The New Endemic Area of *Schistosoma japonicum* in Bada Highland Western Lore Subdistrict, District of Poso, Central Sulawesi Province

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ABSTRACT
Introduction: A new endemic area of schistosomiasis was discovered in Bada highland in 2008. Its prevalence in humans in the same year was 0.8%, and so far there is no studies about prevalence and characteristics of focus and human behavior related to the transmission of schistosomiasis in that area have been conducted.
Objective: To identify the prevalence of the disease caused by *Schistosoma japonicum* in humans, rats, and infection rate in snails. This study also described characteristics and human behaviors related to these characteristics and the history of visits to the endemic areas of Napu/Lindu.
Methods: This study was a cross sectional survey. The prevalence of schistosomiasis in humans was identified through stool examination by Kato Katz method. The prevalence in mice was estimated through examinations in dissected mice, and the identification of cercariae in snails was done with crushing methods. Behavioral data were collected using questionnaires and focus characteristics were documented through observations. This research was part of the comprehensive study on schistosomiasis in Bada highland by Research and Development Center for Eradication of Disease of Animal Origin, Donggala.
Results: The prevalence rate of schistosomiasis in humans was 5.93%, in rats 0% and in snails 1%. Types of focus were springs, ponds, irrigation channels, especially those with debris such as grasses, leaves, sticks dropped on the water. Prevalence rate in human was related to bathing in the river (p=0,00), entering the focus without protective shoes (p=0.034), defecation on the river (p=0,016). History of visit to endemic area of Napu/Lindu was not associated with infection in human (p=0.344) and washing in the river was not associated also with human schistosomiasis (p= 0.521).
Conclusion: The transmission of *Schistosoma japonicum* in a new endemic area of Bada highland is occurring and related to bathing, defecation in the river, and visit to the endemic focus without protective shoes.

Keywords: *Schistosoma japonicum*, Bada highland, focus, transmission, *Oncomelania*

INTISARI
Pendahuluan: Daerah endemik baru Schistosomiasis ditemukan di dataran tinggi Bada pada tahun 2008. Prevalensi penyakit ini pada tahun tahun 2008 adalah 0.8%. Sejauh ini belum ada penelitian mengenai kasus prevalensi dan karakteristik focus dan perilaku manusia terkait transmisi schistosomiasis.
Tujuan: Untuk mengidentifikasi prevalensi penyakit yang disebabkan oleh *Schistosoma japonicum* pada manusia, tikus, dan tingkat infeksinya pada siput. Penelitian ini juga menggambarkan karakteristik dan perilaku manusia yang berhubungan dengan karakteristik dan riwayat kunjungan ke daerah endemis Napu/Lindu.
Metode: Penelitian ini merupakan survei cross sectional. Infeksi schistosomiasis pada manusia diidentifikasi melalui pemeriksaan tinja dengan metode Kato Katz. Tingkat infeksi pada tikus diperkirakan melalui pembedahan tikus, dan identifikasi serkaria pada siput dilakukan dengan metode penghancuran. Data

perilaku dikumpulkan dengan menggunakan kuesioner. Karakteristik fokus didokumentasikan dengan metode observasi. Penelitian ini merupakan bagian dari studi komprehensif tentang schistosomiasis di dataran tinggi Bada oleh Balai Penilitian dan Pengembangan Pengendalian Penyakit Bersumber Binatang, Donggala.

Hasil: Prevalensi schistosomiasis pada manusia adalah 5,93%, pada tikus 0% dan siput 1%. Jenis fokus adalah mata air, kolam, saluran irigasi, di mana di dalamnya terdapat sampah rumput, daun, ataupun batang yang jatuh di air. Prevalensi pada manusia terkait dengan mandi di sungai (p = 0,00), memasuki fokus tanpa sepatu pelindung (p = 0,034), buang air besar di sungai (p = 0,016). Riwayat kunjungan ke daerah endemik Napu / Lindu tidak berhubungan dengan infeksi pada manusia (p = 0.344) demikian pula mencuci di sungai tidak terkait juga dengan schistosomiasis manusia (p = 0,521).

Simpulan: Transmisi *Schistosoma japonicum* terjadi di daerah endemic baru yaitu di dataran tinggi Bada. Transmisi yang terjadi berhubungan dengan mandi, defekasi di sungai dan kunjungan ke daerah endemis tanpa menggunakan sepatu pelindung.

