MINISTRY OF EDUCATION AND TRAINING MINISTRY OF HEALTH

NATIONAL INSTITUTE OF HYGIENE AND EPIDEMIOLOGY

.....*.....**

PHAM THE XUYEN

CURRENT SITUATION OF HYPERTENSION IN PEOPLE AT AGE FROM 45-64 YEARS OLD AT DIEN BIEN DISTRICT, DIEN BIEN PROVINCE AND THE EFFECTIVE COST OF THE INTERVENTION

Major: Public Health

No.: 62 72 03 01

SUMMARY OF DOCTORAL THESIS IN PUBLIC HEALTH

Hanoi - 2019

This study was completed at:
NATIONAL INSTITUTE OF HYGIENE AND EPIDEMIOLOGY

Scientific supervisor:

1. Dr. NGUYEN THI BACH YEN
2. Assc. Prof. Dr. DUONG THI HONG

Reviewer 1:

Reviewer 2:

This thesis will be defended in front of Institutional Review Committee at National Insitute of Hygiene and Epidemiology at day month year 2019

This thesis can be found at:

1. National Library
2. Library of Nation Institute of Hygiene and Epidemiology

ABBREVIATION

BMI	: Body Mass Index	WHR	: Waist – Hip Ratio
IC	: Intervention Commune	ICER	: Incremental cost/ efficiency increase ratio
CC	: Control Commune	QALYs	: The quality-adjusted life year
WHO	: World Health Organisation		

INTRODUCTION

According to WHO, hypertension is one in eight highest reasons caused disablity and mortality in the world with 7,1 million death each year. WHO also had confirmed that adult people suffering hypertension had increased from 594 million people in 1975 to over 1 billion people in 2013, estimated about 1,56 billion people suffering hypertension in 2025 in the world. In Viet Nam, as report of Cardiovascular center in Bach Mai hospital in 2013, total diagnosised hypertension people through health screening was 143,210, the rate of suffering hypertension at over 40 years old was 25,1%. Hypertension is chronic disease, long time treatment or lifelong. Estimated in the world, hypertension had consumed over 1 thousand billion US dollar and if hypertension without treatment, the cost will come over 3,6 thousand billion US dollar each year. In Viet Nam, hypertension has created not only health burden but also economics and social burden. Several researches to evaluate the economics have conducted and pointed out the cost-effectiveness of the intervention in order to manage and control hypertension as: the research of Health Strategy and Policy Institute had reported the cost of the intervention in using drug for hypertension patient level I about 195.843 VND/person/year; for hypertension patient level II and III

about 570.609 VND/person/year, all intervention had reached the cost-effectiveness. The research of Nguyen Thi Phuong Lan had proven that health screening and hypertension treatment management during 10 years had gained the cost-effectiveness with the cost/1 QALY less than 15,883 US dollar.

In Dien Bien district, accoridng to the study in 2012, hypertension was accounted for 22,86% in people at age over 40 years old. Hypertension is a public health issue but there are no research of current situation and the effective intervention of it, the relation between the cost and the effective intervention in managing and treatment in Dien Bien. Based on the reason of providing the evidence for local health manager about the current situation, the effective intervention and the cost - effectiveness of managing and treating intervention, we have conducted this study: "**Current situation of hypertension in people at age from 45-64 years old at Dien Bien district, Dien Bien province and the effective cost of the intervention**" with 2 following objectives:

1. To describe the current situation of hypertension and several related factors in the age group of 45-64 years old at Dien Bien district, Dien Bien province, 2014.

2. To analyze the cost – effectiveness of the intervention method in managing hypertension treatment in the age group of 45-64 years old at Dien Bien district, Dien Bien province, 2015-2016.

