人類生態班

Water utilization situations at two suburban areas in Lao P.D,R. - The cases of Lahanam district, Savannakhet and its changing pattern in Xaithani district in Viennntiane Capital -

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Abstract

Utilization and availability of water source is a serious health problem in developing countries. To analyze local condition of water utilization patterns in Lao PDR, a comparative study on water utility and sanitation condition along the local context was conducted at 2 villages in Savannakhet province and a village in Vientiane Capital in 2005. There was no city water supply in the two areas. Water utilization and the sanitation data of the Capital village in 2000 were also employed to compare change of the situation for 6 years at the place. In Savannakhet, main water sources were dug well, river, purchase-bottle water, and rainwater storage. Rainwater was common drinking source, and a half of them drink before boiling. In the capital area, main water sources were well (borehole and dug wells), purchase-bottle water both in 2000 and in 2005. Utilization of drinking water, well water was chosen firstly and the water boiling practice rates were not so different in both areas. The consumption of purchase water was higher in Vientiane than in Savannakhet. Also, it was demonstrated that the rate of purchase water increased much at the capital in these six years.

INTRODUCTION

Study on prevention of food-borne and water-borne diseases is one of the important components of our scheme in the Health Development Research project. We conducting investigation on environmental health in Laos since 1993 (Midorikawa et al.,1996), and it have been demonstrated that purchase waters were widely use in the city area, which were mostly polluted by monitoring of indicator bacteria as faecal coiform and *E. coli* (Watanabe et al. 2005). In this point of view, we present here the water utility patterns at suburban village cases in the Savannakhet and the Vientiane Capital in relation to their hygiene and illness episodes. Especially the village currently continued and investigated in which non-water supply district of the Vientiane capital, the results of an investigation of years 2000 and 2005 are compared.

MATERIALS AND METHODS

1. Savannakhet province: Field survey was performed at 2 villages located in Lahanam district 50Km southeast of Savannakhet city. These names are Lahanam Tha and Lahanam Thong. Their populations and house hold numbers are 1012, 151 (the national population census 1995) and 1256, 210 (1995), respectively. The data on the use of water sources, drinking practice, the disease episode and family face sheet data including the income were obtained from households by interviewing the household heads and/or house wife, or adult family member, using common questionnaire. Besides the above, before performing the interview full informed consents were given to the interviewee and accepted family data were used for analysis. The data from two villages is totalled and shown in this report.

2. Vientiane Capital: Fieldworks were conducted in Phailom village, Xaithani district, Vientiane Capital, 23km north-east from the capital city area of Lao PDR, in August 1999, March and September 2000, and September 2005. This village has about 260 households, with a population of 1456 in 1995 and 211 households with a population of 1545 in 2005. The dwellers are consisted of typical suburban rice farmers (67 %) and civil servants (22%) commuting to the city area in 2000 (Nakamura et al.). The villagers had experienced epidemic of cholera for the first time in the Vientiane municipality in 1995 (Nakamura and Marui, 2000). Interview survey was made the same manners as in the villages of Lahanam. The survey results in 1999 and in 2000 were combined together, and the results are expressed as in 2000.

RESULTS

1.Lahanam district, Savannakhet province

1-1. Main water sources: Seventy-nine households data were obtained through the interview survey. Their drinking water source was found to 4 kinds; Dug well, river, purchase (bottle) water, and rainwater storage. For drinking water use, well water was chosen firstly in the area. Tap water categorized here means no public water

Table 1. Type of water source (for drinking)

	1st choice	2nd choice	3rd choice	4th choice
	n (%)	n (%)	n (%)	n (%)
Bore well	25 (31.6)	1 (1.3)	1 (1.3)	- (-)
Tap water	7 (8.9)	3 (3.8)		- (-)
Dug well	39 (49.4)	10 (12.7)	2 (2.5)	- (-)
Rain	7 (8.9)	57 (72.2)	9 (11.4)	- (-)
Bottled	- (-)	1 (1.3)	3 (3.8)	1 (1.3)
No answer	1 (1.3)	7 (8.9)	64 (81.0)	78 (98.7)

Table 2. Type of water source (for washing foods and laundry)