Kata kunci: *Schistosoma japonicum*, dataran tinggi Bada, transmisi, fokus*, Oncomelania*

INTRODUCTION

Schistosomiasis is a waterborne disease and considered as a disease which gets less attention (*neglected diseases*)[1]. *Schistosoma japonicum* is one of the four species which causes schistosomiasis (*S. mansoni, S. japonicum, S. haematobium* and *S. mekongi*) and firstly found by Katsurada (1904, *cit* Hadidjaja, 1985) in Yamanashi prefecture, Japan[2].

Schistosomiasis in Indonesia is only found in a remote area of Central Sulawesi named Napu Valley – Besoa, Poso Regency and Lindu Plateau, Donggala Regency[1,3]. This disease is caused by *S. japonicum* which is firstly found by Muller and Tesch, in a 35-year-old male patient from Tomado village in Lindu valley which suffered from chronic schistosomiasis and finally died in Palu Hospital, Central Sulawesi in 1937[3]. Schistosomiasis is the worst disease and may cause death. It is a zoonosis disease which has reservoir host are of all kind of mammals.

Animals which can act as the reservoir of this disease are cow, pig, dog, cat, buffalo, sheep, deer, horse, mouse. Intermediate host is the snail from the species of *Oncomelania hupensis lindoensis* (*O.h.lindoensis*) which is firstly found by Carney *et al*. in 1971[4] and is the only vector in Indonesia until now.

The aim of schistosomiasis eradication program in Indonesia is reducing the prevalence rate of this disease to be less than 1% of the population. In Central Sulawesi, the eradication program was intensively implemented from 1982 by the Central Sulawesi Provincial Health Office in Lindu and Napu areas. Implemented prevention activities are such as focus eradication, patient treatments, improving sanitation, and health education[1].

During the years of 1982-1988, there was a decline in prevalence rate from 33.85% to 1.22% in Napu area and continued to decline and in 2003 reached 0.66%. However, that decline in prevalence rate turned out to cause the disease to get less attention so that in 2007, it showed rising prevalence rate to 1.2%. The newest survey conducted by Loka Litbang P2B2 Donggala Health Department (now *Balai Penelitian dan Pengembangan Pemberantasan Penyakit Bersumber Binatang* (*Balitbang P2B2*) in 2008 was obtained the prevalence rate 2.22% in Napu areas and 2.21% in Lindu areas. This result is not different from the research documents by Universitas Airlangga Surabaya in 2002 with the obtained prevalence rate was 2.4%[5]. In Napu areas there were two villages with high

prevalence rate, i.e Dodolo with prevalence rate 8% and Mekarsari village with prevalence rate 7.3%[6]. The *Balitbang P2B2* Donggala survey in 2008 found the new area of schistosomiasis, i.e. Bada Plateau with the population prevalence 0.8%. From the results of a brief interview in that survey, a death of a resident with abdominal bloating was reported, although it was not decided yet whether the resident was suffering from schistosomiasis or not. The number of focus found in that research as a whole were 21 focuses with 15 focuses were positive . The prevalence of *S. japonicum* in mice was 11.1%.

Bada Plateau is located about 350 km in the southwest from the city of Palu in coordinate 01° 51' 21" SL dan 120° 13'47" EL. This area has hilly topography, valley, and is located in the south of Napu-Besoa Plateau.

The native of Bada society is the Lore tribe which is the same tribe with the people in Napu plateau. The relationship between Bada Plateau society and Napu society is quite close which allows the relatively high mobility of people in and out of the two regions[7].

People in Bada Plateau area, District of Poso are mainly farmers who are always dealing with water when working in the rice fields. The habit of taking a bath and using water fountain for daily needs are still found in this area[6].

Several studies showed the incidence of schistosomiasis are highly related to human behavior or an habit. Generally, schistosomiasis sufferers are those who have habit always contact with water. Frequent contact with water or entering the water infected with parasite *Schistosoma* causes the increase of schistosomiasis in the society[8].

Survey result of the focus existence of the snail type *O.h lindoensis* shows that they are mainly moat, small waterways in the middle of forest, spring, and muddy swamps in the former rice fields. Most all of the focus characteristics are muddy, the presence of litter and some types of grass growing around the focus[6].

Based on those reasons, this study is conducted to find out more the prevalence rate on the population, mice, temporary hospes, temporary host habitat, and the existence of the factors related to the incidence of schistosomiasis in Bada Plateau.

