

Diverse Information Sources and The Community's High Level of Knowledge About Lymphatic Filariasis in Air Salobar and Waihaong, Ambon City, Indonesia

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ABSTRACT

Background: Mass Drug Administration (MDA) is a strategy to eliminate lymphatic filariasis (LF) in endemic areas. However, individuals' decision to take LF drugs in MDA is associated with their knowledge and awareness about LF. This study examined the association between the community's level of knowledge and awareness about LF with the number of informant types and media types for LF information in Waihaong and Air Salobar Health Centers, Ambon City, Indonesia.

Methodology: We used data from a household survey conducted in January 2019 involving 944 respondents aged 18-70 living in the study sites. Data analysis was performed using multivariable logistic regression.

Results: We found that only 33.3% of respondents had a high level of knowledge and awareness about LF. An increased odds of having a high level of knowledge and awareness about LF was associated with respondents receiving information from more than one type of informant and one type of media (aOR=10.55, 95%CI: 2.35-47.37, p=0.002), and among female respondents (aOR=1.92, 95%CI: 1.25-2.94).

Conclusions: These findings emphasize the importance of comprehensive health promotion strategies using different types of informants and media to enhance the community's knowledge and awareness about LF, which is important to support the elimination of LF in Ambon City, Indonesia.

Key-words: Elephantiasis, Sources of information, Awareness, Mass drugs administration

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INTRODUCTION

Lymphatic filariasis, or elephantiasis, is a persistent infectious disease caused by filarial worms invading the lymph nodes and ducts. The parasite is transmitted to humans via mosquitoes. There are three types of filarial worms: *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*. In Southeast Asia, nine countries, including Indonesia, are endemic to LF.^{1,2} According to the World Health Organization, in 2021, an estimated 51.4 million people was infected with LF.^{2,3} The WHO declared The Global Goal of eliminating LF as a Public Health Problem by 2020.^{4,5} This goal was pursued through the implementation of Mass Drugs Administration (MDA) involving the administration of three DEC tablets and one Albendazole tablet once a year for five consecutive years.⁶

Indonesia reported a total of 9,906 cases of chronic LF in 2020.⁷⁻⁹ In Maluku Province, the largest archipelago province of Indonesia, 39 cases of lymphatic filariasis reported. Four of these cases were chronic and located in Ambon City, the province's capital.^{10,11} The MDA program in Ambon City was started in 2009.

During the initial five years of its implementation (2009-2013), Ambon City was declared unsuccessful as the MDA program reached less than 65% of the total population (only 51.3%).⁹ However, the MDA for the LF in Ambon City was relaunched in 2015 with the goal of expanding coverage and improving population compliance with taking LF drugs.^{12,13} To achieve the successful elimination of LF, it is crucial to address the issue of community non-compliance, which has been reported in various studies.^{14,15} Studies have also highlighted the correlation between low compliance and the community's lack of knowledge and awareness about LF.^{13,14}

In 2018-2019, Universitas Pattimura Faculty of Medicine, together with The Task Force of Global Health, Atlanta, USA, and in collaboration with *Bruyère Research Institute* (Ottawa, Canada) and *Centers for Disease Control and Prevention* (Atlanta, USA), conducted a study on community compliance with taking LF drugs in the working areas of Waihaong and Air Salobar Health Center, Ambon City. The study confirmed that community knowledge and awareness plays a critical role in their compliance with taking LF drugs during MDA.^{13,16} Based on the data collected from the survey, this study examined the association between the community's level of knowledge and awareness about LF with the number of informant types and media types for LF information in Waihaong and Air Salobar Health Centers, Ambon City, Indonesia.

METHODOLOGY

In this study, we used data from a cross-sectional survey administered by the Faculty of Medicine at

Pattimura University in partnership with the Bruyère Research Institute in Ottawa, Canada, and the Centers for Disease Control and Prevention, Atlanta, USA. The survey, funded by The Task Force of Global Health in Atlanta, USA, was conducted in January 2019 in the community living in the catchment areas of Waihaong and Air Salobar Health Center in Ambon City.