	Washing foods			laundry		
	1st choice	2nd choice	3rd choice	1st choice	2nd choice	3rd choice
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Bore well	21 (26.6)	- (-)	- (-)	19 (24.1)	- (-)	- (-)
Tap water	43 (54.4)	2 (2.5)	- (-)	46 (58.2)	2 (2.5)	- (-)
Dug well	11 (13.9)	5 (6.3)	- (-)	9 (11.4)	2 (2.5)	- (-)
Rain	3 (3.8)	51 (64.6)	7 (8.9)	2 (2.5)	47 (59.5)	4 (5.1)
River	- (-)	- (-)	- (-)	1 (1.3)	1 (1.3)	- (-)
No answer	1 (1.3)	21 (26.6)	72 (91.1)	2 (2.5)	27 (34.2)	75 (94.9)

Table 3. Type of water source (for bathing and others)

	bathing			others
	1st choice	2nd choice	3rd choice	1st choice
	n (%)	n (%)	n (%)	n (%)
Borehole well	20 (25.3)	- (-)	- (-)	- (-)
Tap water	46 (58.2)	3 (3.8)	- (-)	6 (7.6)
Dug well	9 (11.4)	2 (2.5)	- (-)	- (-)
Rain	2 (2.5)	50 (63.3)	5 (6.3)	- (-)
River	1 (1.3)	1 (1.3)	- (-)	- (-)
No answer	1 (1.3	23 (29.1)	74 (93.7)	73 (92.4)

supply system, but people derived the water from river near by their houses. In the second choice, especially, the rainwater, the usage was very common in the area was found. The results were summarized as following tables and figures. Purchase water was not common in these villages. The types of water source for other uses were depended mainly on tap as river water among the people living in this area.

1-2. Drinking water practice: Of the drink water practice, 60 % of the cases were used with boiling for well water sources. A half of the people used rainwater as drinking water with boiling as second and/or third choice in the area.

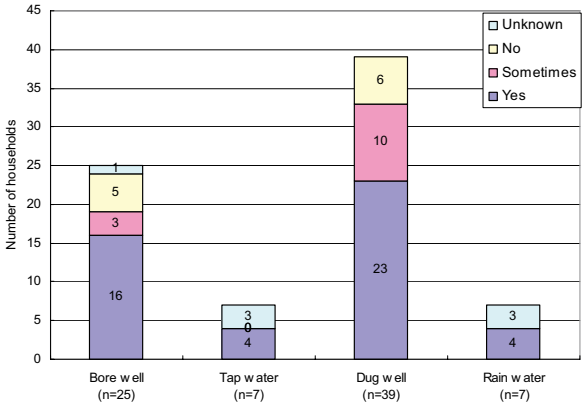


Figure 1. Boiling practice on drinking water at 1st choice of water source at Lahanam villages, Savannakhet, 2005

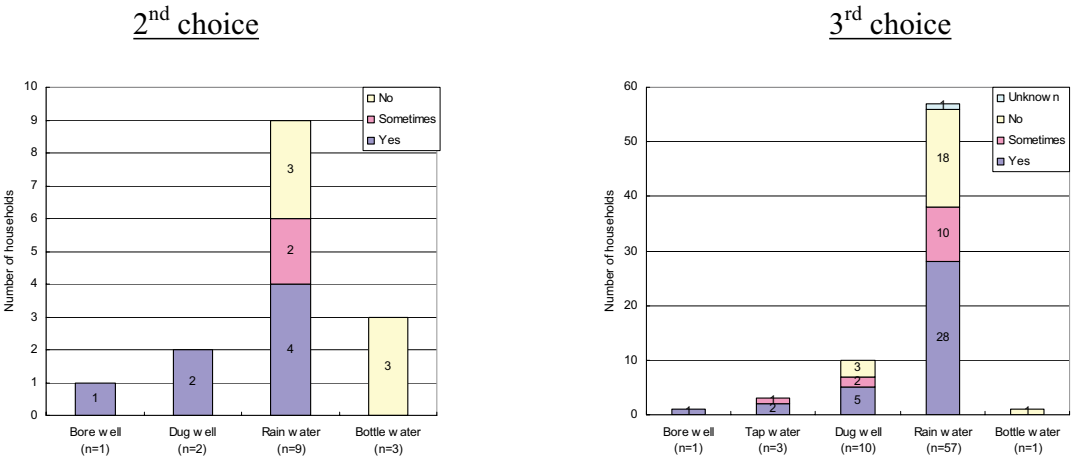


Figure 2. Boiling practice on drinking water at 2nd and 3rd choice of water source at Lahanam villages, Savannakhet, 2005