MATERIALS AND METHODS

This study used survey research methods with cross sectional study design to describe phenomena which relates to the distribution and determinants of schistosomiasis in new endemic areas of Bada Plateau[9]. The focus of the study was about schistosomiasis prevalence in human, mice, and snails and also introduction of habitat and society behavior related to the incidence of schistosomiasis.

Feces for the prevalence test in human were taken by giving feces pots to the entire population over two years old who got counseling previously and all the collected feces were tested to find the eggs of *S. japonicum* by using the *Kato-Katz* method. Identification of *S. japonicum* for the calculation of prevalence on mice conducted by placing mousetrap with roasted coconut and peanut as baits, placed around known focus and on the other places suspected as a focus. Surgery then performed on the mice which were caught to see the presence of *Schistosoma japonicum* adult worms. Calculation of infection rate in the intermediate host (snails of *O.h. lindoensis*) was done by checking all of the successfully collected snails *O.h.lindoensis* from the focus area[10,11]. This activity was preceded by finding temporary host focus and tracing places suspected as temporary host focus based on the characteristics of several previous studies. Places as potential habitat of snails as an intermediate host were identified and its characteristics were determined.

Identification of society attitudes related to the incidence of schistosomiasis was conducted by interviews to 150 respondents randomly using questionnaires. Interview results then analyzed by using a 2x2 table with the Chi-square test at CI 95%. The weakness of this study is the absence of direct observation activities to match the interview results with daily attitudes such as activity, intensity, or location.

RESULTS AND DISCUSSION

Prevalence on human. The result of schistosomiasis prevalence rate in 2010 showed large enough number 5.93%, increased if compared to the prevalence rate in 2008 (0.8%). The number of feces collected and examined in 2010 reached 61% of the population. This range has more number compared to the number in 2008 (36.16%)[6]. According to Sudomo (2010), the dimensions of prevalence rate based on the experience are affected by the range of feces population test. Prevalence is considered reflecting the real condition if the scope of test reached at least 80% of the population[12]. The high prevalence in this area probably was affected by eradication program that is not optimal. Since this region is known as an endemic schistosomiasis area in 2008, until the time when the study conducted, an effort to eradicate the focus has not been made and only treatment efforts were done.These focuses need to be addressed because *O.h. lindoensis* snail habitat that is infected by the *Schistosoma japonicum* will be the source of a transmittion of the schistosomiasis[13].

a. Prevalence based on gender

The table 1. showed that the prevalence of schistosomiasis patients in women was higher than men. The level of exposure or relationship intensity between transmission media with

Table 1. Schistosomiasis Prevalence based on Sex in Western Lore Subdistrict, District of Poso in 2010

Sex	Number of Examine	Number of Positive	Prevalence (%)
Male	750	38	5.07
Female	734	50	6.81
Total	1484	88	5.93

society depended on the behavior[14]. This study result showed a difference behavior between man and woman related to schistosomiasis. Woman proportion which had a habit to contact with the focus was greater than man (75.9% and 66.2%), supported by the habit of women wearing boots which was also lower than men (36.7% and 53.5%). Daily behavior showed difference of woman proportion that had a habit to defecate not in the toilet (26.5 % and man for 14.1%). The habit of bathing in the river also showed that women had greater proportion than men (21.5% compared to 15.5%).

b. Prevalence based on age group

Table 2. Schistosomiasis Prevalence on Children and Adults in Western Lore Subdistrict, District of Poso in 2010

Age group	Number of examine	Number of positive result	Prevalence (%)
Child (<15 yo)	418	24	5.74
Adult (>15 yo)	1066	64	6.00
Total	1484	88	5.93

Schistosomiasis in Bada Plateau infect all age-groups. This is on a par with Chin states, that no one is immune to schistosomiasis infection[15]. Prevalence of the adult group was a slightly higher than the child group, 6% and 5,7%. The

Table 3. Schistosomiasis Prevalence Based on Age in Western Lore Subdistrict, District of Poso in 2010

Age group	Number of examinee	Number of positive result	Prevalence (%)
2 – 4 years old	102	7	6.86
5 – 9 years old	195	9	4.62
10 – 14 years old	121	8	6.61
15 – 19 years old	45	1	2.22
20 – 44 years old	573	32	5.58
45 – 54 years old	211	9	4.27
54 – 59 years old	79	5	6.33
60 – 69 years old	100	10	10.00
70 years old above	58	7	12.07
Total	1484	88	5.93

Table 4. Schistosomiasis Prevalence Based on the Village in Western Lore Subdistrict, District of Poso in 2010

