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The Development of Training Packages Environment Education on Solid Waste in Community for Village Health Volunteer in Amphoe Muang Sakon Nakhon

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Abstract: The aim of this study is to investigate as follows, to study the operations and management of the problems regarding solid wastes. To develop the training packages environment education on solid wastes in the local community for village health volunteers. Also to evaluate the efficiency of the 80/80 criterion and efficiency index. To compare the knowledge, the participatory action and the skills of operations before and after the training by using the training packages environment education on the topic of solid wastes in the local community. Regarding the village health community volunteers, they are categorized into age groups, working experience and the site of location of work. To study and compare the differences of knowledge, the participatory action and the skills of operations by village health community volunteers. And the impact of the solid wastes in the community specifically demographics. To study the satisfaction of village health community volunteers who have been trained by using the training packages environment education. The samples size of village health community volunteers are 53 who were selected by cluster random sampling method. The research kit was composed of questionnaires which consisted of knowledge questions, participatory questions and operational skills questions and also the scale for the evaluation of satisfaction. The statistic in this research are descriptive and inferential statistics which are pair t-test and F-test (one way Mancova). The result of this research was found that the daily production of solid wastes is 55 tons and the production rate is 0.94 kg/person/day. The most popular wastes are organic and the second is recycled wastes and wastes in general. The efficiency of the training packages environment education is 90.61/89.90 which is higher than the requirement of the setting up criterion of 80/80 and the index of training is equal to 0.6030. After the efficiency of the training course, the village health volunteers can show that there is an increase of knowledge and participants skills and skills of the operations, individually and overall. The increasing levels are highly significant in statistic ($p<0.05$). After the training, the result showed that the knowledge, the participatory action and the operational skills of the village health volunteers who have different ages, different work experience and different demographics have no differences. The satisfaction of the village community health volunteers who were trained by using the training packages environment education for solid wastes in community are at the highest level. Therefore, this training packages environment education is effective and can create knowledge, the participation and the operational skills of the village community health volunteers can show the prototype model which can be used in the future of solid waste management.

Key words: Training packages environment education, solid wastes, knowledge, participation, skills of operations, volunteers

INTRODUCTION

Presently, there is the development of economical, social and technology which is expanding rapidly in the suburbans areas. There is an increase of population which is resulting in a higher amount of solid wastes in urban areas. The environmental pollutions concerns are priority and have a tendency to be the most severe problems in near future. This mentioned the quantity of solid wastes in 2001 increased over 30% or the daily wastes increased to 38,600 tons. Inside the city of Bangkok also showed that the amount of solid wastes has increased to 9,320 tons daily or 24% of total solid wastes of the countries solid wastes. In Pattaya Municipality area, there is 11,900 tons daily of solid wastes or 31% and 17,420 tons daily solids wastes in the outer area of municipality or 45% of overall. The future expected amount over the next 10 years is increasing from 39,400-4700 tons daily solid

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wastes in 2011 or 2.0% increase of solid wastes which is between 700-900 tons daily. In 2008, solid wastes which came to 15.03 million tons especially inside the municipality area and in Pattaya city, the increase was 14,915 tons (36%) daily. The outside of municipality increased to 17,369 tons (43%). The figures from Metropolitan of Bangkok are 8,780 tons of solid wastes daily (21%).

Sakon Nakorn Municipality has obtained the areas of 54.54 km^2 which consists of 40 community and the populations is 53,933 people (27,048 males and 26,945 females) recorded on 31st December, 2008. The numbers of residences are 18,881 household inside Sakon Nakorn Municipality which possess the amount of 55 tons of daily solid wastes. The Solid Sakon Nakorn Municipality office is able to collect 50 tons of solid wastes collected daily.

The statistic report from Division of Public Health and Environment found that there was of 5 tons of uncollected solid wastes daily. Inside Sakon Nakorn Municipality has provided the cleaning system, well organized however, it does not cover all the small rural areas. Sometimes, there are the solid wastes left over in the river areas. The majority of solid wastes are plastics, papers, foods, fruits rinds, banana leaves, wood, glass bottles, etc. The plastics and the food gabages are the most popular ones. The people have no ideas in managing since they get used to their own daily practices. The government does not have the proper way to regulate an appropriate solution in order to remove all solid wastes especially at Sakon Nakorn Municipality. The problem continue to become more severe.

There are many village health volunteers who are hired by Sakon Nakorn Municipality in order to be the center of teaching especially in environmental and community development. This organisation also is the center to represent the community in co-ordinating with city in various health functions.

The participatory action of village health volunteers are very essential in resolving all the problems in the community such as health promotion problems and environmental concerns with health problems. The roles of the village health volunteers are to be the leader of the health management team. The leads should convey all messages about health issues to the people in order to increase the quality of life and diminish all the tragedy to their lives.