1-3. Toilet type: Common type of the toilet in the survey villages was pit toilet with water flash (72%). However, no toilet or defecation at outside ground was also observed at there.

Table 4. Type of toilet at villages in Lahanam, Savannakhet

	n (%)
Flush toilet	57 (72.2%)
No toilet	17 (21.5%)
Outside on ground	3 (3.8%)
No answer	2 (2.5%)

1-4. Morbidity: In replies of illness episodes questionnaire, fever was commonest, and diarrhea, cough were follows. Helminthes infection was also well known episodes among the villagers (Fig.3).

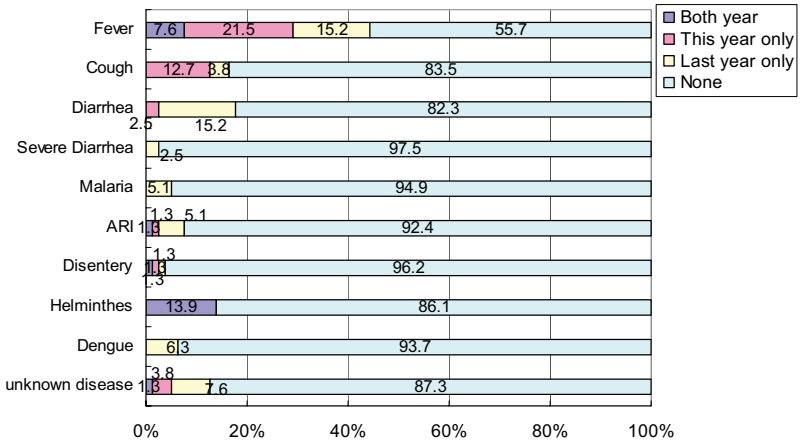


Figure 3. Morbidity of the family members during the last/this year at villages, Lahanam, 2005.

2. Xaithani district, Vientiane Capital

2-1 Phailom village in 2000

2-1-1. Main water sources: In 2000, of 202 households studied, 128 households used Borehole wells as the main drinking water sources (63%), and 70 used dug wells (25%) at the first choice (Table 5). The purchase bottled water used for drinking was not so common in the village. Rainwater used for drinking was less common at 2.5% among the households in this village even at the second use. The main water source for other use as washing foods, laundry, bathing etc. were also depended on ground water.

Table 5. Type of water source at Phailom village, Vientane Capital, 2000

	Drinking (1st use)		Drinking (2nd use)		Washing food		Laundry		Bathing		Others	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Borehole well	128	(63.4)	1	(0.5)	133	(65.8)	133	(65.8)	133	(65.8)	42	(20.8)
Dug well	70	(24.7)	2	(1.0)	69	(34.2)	69	(34.2)	69	(34.2)	32	(15.8)
Rain water	1	(0.5)	5	(2.5)	-	(-)	-	(-)	-	(-)	1	(0.5)
Bottled	3	(1.5)	11	(5.4)	-	(-)	-	(-)	-	(-)	-	(-)
No answer	-	(-)	183	(90.6)	-	(-)	-	(-)	-	(-)	127	(62.9)

2-1-2. Drinking water practice: On the drinking practice at each water sources, 122 among 128 bore-well

source families use raw water for drinking (95%) at the first choice (Fig.4). On the contrary, nearly 90% of the people use drinking water with boiling on dug-well water. In the second use, purchased bottled water was much used without any boiling practice though the cases were in smaller (Fig.5).

