test vs control) as independent variables. A second analysis, using the presence of BF cases at site level (test vs control), as dependent variable was done to determine associations with knowledge, practices and some socio-demographic and environmental variables.

Knowledge and practice domains were quantified by scoring responses to individual questionnaire items and summing them to generate composite scores. For the knowledge component, each response was classified as correct (score = 1) or incorrect (score = 0) based on current scientific evidence from the literature. The total knowledge score therefore ranged from 0 to 16. Knowledge scores were dichotomized using the mean score as the cut-off point and categorized as "poor" (0–10) and "good" (11–16). Practices were assessed using a similar scoring method. Individual practice items were scored and summed to obtain a total practice score ranging from 0 to 8. Based on the mean score, practice levels were categorized as "poor" (0–2) and "good" (3–8).

Descriptive statistics, including means, standard deviations, and ranges, were used to summarize knowledge and practice levels. Multiple logistic regression analysis was conducted to identify factors associated with good knowledge and good practice categories. Since both knowledge and practice scores were normally distributed, Pearson's correlation coefficient was used to assess the relationship between self-experience of filarial infection and knowledge and practice scores. Pearson correlation analysis was also performed to examine the association between continuous knowledge and practice scores.

Associations between categorical variables, such as age group and knowledge category, were evaluated using the chi-square test. Association between the mean knowledge and practice scores between the sites were analysed using ANOVA. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

Knowledge and practice on filariasis infection and control

Of the 320 total respondents 40.3% (n=129) had good knowledge while 59.4% (n=190) had poor knowledge. The mean knowledge of all test sites together was higher than that of the control site (Figure 2). Out of 320 total respondents 40% (n=128) had good practices while 60% (n=192) had poor practices. The mean practice score of all test sites together was higher than that of the control site (Figure 2).

A one-way ANOVA revealed a statistically significant difference in mean knowledge scores among Puruduwella, Nelumpokuna, Karavitagara (control site), and Thummodara ($F= 23.5867$, $p < 0.001$). Post hoc comparisons using Tukey's HSD test demonstrated that Puruduwella had significantly higher mean knowledge scores compared to Nelumpokuna, the control site: Karavitagara, and Thummodara. Nelumpokuna also had significantly higher scores than the control site and Thummodara (Table 1). Additionally, the control site demonstrated a significantly higher mean knowledge score compared to Thummodara (Table 1). Overall, mean knowledge scores followed the order: Puruduwella > Nelumpokuna > Karavitagara (control site) > Thummodara.

A one-way ANOVA revealed a statistically significant difference in mean practice scores among Puruduwella, Nelumpokuna, Thummodara, and the control site ($F=10.7544$, $p < 0.001$). Post hoc analysis using Tukey's HSD test demonstrated that Nelumpokuna had significantly higher mean practice scores compared to Puruduwella, Thummodara, and the control site, Karavitagara (Table 1). No statistically significant differences were observed between Puruduwella and Thummodara, Puruduwella and

the control site, or Thummodara and the control site ($p > 0.05$) (Table 1). Overall, practice scores were highest in Nelumpokuna and lowest in the control site.

Socio-economic factors associated with knowledge and practice

Good knowledge on filariasis was significantly associated only with the Education level (χ^2=14.76; p=0.011) and the income level (χ^2=17.54; p=0.002). Surprisingly, respondents that possessed the highest educational qualification; degree, did not have a good knowledge compared to those who had a lower educational level (Table 2, 3). The respondents who had only a secondary education has a significantly higher knowledge than the respondents who had no formal education (OR=3.1421) and who had a primary educational qualifications (OR=4.3459) (Table 3). Since only two respondents without formal education demonstrated good knowledge, comparisons with other educational categories may be subject to bias due to the limited representation in this subgroup. Similarly the respondents with O/L education qualifications and A/L qualifications, were having significantly good knowledge than the respondents with secondary education (OR=5.4822, OR=3.3876 respectively; Table 3). When considering the income levels, the highest proportion with good knowledge was among the residents who earn 40,000 LKR per month or more (47.9%). The respondents with higher income levels had better knowledge than the respondents with "no income" (Table 3).