The village health volunteers will transfer the messages and persuade the local people to participate in the team and guide them how to understand the training packages environment education on solid. It is important to educate the local people to be responsible in the area of wastes management (Veeravatnanond, 2003). The solid wastes training packages environment education will be useful in the area of education and developing positive attitudes and skill of attitudes in management of solid wastes. Therefore, the packages which consists of teaching program will educate the new village health volunteers and also the previous volunteers to obtain better knowledge, better skill and better attitude in management.

Research objectives:

- To study the operational processes and the problems of managing of solid wastes
- To develop the training packages environment education on solid waste for the village health volunteers team with 80/80 criterion and to calculate the effectiveness index
- To compare the knowledge of the management of solid waste, the participatory action and the skills of operation before and after using the training packages environment education on solid waste. This is related to the differences of the ages group, the working experiences and the location of work places
- To study and compare the knowledge, the participatory action and the skills of operation related to solid wastes disposal in the local community of different in demographic population
- To study the satisfaction of village health volunteers who have been trained by using the training packages environment education on solid waste

MATERIALS AND METHODS

This research is experimental study. The sample group is village health volunteers which are located in Amphoe muang of Sakon Nakorn province.

The sample selection is cluster random sampling which was composed of 4 groups of village health volunteers who have been trained inside the city for 2 groups and 2 groups outside the city. The total of 4 groups is 53 people. The research tool is training packages environment education on solid waste which has been used for village health volunteers in 4 areas as follows:

- Basic knowledge of solid wastes management
- The knowledge of transformation and separation of the solid wastes
- The recycling of the solid wastes
- The evaluation of participatory of management of solid wastes including the training plan, the scale of satisfaction, evaluation, the scale for measuring the participatory action, the scale for measuring the knowledge and competency

The statistical method used in this research was an descriptive statistic such as percentage, mean and standard deviation. The inferential statistics used for testing the hypothesis before and after training the village health volunteers was paired t-test and dependent t-test. The statistics used for testing the knowledge and the competency ability was (one way Mancova) by using the Mean of conceptual levels by using t-test and F-test.

RESULTS AND DISCUSSION

The result showed that the quantity of daily solid waste is 55 tons and the production rate is 0.94 km/person/day. The largest quantity of solid waste is organic with 25.05 tons daily. The second largest is 13.3 tons daily and the general wastes is 38.35 tons daily. The nature of the physical property are flammable dried leaves and dried grass. The collection of the solid wastes operation in Sakon Nakorn Municipality office is not efficient. The collecting vehicles of solid wastes are not capable to obtain the amount of 50 tons daily. The volume of solid wastes will be buried underground in the highly sanitized places which belongs to the municipality. The household solid wastes are kept inside the bins, plastics bags, woody tanks or plastic tanks. Normally, village health volunteers used the method of outdoor burning, burring and developing fertilizers. The developing of environmental solid wastes training packages by village health volunteers found that the efficiency and the effectiveness of the operation met the 80/80 criterion level. Firstly step, the result of the efficiency index analysis of environmental solid wastes training packages by village health volunteers found that the efficiency and the effectiveness of the operation met the 80/80 criterion level by sub-testing score after training and knowledge testing score after training are in Table 1. It was found that the training by using environmental solid waste training packages has increase the efficiency from 80/80-90.61/89.90. Secondary step, the result of efficiency analysis of solid waste training packages in community of village health volunteers after the training find that efficiency index scores showed 0.6030 which meant that these the increase of knowledge of the village health volunteers and came to 60.30%. The comparative study of the knowledge, the skills of operations before and after the training with the environmental solid wastes training packages.

From Table 2, after training, it was found that the village health volunteers had obtained the 92% knowledge ($\bar{X}$ = 9.22), 86% in the transformation of solid waste ($\bar{X}$ = 8.64), 89% in management ($\bar{X}$ = 8.96) and 94% of the participatory actions ($\bar{X}$ = 9.42). Therefore, the total scores which were of the composed of the 4 areas in knowledge, perceptions after training are higher than before the training at the significant in statistic level at 0.05. After the training was performed the village health volunteers obtained the participatory decision making at $\bar{X}$ = 3.93, the operational action at $\bar{X}$ = 3.82, the beneficial acceptance at $\bar{X}$ = 4.12, the evaluation at $\bar{X}$ = 4.64 which are very high level. The total of the knowledge level are high level at $\bar{X}$ = 4.13 in order to operation of solid waste of the village health volunteers. The overall participatory actions after training of the 4 areas are higher than before training at significant in

Table 1: The efficiency of solid waste product training packages solid waste product in local community 80/80 criterion