The respondents were selected using a two-stage cluster method. In each Health Center working area, 20 hamlets (*rukun warga*) were selected using the probability proportional to size (PPS) method, with the primary sampling unit using the hamlets list derived from the field coordinator in collaboration with local staff. The random sampling method was used to select sub-hamlets (*rukun tetangga*). Simple random sampling was also used to select 25 respondents per sub-hamlets. The total number of respondents included in the survey was 1010, with the criteria of individuals aged 18-70 who resided in the working areas of Waihaong and Air Salobar Health Center during the MDA implementation in 2018. This analysis, however, only used data from survey respondents who claimed to have heard about LF. Therefore, this analysis only used information from 964 survey respondents.

The survey used a structured questionnaire developed based on the Risk, Attitudes, Norms, Abilities, and Self-regulation (RANAS) framework.¹² The instrument included information on respondents' risks, attitudes, norms, abilities, and self-regulation related to LF, receipt of LF drugs during MDA, and respondents' knowledge of LF. Data were collected using the Commcare application on an *Android-based* device.¹⁷

The dependent variable in this study was the community's level of knowledge and awareness about LF in the working area of Waihaong and Air Salobar Health Center (high/low). To evaluate the community's level of knowledge and awareness regarding LF, an inquiry was conducted to assess their comprehension of the disease and potential preventive measures. The assessment encompassed several key aspects: (1) the probability of contracting LF, (2) potential consequences associated with LF infection, (3) strategies for LF prevention, (4) the hereditary nature of LF, (5) the required commitment to LF medication during MDA, and (6) respondents' perspectives on the appropriate method for administering LF drugs. Respondents were classified as having a high level of knowledge if their correct answer rate surpassed 75%. Those falling below this threshold were categorized as having a low level of knowledge.

The independent variable examined was the source of LF-related information, which comprised two distinct factors: (1) the number of informant types (single informant and multiple informants), and (2) the number of media types (no media source, one media source, and multiple media sources). Additionally, the analysis included several socio-demographic var-

ables, including the health center's working area (Air Salobar and Waihaong), respondents' age (17-25 years, 26-35 years, 36-45 years, 46-55 years, 56-65 years, and over 65 years), gender (male and female), education level (no school, junior high school, senior high school, diploma/university), and employment status (not employed and employed).

The study used univariable and multivariable logistic regression methods to analyze the data. Univariate logistic regression was used to examine the relationship of each independent and dependent variable without controlling for other variables. Multivariate logistic regression was used to examine the relationship of each independent and dependent variable while controlling for other variables. In the multivariable logistic regression analysis, we included variables showing a significance level of less than 0.25 in the univariate logistic regression analysis. We included the health center variable selected a priori to be retained in the model, to control for the role of environmental factors, regardless of its significance.

The multivariable analysis consisted of three different models. **Model 1** was used to examine the association between the number of informants for LF-related information and the level of knowledge and awareness about LF, after controlling for other covariates. **Model 2** was used to examine the association between the number of media types for LF-related information (replacing the number of informants) and the level of knowledge and awareness about LF, after controlling for other covariates. **Model 3** was used to examine the association between the combined number of informants and media types with the level of knowledge and awareness about LF, after controlling for other covariates. The findings were presented using odds ratios (ORs) and 95% confidence intervals (95% CI). IBM SPSS Statistics version 15.0 was used to perform all analyses with complex sample procedures.

The study received ethical approval from the Medical and Health Research Ethics Committee of the Faculty of Medicine at Universitas Pattimura (Number 010/FK-KOM.ETIK/VIII/2022). All survey respondents who agreed to be interviewed were required to sign an informed consent form after receiving an explanation from the researcher indicating their willingness to participate.