NEW FINDINGS OF THIS STUDY: This study had several new findings in describing hypertension situation as the ratio of suffering hypertension quite high (35,5%) in comparison with this ratio in adult people (25,1%), this ratio higher in male than in female. There was 31,3% without knowing suffering

hypertension in hypertension patients. This study had pointed out that the factors as diet, weight, older group, smoking behavior were related to hypertension. This study had also reported that the intervention in the health targe program combined with appropriated additional intervention in Dien Bien had brought the effectiveness in managing hypertension treatment such as: Changing the knowledge of people about hypertension; increasing the rate of reached blood pressure target; reducing the average of the systolic and diastolic blood pressure. The additional intervention had gained the cost – effectiveness with the cost for reducing 1 mmHg at 156,7 VND and lower than managing hypertension according to the general guideline of the program at 230,9 VND. The increasing cost of reducing 1 mmHg was 130,5 VND. Investing an additional 488,416.9 thousand VND will gain 1 more year of quality life.

STRUCTURE OF THESIS: The thesis is structured by 124 pages and consists of 2 pages of introduction, 37 pages of overview, 22 pages of subjects and methodology, 28 pages of study results, 32 pages of discussion, 2 pages of conclusion and 1 page of recommendation. The thesis includes 34 tables, 06 diagrams and 126 references, of which 59 in Vietnamese and 67 in English.

Chapter 1: OVERVIEW

1.1. Current situation and several related factors of hypertension in the world and Vietnam

1.1.1. Current situation of hypertension: * *In the world:* According to the report of WHO, the percentage of hypertension was from 10-30% at people over 18 years old. WHO defines the hypertension as “Silent killer, global public health crisis” in 21st century. * *In Vietnam:* The percetage of hypertension in adult was 25,1%, about 50% of hypertension

patients in community was unknowed about their disease. As consequently, hypertension becomes a public health problem. * *In Dien Bien:* The percentage of hypertension was accounted for 22,86% when investigating at age group of over 40 years old in 2012; health checking, treatment and managing patients at provincial and district general hospital; the initial application in the managing model of hypertension was performed pilot in several communes.

1.1.2. Several related factors of the hypertension: According to WHO, the risk factors of hypertension are divided to 3 groups: lifestyle behavior, environment and biological factors. Do Thai Hoa et al (2013) have reported the research in Thanh Hoa that the association among the hypertension ratio with age group, sex, BMI, waist-hip ration (WHR) with OR from 1,84-2,24, $p<0,05$. The smoker has risk acquiring the coronary artery disease 2-4 times higher and also 70% of mortality than hypertension. Truong Thi Thuy Duong, Le Thi Huong, Nguyen Van Hien (2013) have done the research in Ha Nam which have shown the alcohol drink related to hypertension (OR = 1,19; CI95%: 0,85-1,67). Many researches have proven that several related factors of hypertension including: inconsequential diet: salty, less vegetable and physical activity.

1.2. Analyzing cost-effectiveness of the hypertension management

* *Definition:* Analyzing cost-effectiveness is a method of economic evaluation which considers the cost and result of different plans in order to achieve the specific target. Normally, the result is described equal the cost/effective unit of each plan, and the cost-effectiveness of these plans is compared to each other. The plan has the lowest cost/effective unit as

consideration as the most effective one.

* *In the world:* The cost – effectivenes analysis (CEA) is used broadly in evaluating the impact of the intervention in prevention of hypertension and the complication. There is no specific criteria for the ratio of cost/effectiveness based on the required intervention. Most of the CEA researches have performed in social perspective and medical health system standpoint.

* *In Vietnam:* Several CEA researches have implemented in Vietnam as: Health Strategy and Policy Insitute has analyzed the cost-effectiveness of the intervention in prevent hypertension in Vietnam. In which, the intervention using medicine with patient at stage 1 was 195.843 VND/person/year; the intervention treatment for patient at stage II and III was 570.609 VND/person/year, all interventions were the cost - effectiveness. The analyses of the cost - effetiveness for health screening and managing hypertension in cardiovascular prevention in North Viet Nam had shown that the cost/1 QALY was 758.695 US dollar during 10 years. The cost - effective analyzing of the intervention in cardiovacular prevention in Vietnam of Ha Anh Duc has shown that the less expensive intervention was the health educating program through social communication to reduce the amount of salt with the cost equal 0,06 US dollar/person. The cost/1 QALY prevention was 118 US dollar.