No. of village health volunteers (N)	Total score of questionnaire after training (40 score)	E_1	Total score of questionnaire (knowledge) after training (40 score)	E_2	The efficiency of solid waste product training packages of (E_1/E_2)
53	36.25	90.61	35.96	89.90	90.61/89.90

Table 2: The comparative study between knowledge environmental participatory action and skills of operation before and after training by using solid waste training packages of the village health volunteers

		Before training (n = 53)		After training (n = 53)			
Factors	Management of solid waste product	$\bar{X}$	S.D.	$\bar{X}$	S.D.	t	p-value
The knowledge	General knowledge	8.55	0.67	9.22	0.47	-5.67	0.000*
	Transformation	7.00	0.83	8.64	0.59	-12.16	0.000*
	Management	7.09	0.93	8.96	0.65	-13.86	0.000*
	Participation	8.57	1.23	9.42	0.93	-6.66	0.000*
	Total	7.80	0.58	9.06	0.31	-14.70	0.000*
The participatory action	Decision making	3.80	0.21	3.93	0.19	-9.35	0.000*
	Operation	3.46	0.20	3.82	0.16	-14.93	0.000*
	Benefits	3.82	0.24	4.12	0.19	-12.96	0.000*
	Evaluation	4.36	0.14	4.64	0.06	-15.56	0.000*
	Total	3.86	0.16	4.13	0.14	-23.72	0.000*
Skills of operation	Collection	4.39	0.14	4.56	0.09	-14.98	0.000*
	Transformation	4.05	0.17	4.37	0.13	-19.52	0.000*
	Decomposition	3.92	0.17	4.48	0.11	-25.83	0.000*
	Total	4.12	0.11	4.47	0.11	-44.16	0.000*

*Significant statistics at 0.05

statistic level at 0.05. After the training was performed the village health volunteers obtained skills of operation the collection of solid wastes management data are more ($\bar{X}$ = 4.56), the transformation ($\bar{X}$ = 4.37) in operation of solid waste also increases more frequently ($\bar{X}$ = 4.48). The total scores of numbers of managing after training of the 3 areas are increased ($\bar{X}$ = 4.47) at highly significant in statistic at the level of 0.05. The comparison of this study showed that there are differences in areas of ages, working experiences and site of work location among the different demographics. After excluding the covariance factors, the result showed that there are no differences in knowledge in the participatory action and skills of operation. It is also shown that there are no differences in the relationship with ages, working experiences and location of workplaces of the village health volunteers. As shown in Table 3-5, comparative between knowledge, the participatory action and skills of operation by using solid waste product. The result of satisfaction of village health volunteers after training by using packages environment education on solid waste in community were found that the total of satisfaction level are most at $\bar{X}$ = 4.82, considerate of each detail were found that both of the accommodation/time/meal and service are the most satisfaction at $\bar{X}$ = 4.88.

The details of content for training package in knowledge, site of external training, useable knowledge and content for training package in participation as same the most satisfaction level at $\bar{X}$ = 4.87, 4.86, 4.85, 4.84, respectively. The lowest of satisfaction level are trainers and content for training package in operation skill are as more satisfaction level at $\bar{X}$ = 4.74 and 4.55, respectively (Table 6). The amount of solid wastes are 55 tons daily and rate of solid wastes production daily is 0.94 km/person/day. The organic waste s are 25.05 tons daily. The second wastes is recycled wastes which are 13.3 tons daily. The general solid wastes products are 38.35 tons daily. The physical property of solid wastes are flammables which are wood, leaves, grasses which are residues from daily life. The dangerous wastes are made of metal and chemical food cans. The continuation of chemical wastes came from the use of pesticides since, the solid wastes were left over from the agricultural system (Adisak *et al*., 2010). The study of the development of learning in managing of wet waste by the village health volunteers this study found that the amount of solid wastes was 0.653 km daily and the producing rate was 0.131 km/person/day. The largest amount of solid wastes are 14.09 in general wastes, 4.02 km of organic wastes and the recycled wastes are 15.42 km.

The environmental solid waste training packages is the tool for village health volunteers in managing the solid wastes disposal. The efficiency of the training packages is 90.61/89.90 which is >80/80 standard criterion. The index of effectiveness in solid wastes disposals management is 0.6030.