Good knowledge on filariasis were significantly associated with the age (χ^2=8.816; p=0.032) where, mature adults were having a significantly higher knowledge than adolescents (χ^2=5.752; p=0.016) and midlife adults (χ^2=4.619; p=0.031) (Table 4). The proportion of respondents with good knowledge and good mosquito control practices varied across age groups. Among adolescents (n = 17), 17.6% (3) had good knowledge, while 76.5% (13) demonstrated good practices. Among early adults (n = 94), 39.4% (37) had good knowledge and 53.2% (50) demonstrated good practices. Among midlife adults (n = 81), 33.3% (27) had good knowledge and 24.7% (20) demonstrated good practices. Among mature adults (n = 128), 48.4% (62) had good knowledge and 39.0% (50) demonstrated good practices.

Good practice on vector mosquito control was significantly associated with the Education level (χ^2=12.5; p=0.029). The respondents with A/L education qualifications had better knowledge than the respondents with primary education (OR=1.8152), secondary education (OR=2.1913) and ones with O/L (OR=1.8418) (Table 3). Good practice on vector mosquito control were significantly associated with the age where, adolescents having a significantly higher good practice than midlife adults (χ^2=16.867; p<0.001) and mature adults (χ^2=8.165; p=0.004). Early adults having a significantly higher good practice than Midlife adults (χ^2=14.725; p<0.001) and Mature adults (p<0.048).

Good knowledge on filariasis were significantly associated with the age (χ^2=8.816; p=0.032) where higher age categories were having more knowledge and good practices. Good practice on vector mosquito control were significantly associated with the age (χ^2=23.349; p<0.001) where, younger age groups were having better practices.

Knowledge of filariasis was not significantly associated with family size, gender, nationality, religion, or employment status (all $p > 0.05$).

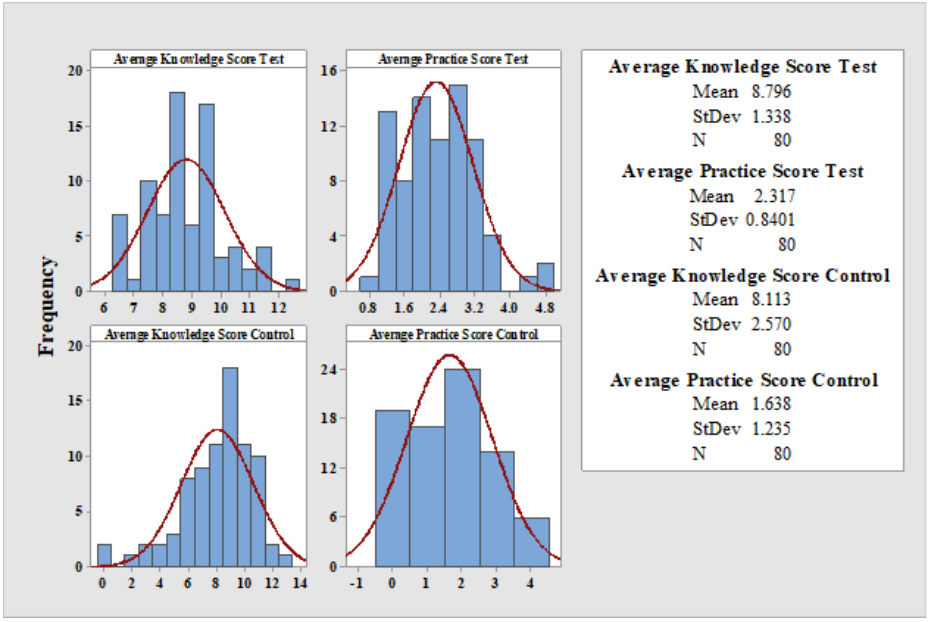

Figure 2: Frequency distributions of average knowledge and practice scores in the test and control groups (Karavitagara population) with fitted normal curves. The corresponding mean, standard deviation (SD), and sample size (N) are shown for each group

