Schistosomiasis Prevention Practices in North Lore District, Central Sulawesi: Wuasa Village, Watumaeta Village, and Alitupu Village

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Abstract: Schistosomiasis is a neglected tropical disease (NTD) categorized as a zoonotic disease that can be transmitted through the snail intermediate host. Schistosomiasis can cause serious complications and also inhibit growth in children. North Lore District is an endemic area for schistosomiasis, including Wuasa Village, Watumaeta Village, and Alitupu Village. Therefore, this study aims to determine the description of schistosomiasis prevention practices in the community in these three villages as endemic areas for schistosomiasis. This study used a quantitative study with a descriptive cross-sectional design involving 70 respondents selected based on the accidental sampling method. The analysis was carried out using SPSS using univariate analysis. The results showed that the majority of respondents used PPE while working (84.3%), routinely washed their hands with soap (97.1%), used bar soap (60.0%), used PDAM water as a source of drinking/cooking water (36.6%), processed drinking water by cooking (62.9%), used PDAM water for bathing/washing (60%), used private toilets (92.9%), used bathrooms for washing and bathing (70 people, 100%). In addition, the prevalence of families who had been infected with schistosomiasis from Wuasa Village, Watumaeta Village, and Alitupu Village were 8.6%, 4.3%, and 2.9%, respectively. In conclusion, efforts to increase public awareness regarding the prevention of schistosomiasis and the need for cross-sector collaboration are still needed.

1 INTRODUCTION

Schistosomiasis is a neglected tropical disease (NTD) that is widespread in many developing countries in Southeast Asia, the Middle East, and Latin America (Aula et al., 2021; Buonfrate et al., 2025). This disease is caused by blood flukes of the genus *Schistosoma* and is endemic in tropical and subtropical areas in low-income rural communities with inadequate sanitation (Aula et al., 2021; Carbonell et al., 2021). Schistosomiasis leads to significant health, social, and economic burdens, with potential complications affecting the nervous system, heart, and lunga, as well as causing anemia, and growth stunting in children (Carbonell et al., 2021; Rinaldo et al., 2021).

This disease is also a zoonotic disease that is endemic in 78 tropical and subtropical countries worldwide and infects around 240 - 250 million people annually (Ponzo et al., 2024; Wang et al., 2021). There are six species of human pathogens, including Schistosoma japonicum which is the most common worldwide, including found on the island of Sulawesi, Indonesia. S. japonicum, which is transmitted by the snail Oncomelania spp., causes more rapid liver fibrosis and sometimes liver failure than other hepatotropic species of Schistosoma spp (Gabrielli & Garba Djirmay, 2023; Ponzo et al., 2024). S. japonicum has more than 40 mammalian species as reservoir hosts and a combined prevalence in 8,795 wild rodents of 3.9% (Wang et al., 2021).

The prevalence of schistosomiasis tends to fluctuate in Indonesia since 2021, 2022, and 2023 at 0.22%, 1.44%, and 0.43%, respectively. This disease is only endemic in Indonesia in three areas of Central Sulawesi, namely the Napu Highlands (Poso Regency), Bada Highlands (Poso Regency), and Lindu Highlands (Sigi Regency). The North Lore Subdistrict is included in the endemic area of schistosomiasis located in the Napu Highlands, Poso Regency (Alghifari et al., 2023; Widayati & Mananta, 2023). The Napu Highlands had a schistosomiasis prevalence of 0.15% in 2019 (Widjaja et al., 2022). Based on local spatial autocorrelation testing (LISA) on schistosomiasis cases in Poso Regency, there are 4 villages with a p-value < 0.05 supporting positive spatial autocorrelation, namely Kaduwaa, Alitupu, Wuasa, Watumaeta (Sakinah et al., 2022).

The emergence of schistosomiasis cases in the North Lore district continuously is likely due to the ongoing reinfection of schistosomiasis. This is suspected to be caused by the low level of schistosomiasis prevention practices (Alemu et al., 2024). Previous research has shown a relationship

between prevention practices and schistosomiasis infection (Anyolitho et al., 2022). Therefore, this study aims to provide an overview of schistosomiasis prevention practices in the community in the Lore Utara district, including Wuasa Village, Watumaeta Village, and Alitupu Village.