* *In Dien Bien:* Until now, there was no research on evaluation of CEA in medical intervention method in general and in hypertension in specific.

Chapter 2: METHODOLOGY

2.1. Objectives, study location and time

2.1.1. Objectives

* *Target 1:* People living in Dien Bien district with the characteristics as: Male and female at the age from 45-64 years old, at the investigate time; having permanent residence and living in communes of Dien Bien district; having ability of listening and speaking and answer the question; agreeing to participate the study.

* *Target 2:* People from 45-64 years old with diagnosis of hypertension and having indication for treatment, living at 02 communes as Noong Het and Thanh Luong, Dien Bien district; agreeing to participate the study.

2.1.2. Study location: Dien Bien district, Dien Bien province.

2.1.3. Study time: 04 years (12/2014-12/2018)

2.2. Methodology

2.2.1. Study design

* Target 1: Cross-sectional description.

* Target 2: Including two study designs: (i) Intervention study design: is a controlled community intervention, based on the repeat cross section description. (ii) CEA study design: Using the ratio of cost/effective unit to compare two plans: (a) Performing the intervention activity according to the routin of target health program implementing at local area in hypertension treatment management; (b) Performing the intervention activity in the routin of national target health program implementing with an additional intervention in combination of supporting activity which is appropriated with the local condition in management and treatment. Which plan having the lower ratio of cost/effective unit is considered more effective. The study was performed according to the program standpoint of public health providing service unit. Time frame

was 01 year after 01 year of intervention.

2.2.2. Sample size and method of choosing sample

**** Target 1:*** **-** Sample size: Using the formula of the appropriate sample size for estimating the proportion of the population as following:

$$n = Z^2_{(1-a/2)} \quad \frac{p.(1-p)}{(p.\varepsilon)^2}$$

In which: n: minimum sample size; Z: reliability coefficients, with the probability threshold α = 5%, and $Z_{(1-\alpha/2)} = 1{,}96$; ε: Relative accuracy, ε = 0,13; p: the ratio of hypertension at age of 45-64 years old at Dien Bien commune (applying the pilot investigating result of the project of hypertention prevention at several communes in Dien Bien province, with the hypertension percentage of 22,86%), p = 0,228. Calculated sample size n = 393 people, 15% reserve, n = 452 people, and to execute equal 460 people.

- Choosing sample: Using Systematic random sampling method. Choosing commune: random lottery, chosen 4 communes (Thanh Nưa, Thanh Luông, Noong Hẹt, Sam Mứn). Choosing objective: At each commune, listing the people from 45-64 years old meet the requirement, choosing according to the systematic ramdom sampling method for 460 people. In fact, 459 people have been investigated.

**** Target 2:*** **-** Sample size: Applying the controlled comunity intervention study as the formula:

$$n_1 \quad n_2 \qquad (P_1 - P_2)^2$$

In which: n1: Sample size for the intervention group, n2: Sample size for the control group. p1: The ratio of target blood

pressure in the intervention group before interventing, p1= 0,107. p2: The ratio of expecting target blood pressure in the intervention group after interventing, p2 = 0,19. $\overline{P}$ = (0,107 + 0,1885)/2 = 0,147. With Z1- $\alpha/2$ = 1,96 (α = 0.05). With Z1- β = 1,282 (β = 0.1). Sample size was equal 301, 5% reserve , finally n1 = n2 = 316, to execute to 320. The real performance with n1 = n2 = 320.

- Method and procedure of choosing sample: (1). Choosing commune: From the list of involved communes in stage 1 of Dien Bien district to choose 02 communes have similar in economics, social, population and the ratio of hypertension. The distance between 02 communes about 10 km in order to limit the influence of the intervention. Noong Het has chosen as the intervention commune and Thanh Luong has chosen as the control commune. (2) Choosing hypertension patient: At intervention and control communes, based on the list of indentified people in age group from 45-64 years old in study in target 1, with people suffer hypertension in target 1 and research criteria, implementing measure blood pressure and interviewing other people in 02 communes to choose and invite to join the study until enough sample size. People were chosen to participate the study who having similar in age, sex, hypertension level and meeting studied requirement. In this study situation, there was none of them withdrawing.