Village	Number of examinee	Number of positive result	Prevalence (%)
Lelio	232	19	8.19
Kolori	231	2	0.87
Lengkeka	264	26	9.85
Kageroa	256	10	3.91
Tuare	309	18	5.83
Tomihipi	192	13	6.77
Total	1484	88	5.93

intensity level of the relationship between the transmission media and the people depended on their attitude, therefore the difference of attitude between the child and adult group would create difference of the exposure[14]. Kasnodiharjo also stated that the age-based prevalence difference is actually focusing on the attitude that concerns with focus contact[8]. In this study, most of the focus is about the area outside the resident area such as trench, former rice field, and swamp. Most of the main occupation of the residents is farming, so the focus contact of the adult group tends to be bigger than the child group that mostly does not go to the rice field that much. The result of the search of the contact history with the focus area was that the number of children who have a contact history with the focus was 53.33%, while the adult age group was 75.83%. The research conducted by Okpala, *et.al* in Apanta and Laranto Plateau Nigeria also stated that schistosomiasis on children happens to those who often go to the rice field or the focus with their parents[16].

The age-based grouping with more detailed

distribution affirmed that under fives and elderly above 60 years old had higher prevalence, under fives (6.8%) and elderly between 60-69 years old (10%) and the 70-year-olds had bigger prevalence (12.07%). The result of the study by Sama *et. al* (2007) in other area in Kumba stated that children were more susceptive to schistosomiasis infection on the same level of exposure[17]. This also happens to elderly age group by assuming that exposure level in the group is even, therefore the prevalence number on the older age group has the possibility to be affected by the immunity situation. This table shows the similarity with the previous statement.

c. Prevalence based on Village

Village-based prevalence showed that Lengkeka Village had the highest prevalence (9.85 %). This was caused by the infection rate on snail *O.h.lindoensis* in this area, was 12.5% and 16.67%. The existence of the disease agent in this environment is what causes the disease on human whose attitude creates exposure. This is on a part with what is described in the life cycle and modes of transmission of *S. japonicum*[1,8,18]. Prevalence in Tomihipi Village was 6.77% with infection rate of cercaria on snail *O.h.lindoensis* in one focus was 3.13%. The distribution of the focus location in both villages is also located in the middle of residency so that the chance of contact is higher. Research conducted by Jastal in 2008 stated that in Timihipi Village, there was one focus is a spring that is daily used by the residents. The focus in Lengkeka Village is near to the village square.The festival of the villages in the whole Kecamatan Lengkeka area in 2008 were participated by the representatives of each village close to the focus[6], so that the chance of the transmission is fairly big.

Lelio Village had a high prevalence (8. 9%) while the result of the focus survey did not find any focus, the mice survey also did not find any *S. japonicum* adult worm on the mice. Therefore, exposure is considered negative in the village. The result of the search of the visiting history to other villages that had focus of all sufferers states that 13 people (68.4%) confirmed that they had been to other villages. The result of the search of the visiting history to the village festival in Lengkeka was that 10 people (52.6%) had a history of participating in the festival in 2008. This is on a par with the study in 2008 that

Tabel 5. Result of the Survey of Mice and *S. japonicum* Prevalence on Mice in Western Lore Subdistrict, District of Poso in 2010

Village	∑ Trap	∑ Caught mice	% Caught mice	∑*S.japonicum* positive mice	% *S.japonicum* positive mice
Tuare	30	3	10.00	0	0
Kageroa	30	3	10.00	0	0
Lengkeka	30	1	3.33	0	0
Kolori	30	0	0.00	0	-
Lelio	30	2	6.67	0	0
Tomihipi	30	3	10.00	0	0
Tomihipi	30	4	13.33	0	0
Mean	210	16	7.62	0	0

Table 6. Result of the Cercaria Examination on *O.h lindoensis* Snails in Western Lore Subdistrict, District of Poso in 2010

Village	Focus	Number of examined snails	Number of cercaria-positive snails	Infection rate
Lelio	Not found	-	-	-
Kolori	Not found	-	-	-
Lengkeka	Lengkeka1	8	1	12.50
	Lengkeka 2	6	1	16.67
Kageroa	Kageroa 1	41	0	0.00
	Kageroa 2	6	0	0.00
	Kageroa 3	38	0	0.00
	Kageroa 4	5	0	0.00
	Kageroa 5	8	0	0.00
	Kageroa 6	26	0	0.00
	Kageroa 7	25	0	0.00
	Kageroa 8	12	0	0.00
	Kageroa 9	3	0	0.00
	Kageroa 10	10	0	0.00
Tuare	Tuare 1	12	0	0.00
Tomihipi	Tomihipi 1	15	0	0.00
	Tomihipi 2	25	0	0.00
	Tomihipi 3	7	0	0.00
	Tomihipi 4	32	1	3.13
	Tomihipi 5	20	0	0.00
	Total	299	3	1.00

the source of transmission in Lelio Village case is the Lengkeka Village [11]. However, considering the children case, it is indicated that there is a source of transmission in the village. The problem is just that the focus has not been found because not all areas have been examined.