2 METHOD

This research used a quantitative study with a descriptive cross-sectional design conducted in June 2025 in the Lore Utara District. The selected villages are Wuasa Village, Watumaeta Village, and Alitupu Village. These villages were chosen because research conducted by (Sakinah et al., 2022) showed a positive spatial correlation indicating a positive concentration of schistosomiasis cases. A sample of 70 respondents was selected based on accidental sampling. Accidental sampling was used due to limited research time and the study's focus on communities in villages with a history of schistosomiasis cases, allowing efficient data collection from available and willing participants. Data collection employed interview techniques using a questionnaire reference, and all respondents agreed to participate before the study commenced. The questionnaire was developed by the researchers and consisted of questions covering knowledge, attitudes, and practices related to schistosomiasis prevention. Data were analyzed univariately using Excel and SPSS to describe respondents' characteristics and schistosomiasis prevention practices in the form of frequencies and percentages. The analysis involved editing, coding data, data entry, and data cleaning. The data are presented in the form of tables and figures.

3 RESULTS

According to the World Health Organization (WHO), around 10 million individuals across the globe were afflicted with Mycobacterium tuberculosis by 2019, resulting in 1.4 million fatalities due to tuberculosis (TB).(1) Prompt identification and timely intervention of tuberculosis (TB) are crucial for achieving efficient TB management. The standard treatment for tuberculosis (TB), known as anti-TB treatment (ATT), is quite effective. However, one of the major obstacles to achieving success with ATT is effectively managing the toxicity of TB medications (Fla, 2022).

Figure 1a shows that most respondents are female, totaling 38 people (54%), while males number 32 people (46%). The majority of respondents have completed junior high and senior high school, with the same number, namely 22 people (31%), while the least number is from higher education (6 people, 9%) (Figure 1b). In addition, more respondents come from Wuasa Village, totaling 32 people (46%), while others are from Alitupu Village (22 people, 31%) and Watumaeta (16 people, 23%) (Figure 1c).

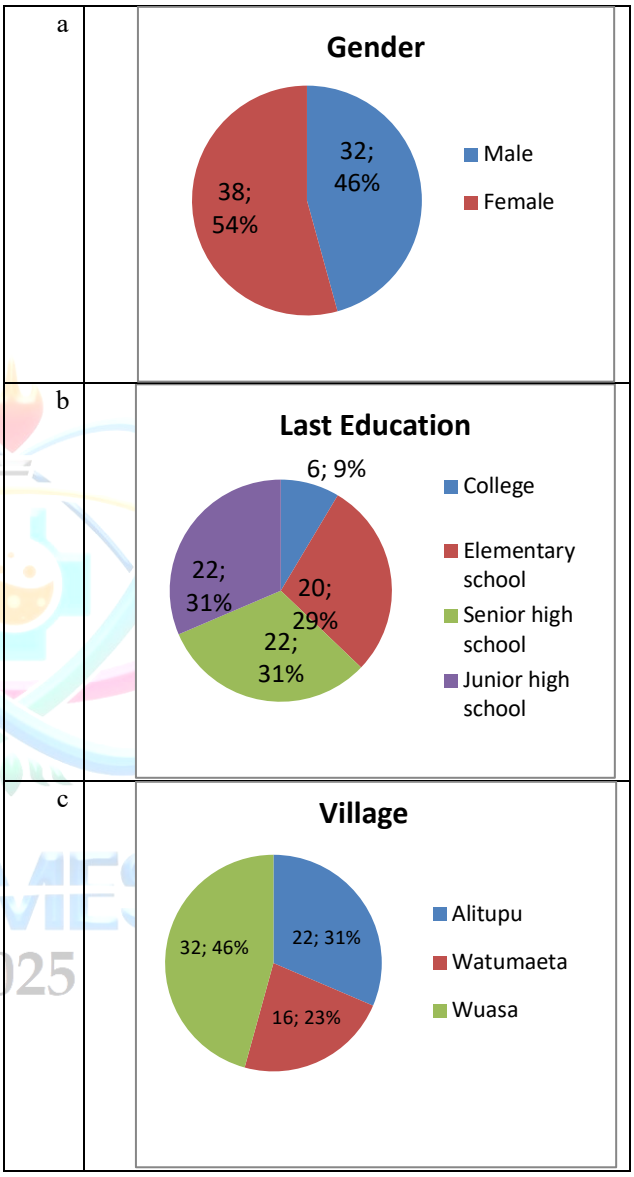

Figure 1. Characteristics of Respondents: Gender (a), Last Education (b), and Village (c)