2.2.3. Describing the intervention content: Organisng 03 training courses to update management information and treatment of hypertension at commune, district and also health education communication skill for 27 medical staffs in commune and village; Organising health club for 320 study subjects; Building record management, controlling at commune level, treatment record at district hospital; Monitoring and supporting the intervention activity.

2.3. Collecting information method: Interview questionaire; measuring anthropometric and blood pressure; Secondary data and record. Collecting information of the cost: All information related to direct cost was collected including: the cost of intervention activity; the data used for calculating the cost for one medical examination; the information of calculating the cost for outpatient treatment of hypertension.

2.4. Index and research variables: (i). General information of study subjects. (ii) Group of risk factor index: BMI, WHR, using alcohol drink, vegetable intake, smoking, physical activity, following treatment. (iii) Group of hypertension index: classification of hypertension, average blood pressure value. (iv) Group of the effective intervention index in knowledge, practising of study subjects about preventing hypertension before and after the intervention. (v) Group of the cost index: The cost for intervetion group including the cost of the intervention activity and hypertension treatment; the cost for control group only the hypertension treatment.

2.5. The cost, effectiveness, the cost – effectiveness

2.5.1. Calculating the cost: The direct cost for both the intervention group and control group has calculated from the perspective of providing medical service. All cost has used the resource which has been adjusted in 2016 in Vietnam Dong and US Dollar.

- The cost for intervention group = Total cost for all intervention activity + total cost for medical periodical examination and medicine supply. The cost for intervention activity:

The cost for training: Training activity uses the available materials of MOH and is a continuing training every year. Therefore, this activity is considered yearly regular cost so that this cost has not allocated as other investment cost. The

communication cots: including materials and orginising health club for study subjects. The cost of managing monitoring: including monitoring wages for medical staffs at village and commune level.

The cost for outpatient treatment of hypertension/1 person/year = The average cost of one medical examination x total actual visit in study year + yearly medicine, testing and medical diagnotic imaging cost. The hospital based costing calculating method is used to measure the medical examination cost.

The cost for one time outpatient treatment = Examination cost + Testing cost + medicine cost + medical diagnotic image cost + other.

- The cost for control group = Total cost for outpatient treatment = number of patient x total cost.

2.5.2. Effective measurement

2.5.2.1. The change in knowledge, practice in hypertension treatment management: Applying the formula: Q = d1–d2, in which:

	Intervention commune	**Control commune**
Pre- intervention		
Sample size	n1	n2
Hypertension case	x1	x2
The ratio of suffering hypertension	p1	p2
Post- intervention		
Sample size	m1	m2
Hypertension case	y1	y2
The ratio of suffering hypertension	q1	q2
Analyse		
The difference between pre and post intervention	d1 = q1 - p1	d2 = q2 - p2
Effectiveness	Q = d1- d2	
The variance of Q	Var (Q)	

*** (p1 = x1/n1, p2 = x2/n2; q1 = y1/m1; q2 = y2/m2)**

2.5.2.2. The change of hypertension index and life quality

* The blood pressure index: Measure blood pressure 3 times,

15 minute difference each time, calculating the average among 3 times to compare in the table below:

Hypertension level	Blood pressure (mmHg)		
	Systolic		Diastolic
Not increase (BP Target)	< 120 - 139	And	< 80 - 89
Hypertension stage 1 (level1)	140 - 159	And/or	90 - 99
Hypertension stage 2 (level 2, level 3)	≥ 160	And/or	≥ 100

* The quality-adjusted life year (QALY) index: Using the study result of Nguyen Thi Phuong Lan et al. in "The utility of patients with hypertension in northern Vietnam", if health adult having life quality as a QALY, people with hypertension at the target blood pressure level, hypertension stage 1, hypertension stage 2 and above will have the life quality about 0,734 QALY, 0,726 QALY and 0,712 QALY respectively in the intervention and control group.