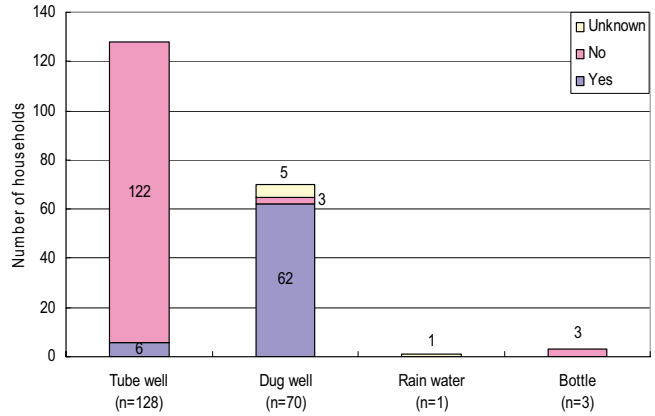


Figure 4. Boiling practice on drinking water at 1st choice of water source at Phailom village, Vientiane Capital, 2000

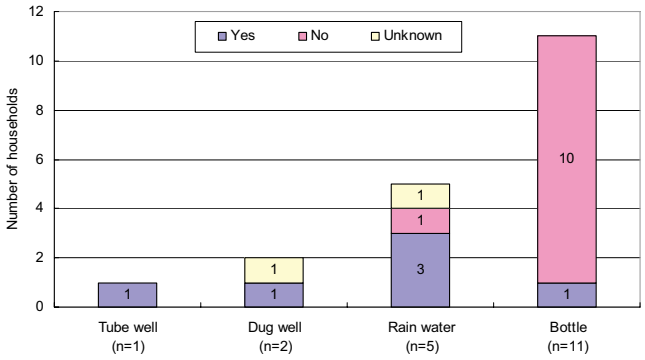


Figure 5. Boiling practice on drinking water at 2nd choice of water source at Phailom village, Vientiane Capital, 2000

2-1-3. Toilet types: Around 80% of the toilet was pit latrine with flash water in Phailom village. However, others had no toilet such as defecated in the forest.

Table 6. Toilet type of Phailom village, Vientiane Capital, 2000

	n	(%)
Toilet		
Latrine with water	161	(79.7%)
Outside ground	16	(7.9%)
Other	1	(0.5%)
None	22	(10.9%)
No answer	2	(1.0%)

2-1-4. Morbidity: In the surveyed years 1999-2000, items of illness episode on fever and cough at the questionnaire were lacking. In Fig. 6, the episodes in 1998 were also included as the last year 1999. Commonest episode were helminthes infections. Then, undiagnosed malaria, and acute respiratory infections were followed. Others included cancer, tuberculosis, diabetes, animal bites, and accidental wounds were observed. No relationship were observed amongst enteric infections and water practices (data not shown).

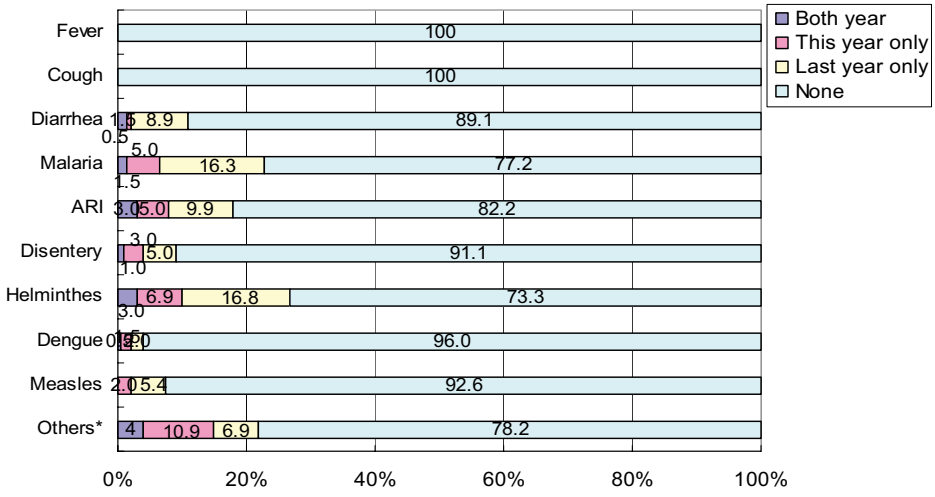


Figure 6. Morbidity of the family members during the last/this year at Phailom village, Vientiane Capital, 2000

2-2. Phailom village in 2005

2-2-1. Main water source: In 2005, of 211 households studied, 151 families (70%) still depended on ground water as drinking water source (Table 7). Some family developed own water distribution from their wells by tap water system applying electric motor. In the first choice, purchase bottled water utility was nearly 7%. However, obviously this water utility was prominent in the second choice among the villagers. Other water utilities were also depended on groundwater as in the year 2000.