Table 1: Tukey HSD in Comparison of Filariasis Knowledge and Practice among and between Study Sites

Knowledge Comparison					
Pair	**Difference**	**Q**	**Lower CI**	**Upper CI**	**p-value**
P-N	3.075	11.2858	2.0798	4.0702	<0.001*
P-K	2.05	7.5238	1.0548	3.0452	<0.001*
P-T	1.025	3.7619	0.02979	2.0202	0.0407*
N-K	1.025	3.7619	0.02979	2.0202	0.0407*
N-T	2.05	7.5238	1.0548	3.0452	<0.001*
K-T	1.025	3.7619	0.02979	2.0202	0.0407*
Practice Comparison					
Pair	**Difference**	**Q**	**Lower CI**	**Upper CI**	**p-value**
N-P	0.7875	5.3304	0.2479	1.3271	<0.01*
N-T	0.125	0.8461	-0.4146	0.6646	0.9325
N-K	0.375	2.5383	-0.1646	0.9146	0.2777
P-T	0.6625	4.4843	0.1229	1.2021	0.0090*
P-K	1.1625	7.8687	0.6229	1.7021	<0.001*
T-K	0.5	3.3844	-0.03962	1.0396	0.0804

*Denotes the significance at p <0.05 level. N-Nelumpokuna, P-Puruduwella, T-Thummodara and K-Karavitagara (control site)

Table 2: Socio-economic characteristics of respondents from the four study sites, presented as frequency and percentage (n, %)

Parameter	**Percentage of sample and Frequency (%) (n)**				
	Puruduwella	**Nelumpokuna**	**Thummodara**	**Karavitagara**	**Total**
Gender					
Male	51.2 (41)	55.0 (44)	56.3 (45)	63.8 (51)	56.6 (181)
Female	48.8 (39)	45.0 (36)	43.7 (35)	36.2 (29)	43.4 (139)
Age Groups					
Adolescents (12-20 years)	6.2 (5)	2.5 (2)	5.0 (4)	7.5 (6)	5.3 (17)
Early adults (21-35 years)	29.6 (24)	30.9 (25)	30.0 (24)	26.3 (21)	29.4 (94)
Midlife adults (36-50 years)	27.2 (22)	28.4 (23)	22.5 (18)	22.5 (18)	25.3 (81)
Mature adults > 51years	35.8 (29)	37.0 (30)	42.6 (34)	43.8 (35)	40.0 (128)
Nationality					
Sinhala	97.5 (78)	98.8 (79)	92.5 (74)	100.0 (80)	97.2 (311)
Tamil	2.5 (2)	1.3 (1)	7.5 (6)	—	2.8 (9)
Religion					
Buddhists	100.0 (80)	90.0 (72)	52.5 (42)	100.0 (80)	77.2 (274)
Hindu	—	—	6.2 (5)	—	1.6 (5)
Catholic	—	10.0 (8)	41.3 (33)	—	12.8 (41)
Family Members					
1	6.3 (5)	6.3 (5)	1.3 (1)	5.0 (4)	4.7 (15)
2	12.5 (10)	6.3 (5)	20.0 (16)	16.3 (13)	13.8 (44)
3	25.0 (20)	16.3 (13)	23.8 (19)	28.8 (23)	23.4 (75)
4	17.5 (14)	28.8 (23)	26.3 (21)	28.8 (23)	25.3 (81)
5	21.3 (17)	28.8 (23)	11.3 (9)	18.8 (15)	20.0 (64)
6	12.5 (10)	8.8 (7)	16.3 (13)	—	9.4 (30)