2.5.3. The cost – effectiveness:

(i) Calculating the ratio of the cost/effectiveness each group: the cost/1mmHg reduction = The total cost/ total mmHg reduction in each group; the cost/ gained 1 QALY = The total cost/total QALY gained in each group. (ii) the increasing cost = The total cost of the intervention group – The total cost of the control group. (iii) the increasing effectiveness = the total effectiveness of the intervention - the total effectiveness of the non-intervention. (iv) The incremental cost-effectiveness ratio (ICER) = The total incremental cost/the total incremental effectiveness. (v) Evaluating the cost – effectivenes of the intervetion: the intervention having lower cost/1 effective unit (1mmHg reduction) reached the cost-effectiveness. (vi) Evaluating the cost-effectiveness of managing hypertension in health target program: the cost/1 gained QALY each group.

2.6. Analyzing data method: The date was collected and inputed by using EPIDAT 3.1 software; analyzed by STATA

16.0 software; economic analyzed by using EXCEL.

2.7. Research ethics: This research had approved through Research Ethics Council of NIHE before implementing; had approved to implement the research by local government and health sector; Subjects were explained about the target, content of the research and voluntury to join the research. All information of the subject was confidential.

Chapter 3: RESULT

3.1. Current situation of hypertension and several related factors in age group from 45-64 years old at Dien Bien district, Dien Bien provine, 2014

Table 3.2. The ratio of hypertension by sex, age, ethnic group and hypertension history of the subject (n=459)

Characteristics	Hypertension	
	Cases	%
Sex		
Male (n=226)	84	37,2
Female (n=233)	79	33,9
Age group		
45- 54 (n=232)	11	4,7
55- 64 (n=227)	152	66,9
Ethnic group		
Thai (n=358)	127	35,5
Kinh and other ethnic groups (n=101)	36	35,6
Hypertension history		
Yes (n=91)	45	49,5
No (n=368)	118	32,1
Total (459)	**163**	**35,5**

The ratio of hypertension of the subject was 35,5%, this rate in male was 37,2% and 33,9% in female; This rate was 65,5% at the age group 55-64 years old and 4,8% at age group 45-54. In Thai minority group, the hypertension rate was 35,5% in comparison with Kinh group and other ethnic groups at 35,6%. In the group without hypertension history, there was 32,1% suffered hypertension.

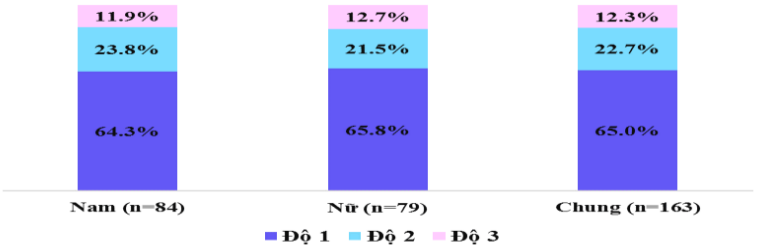

Chart 3.1. Hypertension level by gender in people with hypertension (n=163)

The incidence of stage 1 hypertension (degree 1) accounts for 65.0%, stage 2 hypertension (level 2, level 3) accounts for 35.0%. In men, the prevalence of stage 1 hypertension was 64.3%, the second stage hypertension was 35.7%. In women, the prevalence of stage 1 hypertension was 65.8%, and the second stage hypertension was 34.2%.

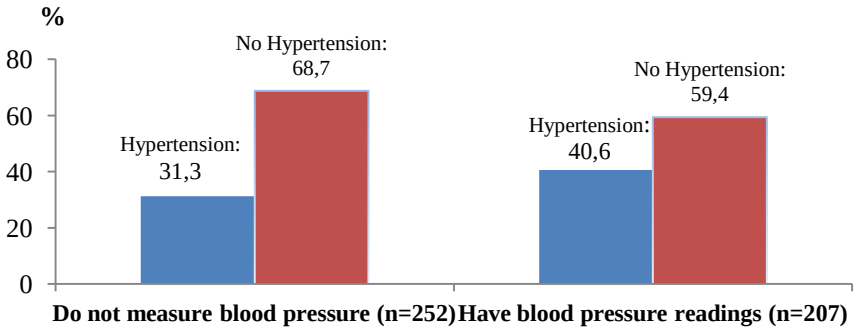

Chart 3.2. The ratio of people with measuring and non-measuring blood pressure within 12 months (n=459)

Within 12 months, there were 252 people in this study who had not measured the blood pressure (54,9%). Detecting 79 people suffered hypertension in this group was accounted for 31,1%.