Figure 2a shows that most heads of families are over 40 years old (48 people, 69%), while those aged 40 years or younger total 22 people (31%). The majority of heads of families work as farmers, totaling 51 people (73%). Meanwhile, the least are those who work as honorariums, mechanics/drivers, KUA employees, private employees, nurses, military

personnel, and unemployed, with each category having the same number of 1 person (1%) (Figure 2b).

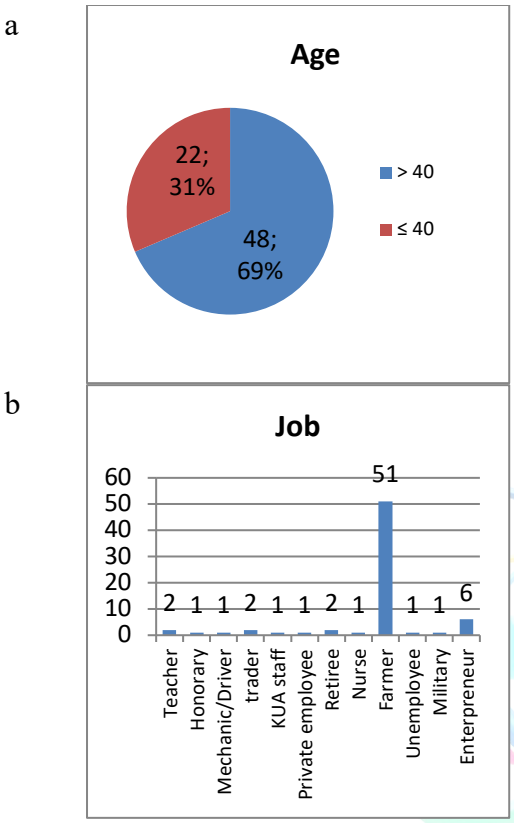

Figure 2. Characteristics of Heads of Household: Age (a), and Occupation (b)

Table 1 shows that the majority of respondents use personal protective equipment (PPE) while working (59 people, 84.3%) such as gloves, shoes, or boots. Almost all respondents also routinely wash their hands with soap, totaling 68 people (97.1%). The types of soap used are bar soap (42 people, 60.0%), liquid soap (19 people, 27.1%), and others (9 people, 12.9%) (Table 1).

The water sources for cooking/drinking with the highest proportions are water from the municipal water supply (PDAM), springs, and refill stations with 26 respondents (36.6%), 20 people (28.2%), and 15 people (21.1%), respectively. The lowest proportion of water sources for cooking/drinking is packaged water (5 people, 7%) and well water (4 people, 5.6%). The majority of respondents also treat their drinking water by boiling it (44 people, 62.9%) (Table 1).

Table 1. Schistosomiasis Prevention Practices in Wuasa, Watumaeta, and Alitupu Villages, Poso Regency, Central Sulawesi

Variables	N	%
Use of PPE		
Yes	59	84.3
No	11	15.7
Use of Soap		
Routine	68	97.1
Not routine	2	2.9
Types of Soap		
Bar soap	42	60.0
Liquid soap	19	27.1
Other	9	12.9
Location of bathing/washing activities		
Bathroom	70	100.0
Source of drinking/cooking water		
PDAM (Municipal Water Supply)	26	36.6
Spring Water	20	28.2
Refilled Water	15	21.1
Bottled water	5	7.0
Well water	4	5.6
Water source for washing/bathing		
PDAM (Municipal Water Supply)	42	60.0
Spring Water	22	31.4
Well water	5	7.1
Refilled Water	1	1.4
Drinking water treatment		
Boiled	44	62.9
Not Boiled	26	37.1
Location of Defecation activity		
Private latrine	65	92.9
Public latrine	5	7.1
Family member had infected of Schistosomiasis		
No	59	84.3
Yes	11	15.7
Wuasa	6	8.6
Watumaeta	3	4.3
Alitupu	2	2.9
Total	70	100.0

The water sources for cooking/drinking with the highest proportions are water from the municipal water supply (PDAM), springs, and refill stations with 26 respondents (36.6%), 20 people (28.2%), and 15 people (21.1%), respectively. The lowest proportion of water sources for cooking/drinking is packaged water (5 people, 7%) and well water (4 people, 5.6%).