>7	5 (4)	5 (4)	1.3 (1)	2.5 (2)	3.4 (11)
Educational Qualifications					
No formal education	7.5 (6)	—	—	1.3 (1)	2.2 (7)
Only primary education (Grade 1-5)	7.5 (6)	2.5 (2)	6.3 (5)	22.5 (18)	9.7 (31)
Only secondary education (Grade 6-11)	50.0 (40)	51.3 (41)	23.8 (19)	55.0 (44)	45.0 (144)
G.C.E. O/L passed & vocational trained	6.3 (5)	32.5 (26)	30 (24)	10.0 (8)	19.7 (63)
G.C.E. A/L passed	23.8 (19)	12.5 (10)	31.3 (25)	11.3 (9)	19.7 (63)
Graduates	5.0 (4)	1.3 (1)	8.8 (7)	—	3.8 (12)
Employment					
Employed	42.5 (34)	37.5 (30)	45.0 (36)	50.0 (40)	43.8 (140)
Unemployed	57.5 (46)	62.5 (50)	55.0 (44)	50.0 (40)	56.2 (180)
Income Level					
No income	2.5 (2)	1.3 (1)	8.9 (7)	0	3.1(10)
Daily Income	31.3 (25)	10.0 (8)	11.4 (9)	36.3 (29)	22.3 (71)
<20,000 LKR	10.0 (8)	15.0 (12)	20.3 (16)	2.5 (2)	11.9 (38)
LKR 20,000 - 39,999	7.5 (6)	20. 0 (16)	20.3 (16)	17.5 (14)	16.3 (52)
LKR. 40,000 and more	48.8 (39)	53.8 (43)	39.2 (31)	43.8 (35)	46.4 (148)
Roof of the house					
Roof Tile	95.0 (76)	83.8 (67)	98.8 (79)	85.0 (68)	90.6 (290)
Asbestos	—	1.3 (1)	—	—	0.3 (1)
Concrete	2.5 (2)	—	—	—	0.6 (2)
Roof Tile + Asbestos	2.5 (2)	13.8 (11)	—	5.0 (4)	5.3 (17)
Asbestos + Concrete	—	1.3 (1)	—	2.5 (2)	0.9 (3)
Roof Tile + Amano	—	—	1.3 (1)	7.5 (6)	2.2 (7)
Walls of the house					
Bricks	28.8 (23)	62.5 (50)	66.3 (53)	45.0 (36)	50.6 (162)
Cement	20.0 (16)	2.5 (2)	28.8 (23)	11.3 (9)	15.6 (50)
Cement Blocks	46.3 (37)	31.3 (25)	1. 3 (1)	27.5(22)	26.7 (85)
Mud	5.0 (4)	3.8 (3)	3.8 (3)	1.3 (1)	3.4 (11)
Cadjan	—	—	—	2.5 (2)	0.6 (2)
Wood	—	—	—	7.5 (6)	1.9 (6)
Wood + Cadjan	—	—	—	2.5 (2)	0.6 (2)
Bricks + Cadjan	—	—	—	2.5 (2)	0.6 (2)
Floor of the house					
Cement	62.5 (50)	73.8 (59)	62.5 (50)	80.0 (64)	69.7 (223)
Floor Tile	5.0 (4)	7.5 (6)	32.5 (26)	7.5 (6)	13.1 (42)
Mud	5.0 (4)	0	2.5 (2)	5.0 (4)	3.1 (10)
Cement + Floor Tile	27.5 (22)	18.8 (15)	2.5(2)	7.5 (6)	14.1 (45)

A single respondent from Thummodara study site has not provided the information for income

Table 3: Association of socio-demographic factors with good knowledge of filariasis and good mosquito control practices among respondents, including odds ratios (OR), 95% confidence intervals (CI), χ^2 statistics, and P values