Table 3.8. Multivariate regression model to identify several related factors of hypertension (n=459)

Risk factor	Multivariate regression model of suffering hypertension		P
	OR	CI 95%	
Vegetable intake			
Not following standard (<5ĐV)	1,92	1,01 – 3,65	0,0087
Following standard (≥ 5 ĐV)	**1**	-	
Smoking			
Yes	4,08	1,99 – 8,36	0,0002
No	1	-	
BMI			
Overweight, obesity	3,89	2,22 – 6,82	0,0012
Normal	1	-	
Drinking alcohol			
Yes	1,23	0,69– 2,18	0,0746
No	1	-	
Hypertension history			
Yes	1,47	0,79 - 2,75	0,2268
No	1	-	
Gender			
Male	0,46	0,22 - 0,94	0,0678
Female	1	-	
Ethnic group			
Thai	0,97	0,51 - 1,87	0,0952
Kinh	1	-	
Age group			
55-64	37,28	18,19 -76,4	0,0087
45-54	1	-	
Low physical activity			
Yes	1,56	0,79 -3,07	0,2006
No	1	-	
Testing the appropriateness of the regression model: $\chi 2$ = 13,5; p= 0,094; df=9			

The rate of suffering hypertension in people who eat vegetable < 5 unit (according to WHO standard)/day was 1,92 times higher than people eating vegetable ≥ 5 unit/day; people in age group of 55-64 years old had risk of hypertension 37,3 times higher than age group 45-54 years old. Overweight and obesity people had suffered hypertension 3,89 times highė than normal

people. Smoking led to high risk of hypertension about 4,08 times higher than non-smoking.

3.2. The cost – effectiveness of the intervention in hypertension treatment management at age group 45-64 years old in Dien Bien district, Dien Bien province, 2015-2016

Table 3.18. Effective intervention with the general knowledge of the subject in 02 communes about hypertension, risk factors, complications và prevention

General knowledge of the study subject		**Pre-intervention (n= 320)**		**Post-intervention (n= 320)**		**Difference of Pre and Post Intervention (%)**	**Effectiveness** (%)
		Quantity	%	Quantity	%		
Qualified	IC	145	45,3	293	91,6	46,3	44,2
	CC	148	46,3	155	48,4	2,1	
Unqualified	IC	175	54,7	27	8,4	46,3	44,1
	CC	172	53,8	165	51,6	2,2	

Post intervention had the increasing rate of having qualified knowledge of hypertension, risk factors, complications and prevention in both communes. The effectiveness was 44,2%.

Table 3.23. The effective intervention with the rate of reached blood pressure target and hypertension stage of the subject

Blood pressure target and hypertension level		**Pre intervention (n= 320)**		**Post intervention (n=320)**		**Difference of Pre and Post Intervention (%)**	**Effectiveness** (%)
		Quantity	%	Quantity	%		
BP target	IC	32	10,0	179	55,9	45,9	29,6
	CC	23	7,2	75	23,4	16,3	
Hypertension stage 1	IC	230	71,9	104	32,5	39,4	31,9
	CC	240	75,0	216	67,5	7,5	
Hypertension stage 2	IC	58	18,1	37	11,6	6,6	2,2
	CC	57	17,8	29	9,1	8,8	

In post intervention, the rate of blood pressure target in IC was higher than in CC (55,9% and 23,4%). The effectiveness was 29,6%.