RESULTS

The analysis was conducted using data from a total of 964 respondents, with 481 from Air Salobar Health Center and the remaining 483 from Waihaong Health Center catchment area. Out of all the respondents who participated in the survey, 88.69% had a high level of knowledge and awareness of LF, while 11.31% had a low knowledge and awareness.

Table 1 displays the frequency distribution of respondents based on various variables included in the

analysis. It was found that most of the respondents were female and had completed senior high school. Moreover, the table shows the distribution frequency of respondents based on their knowledge and awareness of LF. The percentage of respondents with a high level of knowledge was found to be slightly higher in the community living in Air Salobar (90.6%) than in Waihaong catchment areas (86.7%). The percentage was also higher in female respondents (91.3%) than male respondents (84.3%).

Interestingly, respondents' level of knowledge and self-awareness about LF remained consistent across all levels of formal education. However, those who mentioned obtaining information about LF from multiple sources, including various informants and media types, had more knowledge and self-awareness. Specifically, 95.74% of respondents who received LF information from more than one informant type and 93.03% who received LF information from more than one media type had a high level of knowledge and self-awareness about LF.

Figure 1 shows that health workers were the primary source of information on LF, with around 80% of respondents receiving information from them. For male respondents, friends were the second most common source of information after health workers, while female respondents were more likely to obtain information from cadres after health workers. Figure 2 illustrates the distribution of sources of information on LF based on respondents' sex and type of media. More than 67% of the respondents received information about LF from TV, regardless of their sex. The distribution of sources of information about LF was similar among males and females.

Table 2 shows the results of the univariable logistic regression performed in our study. We found that respondents' knowledge and awareness about LF was associated with the number of informant types, media types, and respondents' sex and employment status, before controlling for other variables.

Model 1 (Table 2) shows the results of analyses conducted to examine the association between the number of informant types for LF information and respondents' level of knowledge and awareness about LF. After controlling for other covariates, the odds of having a high level of knowledge and awareness were significantly higher in respondents who received LF information from more than one type of informant (aOR=3.46; 95%CI: 1.81-6.63, $p<0.001$). From the socio-demographic characteristics group, the odds were significantly higher among females than males (aOR=1.89; 95%CI: 1.24-2.89, $p=0.003$).

When the variable representing the number of informants types was replaced by the number of media types for LF information (Model 2 in Table 2) in the multivariable regression model, we found that the odds of a high level of knowledge and awareness of LF were significantly higher among respondents who received information from more than one type of media (aOR=2.16; 95%CI: 1.08-4.33, $p=0.029$).

Table 1: Distribution of factors analysed by the level of knowledge about lymphatic filariasis

Variable	Frequency n (%)	Level of knowledge & awareness	
		High, n (%)	Low, n (%)
Health Center Working area			
Air Salobar	481 (49.9)	436 (90.6)	45 (9.4)
Waihaong	483 (50.1)	419 (86.7)	64 (13.3)
Respondent's age (years)			
17-25	157 (16.3)	135 (86.0)	22 (14.0)
26-35	190 (19.7)	164 (86.3)	26 (13.7)
36-45	223 (23.1)	205 (91.9)	18 (8.1)
46-55	186 (19.3)	165 (88.7)	21 (11.3)
56-65	152 (15.8)	138 (90.8)	14 (9.2)
>65	56 (5.8)	48 (85.7)	8 (14.3)
Sex			
Male	356 (36.9)	300 (84.3)	56 (15.7)
Female	608 (63.1)	555 (91.3)	53 (8.7)
Respondent's highest level of education			
Not in school/elementary school	73 (7.6)	65 (89.0)	8 (11.0)
Junior High School	102 (10.6)	90 (88.2)	12 (11.8)
Senior High School	535 (55.5)	474 (88.6)	61 (11.4)
Diploma/University	254 (26.4)	226 (89.0)	28 (11.0)
Respondent's occupation			
Not working	58 (6.0)	46 (79.3)	12 (20.7)
Work	906 (94.0)	809 (89.3)	97 (10.7)
Number of informant type for LF information			
One person	706 (73.2)	608 (86.1)	98 (13.9)
More than one person	258 (26.8)	247 (95.7)	11 (4.3)
Number of media type for LF information			
None	121 (12.6)	105 (86.8)	16 (13.2)
One media	513 (53.2)	443 (86.4)	70 (13.6)
More than one media	330 (34.2)	307 (93.0)	23 (7.0)
Combination of number of informant and media type for LF information			
Only from the media	121 (12.55)	105 (86.8)	16 (13.2)
One type of informant and media type	423 (43.88)	361 (85.3)	62 (14.7)
More than one type of informant but one type of media	90 (9.34)	82 (91.1)	8 (8.9)
One type of informant but more than one type of media	191 (19.81)	170 (89.0)	21 (11.0)
More than one type of informant & more than one type of media	139 (14.42)	137 (98.6)	2 (1.4)