The majority of respondents also treat their drinking water by boiling it (44 people, 62.9%) (Table 1).

4 DISCUSSION

This study found that the majority of household heads in Wuasa, Watumaeta, and Alitupu Villages worked as farmers. Farming activities often involve frequent contact with soil and water, which may increase the risk of exposure to Schistosoma parasites in endemic areas. Similar findings have been reported in previous studies, where farming was identified as a high-risk occupation for schistosomiasis infection (Gurmassa et al., 2024; Yusuf et al., 2022; Al Akbar et al., 2024; Jin et al., 2022; Martínez–Ortí et al., 2019). A study conducted in the Napu Valley showed that the majority of respondents worked as farmers, where the occupation related to the occurrence of Schistosomiasis had a p-value of 0.01 and an odds ratio of 2.7 (F. Al Akbar et al., 2024).

This study showed that the majority of respondents have good preventive practices including the use of personal protective equipment (PPE), regularly washing hands with soap, and using private latrines. These practices are important protective factors in reducing the risk of schistosomiasis transmission. However, a small proportion of respondents still reported not using PPE and not washing hands regularly, which may increase their vulnerability to infection in endemic settings. Previous studies have also shown that inadequate preventive practices, such as not wearing protective boots/ shoes, protective clothing, or poor hand hygiene, are associated with an increased risk of schistosomiasis and other helminth infections (Quarcoo et al., 2025; Anyolitho et al., 2022, Gurmassa et al., 2024). Research on farmers in Greater Accra shows that inadequate use of PPE, including boots and gloves while working, is strongly correlated with worm infections (Odds ratio; 4.3, 95% Cl: 1.03–18.00, p-value = 0.04) (Quarcoo et al., 2025)

This study showed that most respondents used PDAM water sources for drinking and cooking and treated their drinking water by boiling. These practices indicate relatively good awareness of water safety. Nevertheless, some respondents still relied on surface water sources such as springs water for daily activities, which may pose a risk of schistosomiasis transmission, particularly in endemic areas where snail intermediate hosts are present. Consistent with these findings, previously research revealed that water of poor quality increases the risk of Schistosomiasis infection (Cao et al., 2017, Andargie & Abera, 2018).

Although the percentage is relatively low compared to other endemic areas, this finding indicates that transmission still occurs within the community. The presence of past infections may reflect ongoing exposure risks and highlights the importance of sustaining preventive practices. Higher prevalence rates have been reported in other endemic areas, such as Lindu, Sigi Regency, where poor preventice poor preventive practices and occupational exposure were common (H. Akbar & Agustang, 2021).

This research has limitations including being only a descriptive cross-sectional study. Therefore, it cannot demonstrate the relationships between variables. In addition, this study was only conducted in 3 villages (Alitupu, Wuasa, Watumaeta) out of 4 villages (Kaduwaa, Alitupu, Wuasa, Watumaeta) in the Lore Utara district (the working area of the Wuasa health center) that have a p-value < 0.05 with positive spatial autocorrelation based on previous research (Sakinah et al., 2022). This is due to the limited study time. It is hoped that future research can use, for example, a case-control design and involve all villages including Kaduwaa Village, which will yield more holistic results. However, this study can serve as an initial depiction or preliminary study that there are still communities that do not practice prevention.

5 CONCLUSIONS

In conclusion, most respondents practiced schistosomiasis prevention, including the use of PPE (84.3%), regular handwashing with soap (97.1%), the use of private latrines (92.9%), and boiling drinking water (62.9%). Most household heads were farmers (73.0%), indicating potential exposure due to frequent contact with soil and water in this endemic area. However, some unsafe practices remain, particularly not using PPE (15.7%) and not boiling drinking water (37.1%). This study emphasizes the ongoing need for schistosomiasis prevention interventions, including educational efforts to the community. Additionally, cross-sector collaboration using a One Health approach is necessary, involving all relevant sectors including animal health workers, human health workers, government officials, community leaders, and others to break the transmission chain of schistosomiasis.

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