Table 3.24. Intervention effect for the number of mmHg decreased by the study subjects

Communes	Hypertension	Pre intervention	Post intervention	Difference of Pre and Post Intervention
IC	Systolic	47.423	44.775	2.648
	Diastolic	28.141	27.437	704
	Total	**75.564**	**72.212**	**3.352**
CC	Systolic	47.515	46.704	811
	Diastolic	28.129	28.065	64
	Total	**75.644**	**74.769**	**875**

After intervention in IC commune decreased 3,352 mmHg, of which 2,648 mmHg of systolic BP, 704 mmHg of diastolic BP, CC decreased 875 mmHg, of which 811 mmHg of SBP, 64 mmHg of diastolic BP.

Table 3.26. The effective intervention with the QALY in two group

GROUP		Blood pressure target	Hypertension stage 1	Hypertension stage 2	Total
Intervention group					
Pre intervention	Quantity	32	230	58	320
	Total QALY	23,488	166,98	41,296	231,764
Post intervention	Quantity	179	104	37	320
	Total QALY	131,386	75,504	26,344	233,234
Changing pre and post intervention		147	-126	-21	
Total increasing QALY		**107,898**	**-91,476**	**-14,952**	**1,47**
CONTROL GROUP					
Pre intervention	Quantity	23	240	57	320
	Total QALY	16,882	174,24	40,584	231,706
Post intervention	Quantity	75	216	29	320
	Total	55,05	156,816	20,648	232,514

GROUP	Blood pressure target	Hypertension stage 1	Hypertension stage 2	Total
QALY				
Changing pre and post intervention	52	-24	-28	
Total increasing QALY	**38,168**	**-17,424**	**-19,936**	**0,808**

COMPARISON BETWEEN INTERVENTION AND CONTROL
The effective intervention (increasing QALY): **1,47 - 0,808 = 0,662**

The intervention group had increased the QALY about 1,47. The QALY had increased 0,808 in the control group. The effective intervention of increasing QALY was 0,662.

Table 3.27. The cost of managing, treatment for hypertension in 02 communes in a year

Cost type	IC		CC	
	cost	%	cost	%
(i) The cost for intervention activity	93.529	**17,8**	-	-
- Communication activity	48.104	9,2	-	-
+ Write, print and spread the flyer for the subject	5.384			
+ Organise club	42.720			
- Training health staff at commune level	7.025	1,3	-	-
+ Training for health staff at commune level	3.740			
+ Training for health staff at village level	3.285			
- Enhance the activity of hypertension management	38.400	7,3	-	-
+ Adding blood pressure measurement machine	7.000			
+ Monitoring activity	31.400			
(ii) The cost for treatment	431.869	**82,2**	202.066	
+ Health screening	38.107	8,8*	17.822	8,8*
+ Medicine	285.032	66,0*	133.235	66,0*
+ Testing, medical image diagnosis, consumable supplies	108.731	25,2*	51.010	25,2*
(iii) Total cost	525.398	**100**	202.066	100
People involved in treatment	320		129	
People with attention	320		320	
(iv) The average cost/patient	1.641,9		631,5	

(* The percentage in total cost for treatment; currency: VND)

Total direct cost of the IC was 525.389 VND and CC was

202.006 VND. The average cost/patient in IC and CC had significantly different in which 1.641,9 VND in IC and 631,5 VND in CC.

Table 3.32. Total cost, effectiveness and the rate of the cost/effectiveness with the mmHg reduction, the qualified QALY in both communes

The cost, the effectiveness	**Commnue**	
	IC	**CC**
Total cost (VND)	525.398	202.066
Total effectiveness		
The reduction mmHg	**3.352**	**875**
The increasing QALY	1,47	0,808
The rate of the cost (VND)/effectiveness		
The cost/the reduction 1 mmHg	156,7	230,9
The cost/the increasing QALY	357.413,6	250.081,7

The average cost/the reduction mmHg had reduced 156,7 VND in the IC and lower than the CC with this rate reduced 230,9 VND. The average cost/the increasing QALY had gained in IC and CC respectively at 357.413,6 VND and 250.081,7 VND.