Socio-demographic factors (total number of respondents in each category)	Good Knowledge					Good Practice				
	% (n)	OR	95% CI	χ^2	P Value	Good % (n)	OR	95% CI	χ^2	P Value
Family Members (320)		0.9743	(0.8178, 1.1608)	0.09	0.771		1.0326	(0.8704, 1.2250)	0.14	0.713
Gender		0.9365	(0.5597, 1.5669)	0.06	0.803		1.2039	(0.7258, 1.9967)	0.52	0.472
Female (139)	55.4 (77)					53.2 (74)				
Male (181)	28.7 (52)					33.7 (61)				
Nationality		3.1585	(0.2218, 44.9878)	0.78	0.379		2.4306	(0.1622, 36.4150)	0.42	0.515
Sinhalese (311)	40.5 (126)					40.8 (127)				
Tamil (9)	44.4 (4)					22.2 (2)				
Religion				1.68	0.431				2.03	0.363
Buddhist (274)	42.0 (115)	0.6153	(0.0359, 10.5349)			41.6 (114)	0.1699	(0.0062, 4.6338)		
Hindu (5)	60.0 (3)	0.5959	(0.2656, 1.3371)			20.0 (1)	0.6763	(0.3064, 1.4928)		
Catholic (41)	29.3 (12)	0.9686	(0.0538, 17.4242)			31.7 (13)	3.9817	(0.1436, 110.4395)		
Employment		1.2943	(0.7717, 2.1708)	0.96	0.327		0.8321	(0.5018, 1.3800)	0.51	0.477
Unemployed (180)	41.1 (74)					55.7 (78)				
Employed (140)	46.4 (65)					37.2 (67)				
Educational Qualification				14.76	*0.011				12.5	*0.029
1. No education (7)	28.5 (2)					85.7 (6)				
2. Only primary education (Grade 1-5) (31)	16.1 (5)	0.723	(0.1051, 4.9723)			35.5 (11)	0.1056	(0.0108, 1.0311)		
3. Only secondary education (Grade 6-11) (144)	45.1 (65)	[1]3.1421	(0.5696, 17.3371)			34.0 (49)	0.0875	(0.0100, 0.7688)		
		[2]4.3459	(1.4926, 12.6541)				0.8284	(0.3379, 2.0310)		

4. G.C.E. O/L passed & vocational trained (63)	47.6 (30)	[1]3.9636	(0.6726, 23.3559)		31.7 (25)	0.1041	(0.0113, 0.9619)	
		[2]5.4822	(1.7357, 17.3158)			0.9855	(0.3682, 2.6379)	
		[3]1.2615	(0.6586, 2.4163)			1.1897	(0.6188, 2.2874)	
5. G.C.E. A/L passed (63)	38.1 (24)	[1]2.4493	(0.4137, 14.4991)		52.4 (33)	0.1917	(0.0207, 1.7753)	
		[2]3.3876	(1.0396, 11.0393)			[2]1.8152	(0.6564, 5.0200)	
		[3]0.7795	(0.4029, 1.5079)			[3]2.1913	(1.1458, 4.1907)	
		[4]0.6179	(0.2869, 1.3309)			[4]1.8418	(0.8667, 3.9139)	
6. Degree Holders (12)	25.0 (3)	[1]0.9422	(0.1071, 8.2914)		33.3 (4)	0.0769	(0.0064, 0.9314)	
		[2]1.3033	(0.2297, 7.3927)			0.7281	(0.1582, 3.3520)	
		[3]0.2999	(0.0709, 1.2685)			0.879	(0.2338, 3.3051)	
		[4]0.2377	(0.0539, 1.0484)			0.7388	(0.1870, 2.9190)	
		[5]0.3847	(0.0869, 1.7030)			0.4011	(0.1019, 1.5792)	
Income Level				17.54 *0.002				4.19 0.38
1. No income (10)	10.0 (1)				0.3 (1)			
2. Daily Income (71)	45.1 (32)	[1]10.0481	(0.4890, 206.4780)		9.1 (29)	[1]5.906	(0.3760, 92.7707)	
3. <20,000 LKR (38)	34.2 (13)	[1]6.172	(0.2857, 133.3201)		5.0 (16)	[1]7.1507	(0.4354, 117.4346)	
		0.6142	(0.2560, 1.4736)			1.2108	(0.5231, 2.8022)	
4. LKR 20,000 - 39,999 (52)	23.1 (12)	[1]2.6958	(0.1242, 58.5189)		5.0 (16)	[1]4.0674	(0.2422, 68.3141)	
		0.2683	(0.1160, 0.6205)			0.6887	(0.3066, 1.5470)	
		0.4368	(0.1653, 1.1544)			0.5688	(0.2292, 1.4119)	
5. LKR. 40,000 and more (148)	47.9 (71)	[1]10.0801	(0.4830, 210.3637)		20.6 (66)	[1]6.2759	(0.3913, 100.6564)	
		1.0032	(0.5246, 1.9183)			1.0626	(0.5510, 2.0494)	
		1.6332	(0.7251, 3.6787)			0.8777	(0.4085, 1.8856)	
		[4]3.7392	(1.7649, 7.9221)			1.543	(0.7656, 3.1097)	