Schistosomiasis prevalence on mice. The result of the mice trap in every village for 4 days of observation is that there are 16 mice that have been caught, consisting of 8 male and 8 female. The species identification of the caught mice were *rattus exulan* 7 mice (43.75%), *Rattus rattus diardi* 6 mice (37.5%) and *Rattus hokmani* 3 mice (18.75%). The dissected-mice showed no *S. japonicum* worm in both vena porta and *S. japonicum* egg from the liver.

The small number of the caught mice causes the failure in finding the *S. japonicum* positive mouse because the prevalence on the mice in some areas such as Napu Plateau which was an endemic area was around 1.32%[2]. The locations of the traps that are spread not only around the focus also influences the success of catching the mice because the study is also to find clues of other focuses while a good catching area is in

Table 7. Relationship between the Habit of Defecating and the Schistosomiasis case in Western Lore Subdistrict. District Of Poso Central Sulawesi Province in 2010.

Habit of Defecating in Toilet	Schistosomiasis				Total		p-value
	Yes	%	No	%	N	%	
No	15	48.39	16	51.61	31	100	0.016
Yes	31	26.05	88	73.95	119	100	
Total	46	30.67	104	69.33	150	100	

Table 8. Relationship between Habit of Bathing in the River and the Schistosomiasis cases in Western Lore Subdistrict, District of Poso, Central Sulawesi Province in 2010.

Habit of Bathing in the River	Schistosomiasis				Total		p-value
	Yes	%	No	%	n	%	
Yes	17	60.71	11	39.29	28	100	0.000
No	29	23.77	93	76.33	122	100	
Total	46	30.67	104	69.33	150	100	

Table 9. Relationship between Habit of Washing in the River and the Schistosomiasis case inWestern Lore Subdistrict, District of Poso Central Sulawesi Province in 2010.

Habit of Washing in the River	Schistosomiasis				Total		p-value
	Yes	%	No	%	n	%	
Yes	10	35.71	18	64.29	28	100	0.521
No	36	29.51	86	70.49	122	100	
Total	46	30.67	104	69.33	150	100	

Table 10. Relationshipbetween Wearing Boots when in Contact with Focus and the Schistosomiasis cases in Western Lore Subdistrict, District of Poso Central Sulawesi Province in 2010

Habit of Wearing Boots	Schistosomiasis				Total		p-value
	Yes	%	No	%	n	%	
No	22	44.00	28	56.00	50	100	0.034
Yes	14	24.56	43	75.44	57	100	
Total	36	33.63	71	66.36	107	100	

fact around the positive focus [6].

Infection rate of cercaria in the *O. h lindoensis* snail. The table 6. showed the average of infection rate of cercaria to the snail, that was 1% with the highest infection rate found in the focus in Lengkeka Village that was 12,5% and 16,7%.

Description of focus. This study showed that the focus types were various, including the trench in the rice field, pond, transpiration area, sewer and spring. Basically, focuses could be divided into two groups; natural focus and non-natural focus or human activity-caused focus.

The characteristics of the natural focus is a natural habitat including seepage in the foothills, spring, swamp that has muddy soil and grasses, ferns, water plants, and some fall out leaves and weathered wood. Snails are found in the bottom of the grasses and under the fall out leaves in the muddy area. Meanwhile, the artificial focus is the pond and the rice fields, trench and unmaintained irrigation channels. Snails are found sticking in the bottom of the grasses touching the muddy soil. The level of acidity (pH) on focus is around 6–8 and the temperature is 21.5°C–30° C. The result of this study is almost similar to the previous study results which state that the characteristics of the found focuses are rice fields, trench, and swamps with the temperature around 25.1°C and pH around 6.7[6].