Note: The level of knowledge and awareness of the community was measured by assessing the answers given to questions about: (1) how likely it is to get LF, (2) the possible effects of getting LF, (3) how to prevent LF, (4) whether LF is a hereditary disease, (5) how much is the obligation to take LF drugs during MDA, and (6) respondents' beliefs about the correct way to take LF drugs. Respondents were categorized as possessing a high level of knowledge if their percentage of correct answers exceeded 75% and as having a low level of knowledge otherwise.

LF: Lymphatic Filariasis; MDA: Mass Drugs Administration

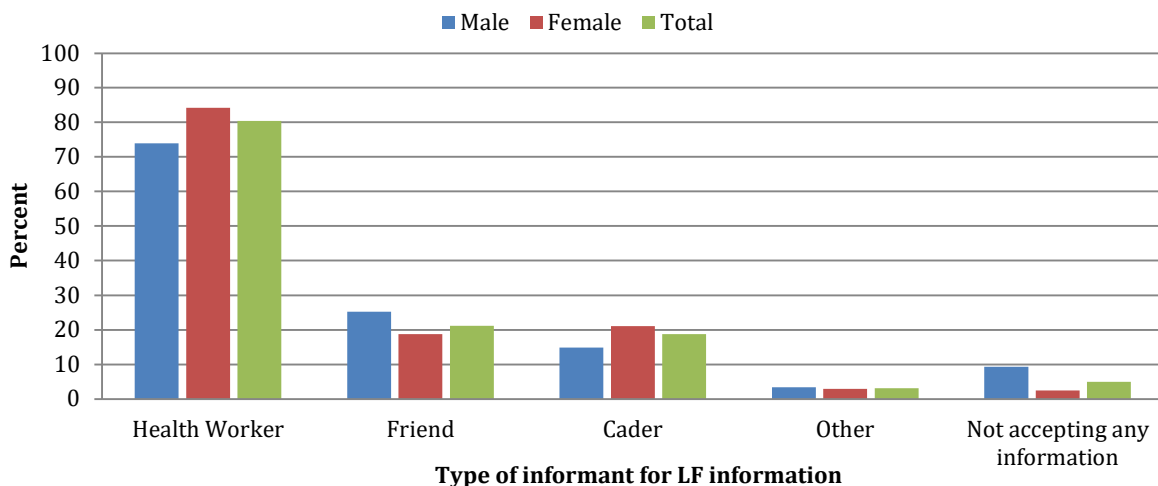
**Figure 1: Sources of information on lymphatic filariasis by sex of respondents and type of informant**

Table 2: Factors associated with the level of knowledge and self-awareness about lymphatic filariasis in the working area of Waihaong and Air Salobar Health Center, Ambon City