*Denotes the significance at <0.05 level. OR denotes Odds Ratio, CI denotes Confidence Interval. Superscript numerals ([1], [2], [3], [4]) correspond to the numbered categories within each socio-demographic variable as listed in the table. For each variable, one category was treated as the reference group, and odds ratios were calculated relative to that category. Where statistically significant associations were observed, the corresponding reference category is indicated in the superscript

Knowledge was positively correlated with mosquito control practices ($r = 0.348$, $p < 0.001$), indicating that respondents with higher levels of knowledge tended to report better practices. The presence of a filariasis patient in the household was also positively correlated with knowledge ($r = 0.138$, $p = 0.013$). However, no significant correlation was observed between the presence of a filariasis patient in the household and mosquito control practices ($r = 0.041$, $p = 0.470$).

Among the possible reservoir hosts, dog population in Puruduwella was significantly higher than that of the Karavitagara ($p = 0.026$). Similarly, cattle were found in all three tests sites but was absent from the control site Karavitagara (Figure 3).

DISCUSSION

This study assessed knowledge and practices on filariasis and mosquito vector control in a selected community in Sri Lanka, revealing significant associations with education, income, age, and geographic location. These findings align with and expand upon previous national research, offering deeper insight into behavioral determinants and public health gaps.

The overall knowledge level among respondents was moderate, with only 40.3% demonstrating good knowledge. This is consistent with findings from Chandrasena et al. (2016), who reported limited community awareness in post-Mass Drug Administration (MDA) settings, despite ongoing transmission in districts like Colombo and Gampaha. The current study further highlights that knowledge was significantly higher in test sites such as Puruduwella and Nelumpokuna compared to the control site Karavitagara ($p<0.001$), suggesting that localized interventions or environmental exposure may influence awareness.

Education was a strong predictor of both knowledge and practice. Respondents with secondary and A/L qualifications had significantly better knowledge and practices than those with primary or no formal education. This supports findings from the Anti-Filariasis Campaign, which emphasizes the role of Information, Education, and Communication (IEC) activities in improving community engagement (AFC, 2023). Interestingly, those with degree-level qualifications did not demonstrate superior knowledge, which may reflect gaps in public health messaging or a lack of engagement with community-level health initiatives. The limited number of respondents without formal education (n=2) who showed good knowledge suggests caution in interpreting comparisons due to potential bias from small subgroup representation. Several studies have demonstrated a positive association between educational attainment and subject-specific knowledge, with higher levels of education generally corresponding to a better understanding of the topic (Selvarajoo et al., 2020; Udayanga et al., 2018; Zibran et al., 2019). Nevertheless, knowledge gaps persist, particularly in rural and endemic settings. For example, Ramaiah et al. (1996) reported notably poor knowledge regarding the transmission and prevention of filariasis in rural areas of South India. Similarly, Titaley et al. (2018) observed that fewer than half of respondents across three districts or cities in Indonesia possessed a high level of knowledge about lymphatic filariasis (LF).

Income level also played a significant role, with higher-income groups demonstrating better knowledge, where with individuals earning ≥40,000 LKR per month showing the highest proportion of good knowledge (47.9%). Respondents with higher income levels had better knowledge than those with no income, indicating that economic stability may facilitate access to health information and services as previously reported by Premaratna et al. (2018), who found that economic stability improves access to health services and preventive measures. The lack of consistent association between better knowledge and higher education/income levels might reflect the effect of focused awareness campaigns in endemic settings, local cultural practices or dependence on prescriber directives compared to independent health-seeking behaviour.