Table 7. Type of water source at Phailom village, Vientiane Capital, 2005

	Drinking (1st use)		Drinking (2nd use)		Washing		Laundry		Bathing		Others	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Bore well	109	(51.7)	3	(1.4)	114	(54.1)	114	(54.1)	114	(54.1)	81	(38.4)
Bore well (M)	14	(6.6)	-	(-)	11	(5.2)	11	(5.2)	11	(5.2)	1	(0.5)
Tap water	4	(1.9)	-	(-)	4	(1.9)	5	(2.4)	5	(2.4)	1	(0.5)
Tap water(M)	1	(0.5)	-	(-)	6	(2.8)	6	(2.8)	6	(2.8)	-	(-)
Dug well	19	(9.0)	-	(-)	13	(6.2)	12	(5.7)	12	(5.7)	8	(3.8)
Dug well(M)	4	(1.9)	-	(-)	11	(5.2)	13	(6.2)	12	(5.7)	3	(1.4)
Rain(M)	1	(0.5)	1	(0.5)	1	(0.5)	1	(0.5)	1	(0.5)	1	(0.9)
Bottled	14	(6.7)	114	(54.0)	-	(-)	-	(-)	-	(-)	-	(-)
Other	4	(1.9)	1	(0.5)	-	(-)	-	(-)			-	(-)
No answer	40	(19.0)	92	(43.6)	51	(24.2)	49	(23.2)	50	(23.7)	116	(55.0)

2-2-2. Drinking water practice: It was found that almost the half use drinking water with boiling amongst the villager who utilized ground water (Fig 7). In purchase-bottled water, the rate of boiling practice was 63% together with the first and the second choice (Fig 8).

2-2-3. Toilet types: Nearly 80% households had latrine in the village (Tab. 8). However, still 10% had no latrine yet. The tendency is not different from the year 2000.

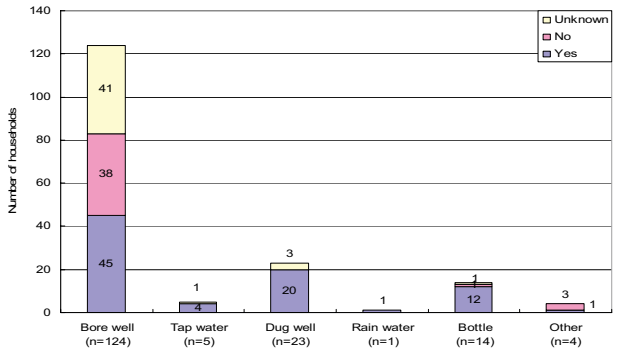


Figure 7. Boiling practice on drinking water at 1st choice of water source at Phailom village, Vientiane Capital, 2005

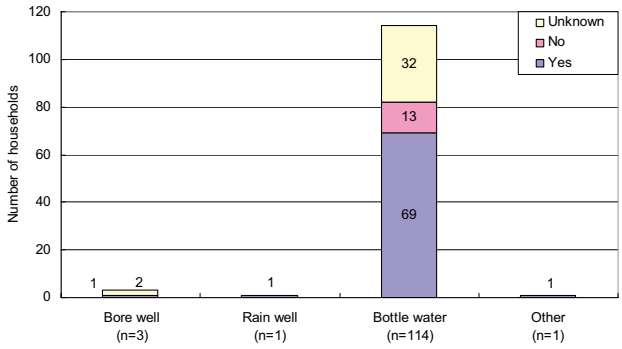


Figure 8. Boiling practice on drinking water at 2nd choice of water source at Phailom village, Vientiane Capital, 2005