Variable	Univariable analysis		Multivariable analysis (Model 1)		Multivariable analysis (Model 2)		Multivariable analysis (Model 3)	
	OR (95%CI)	p-value	aOR (95%CI)	p-value	aOR (95%CI)	p-value	aOR (95%CI)	p-value
Health Center working area								
Air Salobar	Reference		Reference		Reference		Reference	
Waihaong	0.68 (0.45-1.01)	0.057	0.86 (0.56-1.32)	0.501	0.72 (0.47-1.10)	0.133	0.80 (0.52-1.23)	0.319
Respondent's age (years)								
17-25	Reference		Reference		Reference		Reference	
26-35	1.03 (0.56-1.90)	0.930	0.95 (0.50-1.79)	0.872	0.87 (0.46-1.64)	0.666	0.92 (0.48-1.75)	0.802
36-45	1.86 (0.96-3.59)	0.066	1.60 (0.80-3.20)	0.188	1.59 (0.79-3.19)	0.194	1.65 (0.82-3.33)	0.158
46-55	1.28 (0.68-2.43)	0.449	1.14 (0.57-2.25)	0.713	1.17 (0.59-2.31)	0.661	1.21 (0.61-2.41)	0.578
56-65	1.61 (0.79-3.27)	0.191	1.37 (0.64-2.91)	0.419	1.53 (0.71-3.27)	0.275	1.50 (0.70-3.23)	0.292
>65	0.98 (0.41-2.34)	0.960	0.98 (0.39-2.45)	0.959	0.98 (0.39-2.46)	0.966	1.02 (0.40-2.57)	0.964
Respondent's sex								
Male	Reference		Reference		Reference		Reference	
Female	1.95 (1.31-2.92)	0.001	1.89 (1.24-2.89)	0.003	1.90 (1.25-2.90)	0.003	1.92 (1.25-2.94)	0.003
Respondent's highest level of education								
Not in school/elementary school	Reference							
Junior High School	0.92 (0.36-2.39)	0.869	0.89 (0.33-2.34)	0.806	0.98 (0.37-2.57)	0.960	0.93 (0.35-2.49)	0.899
Senior High School	0.96 (0.44-2.09)	0.911	1.17 (0.52-2.67)	0.704	1.13 (0.49-2.57)	0.777	1.10 (0.48-2.53)	0.804
Diploma/University	0.99 (0.43-2.28)	0.988	1.31 (0.54-3.16)	0.548	1.17 (0.49-2.85)	0.721	1.18 (0.48-2.87)	0.707
Respondent's Occupation								
Not working	Reference		Reference		Reference		Reference	
Work	2.18 (1.11-4.25)	0.023	1.59 (0.78-3.23)	0.199	1.62 (0.80-3.29)	0.181	1.54 (0.75-3.13)	0.234
Number of informant type for LF information								
One person	Reference		Reference					
More than one person	3.62 (1.91-6.87)	<0.001	3.46 (1.81-6.63)	<0.001				
Number of media type for LF information								
None	Reference				Reference			
One type	0.96 (0.54-1.73)	0.903			0.91 (0.50-1.66)	0.759		
More than one type	2.03 (1.04-4.00)	0.039			2.16 (1.08-4.33)	0.029		
Combination of number of informant and media type for LF information								
Only from the media	Reference						Reference	
One type of informant & media type	0.88 (0.49-1.60)	0.692					0.85 (0.46-1.58)	0.626
More than one type of informant but one type of media	1.56 (0.63-3.82)	0.330					1.39 (0.55-3.50)	0.476
One type of informant but more than one type of media	1.23 (0.61-2.47)	0.554					1.34 (0.65-2.76)	0.412
More than one type of informant and more than one type of media	10.43 (2.34-46.39)	0.002					10.54 (2.34-47.37)	0.002

In the multivariable models, only variables with a significance level of $p < 0.25$ were included.