Age was significantly associated with both knowledge and practice. Mature adults demonstrated significantly higher knowledge scores than adolescents and midlife adults ($\chi^2 = 8.816$; $p = 0.032$). In contrast, younger age groups, particularly adolescents and early adults, exhibited significantly better mosquito control practices ($\chi^2 = 23.349$; $p < 0.001$). Notably, while knowledge tended to increase with age, especially among mature adults, preventive practices were more prevalent among younger individuals. This discrepancy suggests that although older adults may possess greater awareness, younger populations may be more proactive in adopting and implementing preventive behaviours. A comparable trend was reported in Northwest Ethiopia, where healthcare workers aged 31 years and above were nearly three times more knowledgeable about infection prevention than those aged 21–25 years (Desta et al., 2018).

Contrary to expectations, variables such as gender, nationality, religion, employment status, and family size were not significantly associated with knowledge or practice, suggesting that these demographic factors may have a limited influence on filariasis-related behaviors in the studied communities. These findings are consistent with previous research on dengue and filariasis in other settings (Al-Abd et al., 2014; Hairi et al., 2003; Selvarajoo et al., 2020; Udayanga et al., 2020). Similarly, a study in North Central Nigeria reported no significant association between awareness of lymphatic filariasis and gender, age, education, or occupation (Amaechi et al., 2016). Most of these variables, with the exception of employment status, are intrinsic characteristics that are generally stable throughout life, which may explain their lack of association with disease knowledge. In contrast, employment status is shaped by an individual's environment and experiences, suggesting that occupational roles could potentially influence knowledge

related to filariasis prevention and control. Although this study did not investigate that relationship, future research could provide valuable insights into how occupation impacts disease awareness and preventive behaviors.

The positive correlation between knowledge and practice ($r = 0.348$; $p < 0.001$) underscores the critical role of targeted education in promoting behavioral change. However, the presence of filariasis patients in the household was only weakly associated with knowledge ($r = 0.138$; $p = 0.013$) and showed no significant association with practice ($r = 0.041$; $p = 0.470$), suggesting that personal experience alone may be insufficient to motivate sustained preventive behaviors. Lymphatic filariasis has persisted in Sri Lanka for a long period. Given that the disease is generally not life-threatening and effective treatment is readily available through Anti-Filariasis Campaigns (AFCs), public engagement in vector control practices may have declined. Community-level differences were evident: there was a significant positive correlation between knowledge of filariasis and the presence of cases within the community. For instance, in Karavitagara, only 30% (n = 24) of individuals in had good knowledge, whereas 70% (n = 56) had poor knowledge. This pattern aligns with dengue-related KAP studies, which report higher disease awareness in populations residing in endemic areas while lower knowledge is recorded in areas with less patients/no patients (Selvarajoo et al., 2020).

In contrast, no significant relationship was observed between mosquito control practices and the number of filariasis patients, consistent with previous KAP studies on vector-borne diseases (Hairi et al., 2003; Al-Abd et al., 2014; Selvarajoo et al., 2020). This finding suggests that current community-level mosquito control efforts are insufficient to prevent BF re-emergence. Enhanced, technically informed, and scientifically guided strategies are therefore necessary to strengthen vector control. Supporting this, a study in Nigeria found that 73.3% of the community had poor knowledge, which corresponded with weak attitudes and practices regarding filariasis prevention (Jaiyeola et al., 2022). Puruduwella had a significantly higher dog population than Karavitagara ($p = 0.026$), and cattle were absent from the control site. These reservoir hosts may contribute to transmission dynamics, as highlighted in Mallawarachchi et al. (2018), who identified zoonotic filarial infections in domestic animals as a potential threat to elimination efforts.