Table 8. Toilet type in Phailom village, Vientiane Capital, 2005

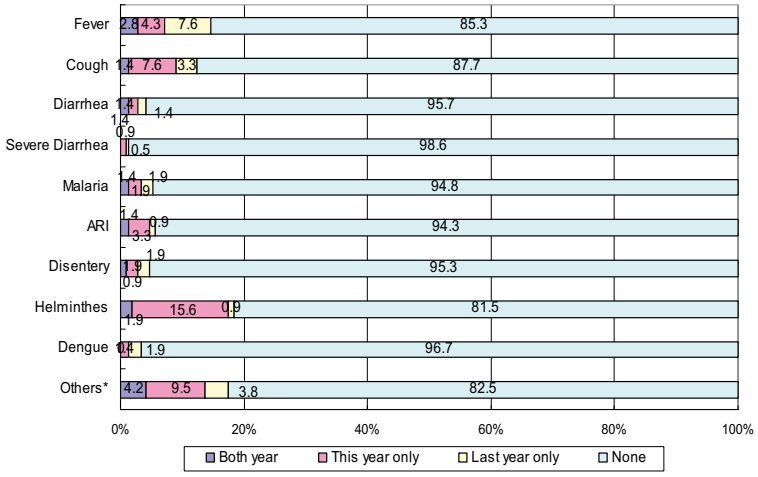
Toilet	n	(%)
Flush toilet	122	(57.9%)
Latrine	15	(7.1%)
Bore hole	30	(14.2%)
Outside ground	15	(7.1%)
Other	4	(1.9%)
None	5	(2.4%)
No answer	21	(10.0%)

2-1-4. Morbidity: Commonest episode were helminthes infections. Diarrhea and suspected malaria cases were reduced comparing to the results in year 2000.

DISCUSSION

Comparing of the results on water utilities between Savannakhet and Vientiane Capital, Savannakhet case had more variety on water sources, combination of their utility (data not shown), and especially use of rain water was remarkable. In the coming decade, on ground water availability and its quality in suburban area such as Vientiane Capital, the situation will be worse because of the rapid economical progress was pointed out. Although the investigation are to be needed among local inhabitants about the preference on rain water as drinking source, it is thought that use of rain water is fully adapted also in Laos, according to known rainwater reservoir movement developed in Isan area in Thailand in 1970s.

In this study, we demonstrate the case that water utilization pattern, especially on drinking water, changed obviously within 6 years in the suburb of Vientiane Capital. The reasons of this change will be explained by their



*Others include “DM”, “tetanus”, “measles”, “TB”, “Polio”, “accident” etc.

Figure 9. Morbidity of the family members during the last/this year at Phailom village, Vientiane Capital, 2005

easy availability, the low cost (20L / 2000-3000kip), and people's belief on its quality in the area. Still sufficient analysis is required at our data, however, no distinct changes on morbidity, income (data not shown), toilet type, waste treatment (data not shown) at this village between 6 years were shown in this report. Consequently, no information at quality of the water in Savannakhet and Vientiane Capital areas were shown here. The river water sample from a survey village at Lhanam district was once performed, and the results indicated that the source of water (Xe Banghian) was densely contaminated by faecal coliform. Also, these indicator bacteria were easily detected from ground water sources except a few borehole wells in Phailom village. Moreover, this kinds of contamination is common in various parts of Laos (Miura et al.,2005), In the case of the large-sized bottle container (20L), the contamination is remarkable. This is because sterilization or disinfection is not fully made in process of washing of this container.

Recently, we found that the purchase bottle water were much prevalent even in the water supplied area in urban part of Vientiane Capital. 40 out of 49 surveyed households, using purchase water for drinking, and 39 house holds of them were drinking the water with boiling was clarified. Tap water only for drinking use was 4 families. It was pointed out that the smell of city water was a reason for the prevalence of purchase water in the city (unpublished data).

Maintain of the water standard is one of national health issues to sustain national health policy in Lao PDR. At the same times, we want to strengthen introduction of the safety and health education viewpoint about the development of tap water system both in local and urban areas in Lao PDR.

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