aOR: adjusted odds ratio; CI: confidence interval; OR: odds ratio

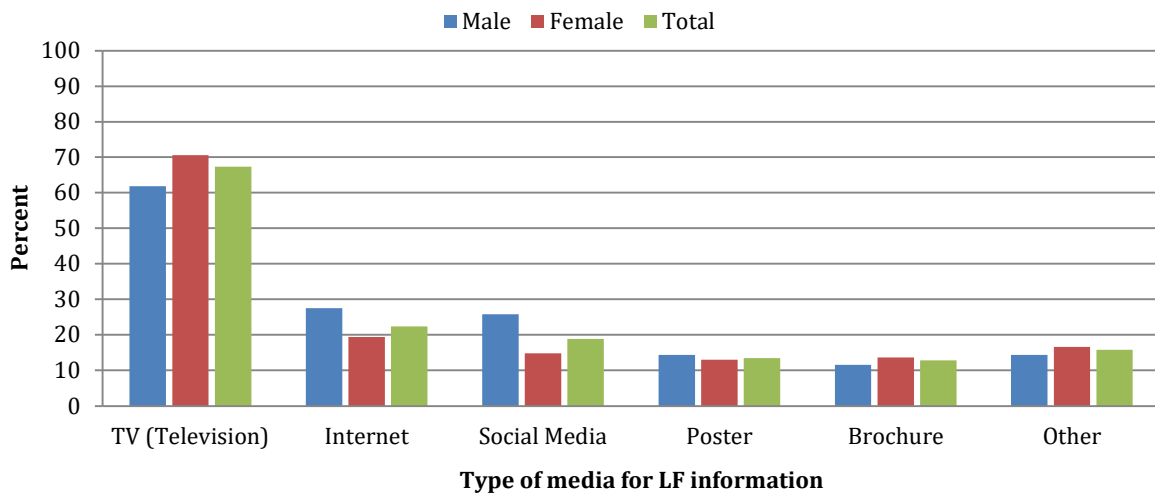


Figure 2: Sources of information on lymphatic filariasis by sex of respondents and type of media

The odds remained significantly higher in female than male respondents (aOR=1.90; 95%CI: 1.25-2.90, $p=0.003$).

Model 3 (Table 2) showed the results of multivariable regression methods when a combined variable of the number of informant types and media types for LF-related information was used. The results showed that the odds of having a high level of knowledge and awareness about LF were significantly higher among respondents who received information from more than one type of informant and more than one type of media (aOR=10.55; 95% CI: 2.35-47.37, $p=0.002$). The odds of having a high level of knowledge and awareness were still significantly higher in females than males (aOR=1.92; 95% CI: 1.25-2.94, $p=0.003$).

DISCUSSION

This analysis shows a significant relationship between the number of informants type and media types with the level of knowledge and awareness about LF of the community living in the catchment areas of Waihaong and Air Salobar Health Center in Ambon City. Respondents who received information about LF from multiple informants and media had a higher level of knowledge and awareness about LF. This study also showed that female participants better understood LF than males. Program holders could use these findings to design practical health promotion efforts using different types of media and informant to improve community knowledge and the effectiveness of the LF elimination program in Ambon City.

Use of multiple types of informants and media to improve community knowledge and awareness

This study confirms that multiple types of informants and media are positively associated with the improved level of knowledge and awareness about LF of the community. This result aligns with previous

studies reporting a significant relationship between the diversity of information sources and the level of health-related knowledge.^{18,19} The more sources of information used, the higher the level of knowledge and awareness.¹² These findings emphasize the need for program managers to use multiple sources of information about LF to improve their knowledge which could positively lead to the community's improved compliance with taking LF drugs. Various information sources such as health workers, cadres, printed media, or audiovisual media are effective methods for health promotion. Those sources allow people to receive information through multiple sensory systems, which enhances their knowledge. The more senses used in receiving information, the better the knowledge gained. Furthermore, the easy accessibility of media such as TV, radio, and internet/social media may be the reason for the high frequency of information on LF in the community.²⁰