Therefore, there is the increase of knowledge in solid wastes disposals management among the village health volunteers. The development of solid wastes management was derived from reviewing and analyzing of the formers training tools after reviewing the literatures and all the research articles as in the references. The experts also

Table 3: Comparative between knowledge, the participatory action and skills of operation by using solid waste product management by village health volunteers categorized by age groups (one way MANCOVA)

Statistical methods	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Pillai's Trace	0.296	1.753	9.000	144.000	0.082	0.099
Wilks' Lambda	0.713	1.857	9.000	112.103	0.066	0.107
Hotelling's Trace	0.390	1.934	9.000	134.000	0.052	0.115
Roy's Largest Root	0.355	5.678[a]	3.000	48.000	0.002	0.262

*Significant statistics at 0.05

Table 4: Comparative of knowledge, participatory action and skills of operation in solid waste product management of village health volunteers categorized by working experience of the volunteers (one way MANCOVA)

Statistical methods	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Pillai's Trace	0.117	0.991	6.000	96.000	0.436	0.058
Wilks' Lambda	0.883	1.002[a]	6.000	94.000	0.429	0.060
Hotelling's Trace	0.132	1.012	6.000	92.000	0.422	0.062
Roy's Largest Root	0.132	2.106[a]	3.000	48.000	0.112	0.116

*Significant statistics at 0.05

Table 5: Comparative between knowledge, the participatory action and skills of operation by using training packages environment education on solid waste in community by village health volunteers categorized by sites of location of work place (one way MANCOVA)

Statistical method	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Pillai's Trace	0.068	1.171[a]	3.000	48.000	0.331	0.068
Wilks' Lambda	0.932	1.171[a]	3.000	48.000	0.331	0.068
Hotelling's Trace	0.073	1.171[a]	3.000	48.000	0.331	0.068
Roy's Largest Root	0.073	1.171[a]	3.000	48.000	0.331	0.068

*Significant statistics at 0.05

Table 6: Study of satisfaction of village health volunteer for training by using the training packages environment education on solid waste in community

Detail	$\bar{X}$	S.D.	Criteria	t	Critical value	Level of satisfaction
Trainers	4.74	0.34	3.51	5.14	2.0057	Most
Accommodation /Time/Meal	4.88	0.17	3.51	16.27	2.0057	Most
Service	4.88	0.22	3.51	12.57	2.0057	Most
Content for training package in knowledge	4.87	0.19	3.51	14.18	2.0057	Most
Content for training package in participation	4.84	0.29	3.51	8.54	2.0057	Most
Content for Training package in operation skill	4.55	0.32	3.51	1.14	2.0057	More
Useable knowledge	4.85	0.22	3.51	11.58	2.0057	Most
Site of external training	4.86	0.19	3.51	13.79	2.0057	Most
Total	4.82	0.14	3.51	16.64	2.0057	Most

agreed on the contents of the environmental solid waste training packages for managing the solid wastes by the village health volunteers. All factors are related and strong in validity and also the continuation of training will be useful for the operation and managing of solid waste by the village health volunteers.

The experts also have adjusted some of the necessary factors included in the training packages. The mean results are very high scores after training (Sunthornchai *et al*., 2010) which the efficiency of training in managing model scores was 86.50/88.00. The efficiency of managing is higher than the setting up of standard criterion. The study showed that the knowledge, the participatory action and the skills of operation are higher after the training with highly significant in statistic level at level of 0.05. There are also the comparative study of knowledge, the participatory action and the skills of operations before and after the training which are categorized in different in age groups, different in working experience and work location.

The result also showed the village health volunteers obtained the better knowledge, better participatory action and better skills of operations at highly significant in statistical level at 0.05 (Wongpraphan *et al*., 2010). The study of impact of the participatory learning, attitudes and operations in preventing the contamination of lead residue to the workers and also the study of environmental status of electronics and repair shops in Nakorn Rajchasrima province.

It was resulted after the training that there are higher in the attitudes scores and higher in perception scores in prevention of the contamination of lead in each items and total scores with highly significant in the statistical level at 0.05. The lower of contamination level before and after the training are 13.82. The techniques of different in training course and materials should be more useful and more interesting to the village health volunteers. It is necessary to adjust the contents of training which are relevant to the needs of learners. It also is important to educate the learners to understand and bring it to daily implementation. The comparative study of knowledge, the participatory actions and skill of operation in solid wastes disposals by village health volunteers composed of different in demographics, age groups, working experiences and work location. After excluding the basic knowledge factor, there were no different in impacts by all these above factors. The study of Tuilar (2010) showed that the use of training packages in rescuing people from flooded crisis gave no different in knowledge, skill of operation with significantly in statistical level at 0.05.

The satisfaction of village health volunteers are at highest level during the training activity by using the training packages environment education on solid waste in community. The level of satisfaction in place, time, food and staffs services also have the highest mean scores. But, the level of training modulators and the contents in the skill of training and skills of organizing of the training are lowest. Anyway, the village health volunteers have gained the better knowledge, better skill of operation and better in participatory action after training.

CONCLUSION

The application of environmental solid wastes training packages in solid wastes disposals management by the village health volunteers is very effective and the training can give the result of better knowledge, better participatory actions and better in skill of operation for the village health volunteers in managing of solid wastes disposals. Therefore, it is benefit for village health volunteers for the management of solid wastes disposals and also can be useful for other organizations in training their staffs in the future.

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