Table 4: Association of age group with good knowledge of filariasis and good mosquito control practices among respondents, based on chi-square tests

Association between age groups	Good knowledge ($\chi^2 = 8.816$; $p=0.032$)		Good Practices ($\chi^2 = 23.349$; $p < 0.001$)	
	χ^2	p value	χ^2	p value
1 & 2	2.945	0.086	3.179	0.075
1 & 3	1.628	0.202	16.867	<0.001
1 & 4	5.752	0.016	8.165	0.004
2 & 3	0.682	0.409	14.725	<0.001
2 & 4	1.807	0.179	3.894	0.048
3 & 4	4.629	0.031	5.078	0.024

1=Adolescents (12-20 years), 2= Early adults (21-35 years), 3=Midlife adults (36-50 years), and 4=Mature adults > 51 years

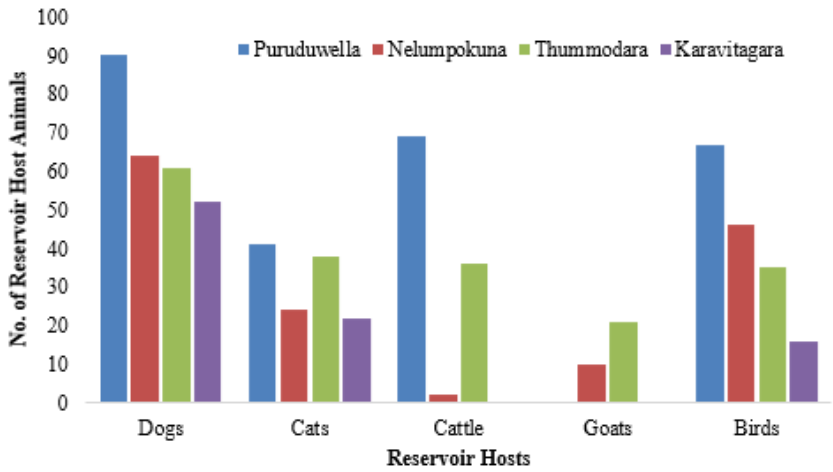

Figure 3: Number of reservoir host animals recorded at the three test sites and the control site.

CONCLUSION

The study highlights knowledge, attitudinal, and behavioural gaps at the community level with respect to both BF as well as mosquito vector control. This may limit sustained access to preventive strategies. Specific demographic factors like gender and employment status had no significant impact, while key determinants of awareness and behavior included education level, income, age, and the ecological setting of a patient location. The elderly had better knowledge compared to younger respondents, but the latter were more physically involved in preventive practices, indicating a knowledge–practice gap across age strata. While knowledge was positively correlated with preventive behavior, personal experience with the disease did not solely drive action. Differences at the community level, environmental exposure and possible animal reservoirs all indicate that transmission risk continues and that established vector control may not be sufficient to halt re-emergence.

However, increasing knowledge alone may not suffice unless it leads to a lasting change in preventative behaviour. Information, education and communication activities need to focus on the low income and less educated groups but should not segregate highly educated population who are less likely to be connected with community health initiative. Targeted interventions based on age, that is, raising awareness among younger individuals and reinforcing behaviors in older adults would be recommended to this particular population. Moreover, this study has urged local authorities to establish health education and vector control programs that are targeted at different socio-economic classes of the populations, taking into consideration not only literacy level but also access to information to ensure greater equity in community engagement. Integrated vector management strategies with consistent community mobilization, environmental control and public health authorities technical guidance are necessarily highlighted. Moreover, future research should explore occupation-related influences and evaluate the effectiveness of behaviour-based interventions, while surveillance and control strategies should adopt a One Health approach, considering the human–animal–vector interface and the potential role of animal reservoirs in filariasis transmission.

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DECLARATION OF CONFLICT OF INTEREST

Authors declare no conflict of interest with any party.

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AUTHOR CONTRIBUTION

Investigation, data collection, and formal analysis: **K.L.K.D.**; Conceptualization, methodology, supervision, interpretation of results, and and writing–original draft: **K.O.B.;** Data curation, formal analysis, and writing–review and editing: **T.S.P.F.;** Methodology, data analysis, interpretation of results, and writing–review and editing: **H.T.R.J.** All authors contributed to the manuscript, reviewed and approved the final version, and accept responsibility for the content of the work.

DATA AVAILABILITY STATEMENT

The raw data supporting the findings of this study are available from the corresponding author upon request.

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