This analysis found the highest proportion of the community received information from health workers, followed by cadres and friends/neighbours/family. As reported in other studies²¹ health workers and cadres are the backbone of various health programs. As expected, health workers play a crucial role in community health development, including LF control efforts. Health workers should be encouraged to use every contact opportunity to disseminate health information to the community. Apart from health workers, health cadres always play a vital role in various health programs in Indonesia. With a limited number of health workers, the role of health cadres is becoming increasingly vital. Previous literature²² showed that the low level of activity among health cadres in providing community counselling has contributed to the suboptimal achievement of health programs. This highlights the need to enhance the capacity of health cadres through various activities such as training and coaching, in order to improve their knowledge and skills, including communication skills and the ability to deliver important health information to the community.^{22,23}

The Ambon City Health Office has made commendable efforts to disseminate health promotion materials concerning LF and MDA through various means, including banners, flyers, and social media channels. Interactive dialogues on local radio and television were employed as a strategic approach before the implementation of MDA. While these initiatives have been valuable in raising awareness, establishing intersectoral collaborations could enhance the potential for impact and reach. By collaborating with various sectors and stakeholders, such as educational institutions, community organizations, and local businesses, disseminating crucial information about LF and MDA could expand to a wider and more diverse audience, fostering a more comprehensive and effective public health response.

Difference of knowledge and awareness about LF between males and females

We found that women had a higher level of knowledge and awareness compared to men. This was also noted in a previous study which found that men have lower adherence to LF drugs than women.^{23,24} Men's higher activity outside the home may mean that they need more information on specific health topics, which could be provided by health cadres in their neighbourhood. Compared to males, females have shown higher knowledge and awareness about health-related matters. This could be attributed to the fact that most of their activities and time are traditionally spent at home, for example, as housewives. As a result, they might have more opportunities to receive information and guidance from health workers or cadres who visit their homes.^{25,26} Mothers are also responsible for maintaining their family members' health by providing them health-related information and education.^{27,28} This can play a significant role in promoting good health.

To increase awareness and knowledge among male groups, social or religious meetings could be held where health information is shared with many men. According to the study results, friends are the second most common source of information after health workers for male respondents.²⁹ In addition, this analysis found that cadres were more of a source of information for female respondents than male respondents. This suggests that the timing of cadre visits to provide health information or drug distribution needs to be considered, allowing cadres to meet male household members working outside the home in the morning to afternoon.

STRENGTHS AND LIMITATIONS

This study used information from a large number of respondents, providing a representation of working conditions in the Waihaong and Air Salobar Health Centers. To our knowledge, only few analyses were conducted to assess the diversity of information sources on LF particularly Ambon City. These find-

ings are expected to provide input for program holders to design appropriate interventions in both study areas. However, there are some limitations to note. As with other cross-sectional studies, the results of this analysis can only describe the association between independent and dependent variables and not showing any causal relationships. Our analyses were limited to the variables available in the datasets. Variables such as the information about the content of LF messages received were not available and thereby was not included in our analysis.

CONCLUSION

In summary, this study confirms that the use of multiple types of informants and media is positively associated with an improved level of knowledge and awareness about LF of the community. Health promotion efforts, including those related to LF, need to consider the diversity of information sources to reach various community components. Health efforts need to involve health workers, cadres, religious and community leaders, and friends, supported by the use of various mass media so that community knowledge and awareness can increase. Increased knowledge and awareness of the community are expected to help achieve the LF elimination target in Ambon City.

This study has found that using a variety of sources and methods to spread information about LF is linked to increased knowledge and awareness about the disease within the community. It emphasizes the importance of program managers using different sources to disseminate information about LF and MDA. The study highlights the need for collaborative efforts between health authorities, media outlets, and community leaders to enhance public understanding and engagement in LF prevention and control measures. Strategic investments in multi-faceted information campaigns are essential to achieve sustained progress in LF elimination, which will improve the health status of the community not only in Ambon City, but also in other parts of Indonesia.

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