Residents attitude. Pathogenesis is a case when the disease is caused by the interactions of the disease sources, in this case schistosomiasis sufferers as the source of transmission that releases *S. japonicum* worm's eggs into the environment; the disease transmission media is in this case *O.h lindoensis* snails; the residents with some variables such as attitude and the residents that are exposed to the disease sources in the environment[19]. Some studies show that schistosomiasis is related to the attitude of human. In general, schistosomiasis sufferers is those who usually have contact with water. The frequent contact with the water or entering the parasite *Schistosoma*-infected water causes the raise of schistosomiasis in the society[8].

The case and difference of infection of schistosomiasis in China related to the bathing activity, swimming or playing and washing in the river or irrigation channel[19,20]. The research in Northern Senegal also stated that schistosomiasis related to the habit of defecating in the river and suggesting to limitate the feces exposure to the river through the supply of the sanitary facilitaties[21, 22]. Therefore, one way to reduce schistosomiasis prevalence in the society is by the use of house sanitation[8,19,23].

This study showed the relationship between schistosomiasis and the habit of defecating in the river, taking a bath in the river, and the habit of not using boots when doing activities in the focus area, as seen in the table follows:

a. Habit of defecating

The habit of defecating in the river showed the relationship to the schistosomiasis case (p=0.016). This founding is on a par with what happens in the Napu Plateau, the reinfection case of schistosomiasis japonica relates to the use of house sanitation[5].

b. Habit of bathing

The table 8. showed that 60.71% respondents had a habit of taking a bath in the river where as the respondents with the habit of taking a bath in the bathroom or in the house or public water channel that suffers from schistosomiasis was 23.77%. Statistical test results in p=0.000 means that schistosmiasis case relates to the habit of taking a bath in the river. This case is the same with what happens in Napu Plateau and China[19,

[20]. That is why the use of bathroom is the effort to reduce the chance of the schistosomiasis infection[24].

The habit of taking a bath in the river was still conducted by the 18.7% of residents, using bathroom was 78.7% and the rest 2.7% had a bathing habit in the public water channel near the house, especially the toddlers and children.

c. Habit of washing clothes

Washing clothes habit of the residents was 81.3% at home, including the use of the bathroom and the public water channel near the house and other 18.7% still used the river to wash.

d. Habit of wearing boots

The habit of wearing boots when going to the focus area was 53.27% (57 people) of the respondents who often had a contact with the focus. The analysis result of the relationship between the habit of not wearing boots when in contact with the focus to do daily activities and the schistosomiasis case was 44.00% respondents while for those who wore boots were 24.56% sufferers. The statistical test results in p=0.034 which means that the schistosmiasis case related to the habit of not wearing boots when going to the focus area. Based on the result, one of the efforts to avoid schistosomiasis infection is by wearing boots while doing activities in the rice field[23].

The infection location. Further investigation about the infection location results in the local infection possibility and does not have anything to do with the visiting history to the endemic Lindu and Napu Plateau. With the finding of schistosomiasis sufferers, the focus of *O.h.lindoensis* snail, cercaria on the snail and the habit of the people that supports the incidence of schistosomiasis, therefore it is estimated that the schistosomiasis case in this area is a local infection. Achmadi claims that pathogenesis is a case when the disease is caused by the interactions of the disease sources, in this case schistosomiasis sufferers as the source of transmission that releases *S. japonicum* worm's eggs into the environment; the disease transmission media is in this case *O.h lindoensis* snails; the residents with some variables such as attitude and the residents that are exposed to the disease sources in the environment[23].

The Board of Health needs to conduct the prevention efforts and schistosomiasis counter measures by doing several activities as follows:

1. Controlling the disease source by doing medication to the sufferers and conducting a survey frequently with high scope, minimum 80%.
2. Providing family sanitary facilitaties and clean water for household needs through the supply of clean water for every family.
3. Controlling vector/eradication of focus snails as well as manipulating the environment by cooperating with the irrigation sector to produce a productive rice fields, maintaining the irrigation channel, the land drying for productive plants diversification for dry land such as vegetables, cocoa plantation, as well as chemically with *molucide*.
4. Conducting health promotion especially concerning the Clean and Healthy Life Attitude with the emphasis to defecate in the right place, use clean water for bathing and other household need as well as to use the boots while doing activity in the rice fields and gardens.

The people in the society need to take care of the environment so that it does not become the transmission media of diseases, conducting clean and healthy lifestyle and obeying the medication process.

CONCLUSION

Schistosomiasis prevalence in the Bada Plateau is rather high (5.93%), population under fives and elderly have higher prevalence compared to the other groups. People whose habits are taking bath or defecating in the river and not wearing boots while doing activities in the focus area were in risk to suffer schistosomiasis.

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