Bảng 3.1. The increasing of cost, effectiveness and the ICER

Commune	**Total cost**	**Increasing cost**	**The increasing effectiveness**		**ICER**	
			The increasing of the reduction mmHg	**The increasing QALY**	**The increasing of the increasing cost /the reduction mmHg**	**The increasing cost /the gained QALY**
IC	525.398	323.332	2.477	0,662	130,5	488.416,9
CC	202.066	-	-	-	-	-

The IC had the increasing cost higher than the CC at 323.332,0 VND, the increasing effectiveness was 2.477 reduced mmHg and 0,662 increased QALY. The rate of increasing cost/effective cost had increased with 130,5 VND/ reduced 1 mmHg and 488.416,9 VND/increased QALY.

Chapter 4: DISCUSSION

4.1. Current situation of hypertension and several relagted factors in age group 45-64 years old in Dien Bien district, Dien Bien province, 2014

4.1.1. Current situation of hypertension in the study subject

The rate of hypertension in study subjects was quite high about 35,5% in which 37,2% in male and 33,9% in female. This rate was 65,5% in age group from 55-64 years old and 4,8% in age group from 45-54 years old. Dividing by ethnic group, Thai group had 35,5% of suffering hypertension in comparison with Kinh and other groups at 35,6%. The detection rate through investigation was 32,1%. In total 163 hypertension patients, people at hypertension stage 1 was accounted for 65% and 35,0% in hypertension stage 2 and 3. This hypertension rate in this research was similar and higher some researches in other areas in Viet Nam as: Truong Viet Dung (2013), Dang Thanh Nhan, Dang Bich Thuy and Nguyen Thi Xuan (2014), Ngo Tri Tuan, Hoang Van Minh and et al (2011). This research have proven that even the hypertension rate was high and mainly in stage 1, so implementing timely the intervention in this stage make better efficiency.

Of these study subjects, only 45.1% had blood pressure (BP) readings in the last 12 months. The number of people who did not measure BP resulted in 54.8% so that these people would not know their BP readings. In addition, 118 of 368 subjects showed that there were no history of hypertension by interviews. However, when checking BP, the rate of hypetension were at 32.1%. The results showed that the rate of detection, management and treatment of hypertension in the community in Dien Bien were still very low. According to the report and assessment of Cardiovascular Center - Bach Mai hospital (2013), our research results were consistent with the

general situation in the Vietnamese community.

4.1.2. Several related factors of hypertension

In this research, we had identified that over a half people not having enough vegetable as WHO standard even the rural area with vegetable as main agricultural product. The result had shown that people having <5 unit (WHO standard)/day was at high risk of hypertension than having ≥ 5 unit/day (1,92 time higher). As this result, ensuring providing clean and fresh vegetable and encouraging people having more vegetable in daily meal were the important content to implement in this study area in the future.

People in age group form 55-64 years old was 37,3 times higher risk suffering hypertension than age group form 45-54. Overweight, obesity people had suffered hypertension 3,89 times higher than normal people. Several researches had proven: People with BMI>30 having risk of hypertension 4 times higher than people with BMI < 25, people with BMI from 25 to <30 had 2 times higher risk of hypertension. The research of Dao Thu Giang had proven that BMI and WHR index had related to hypertension.

The smoking behavior led to the high risk of hypertension than non-smoking group (4,08 times higher). Except for the factor of age, this study had shown the high smoking rate and the high rate of suffering hypertension in smoking group. This is the challenge of the local issue because the characteristics of ethnic people with continuing smoking habit not only in male but also in female. Jose et al had studied in 2.021 people at age of 34-64 years old in Spain to show the smoking related to the hypertension with statistical significance (p<0,05). Other epidemiological statistics had shown that smoking 1 box/day in male led to increase mortality rate at 70% and had 3-5 times higher risk of coronary artery disease in comparison with non-

smoking people. Several national and international researches had proven that several related factors to hypertension as older group, smoking, diet, physical activity, overweight and obesity. The result of this study was consisted with WHO recommendation and warning of Viet Nam government about the risk factors related to hypertension.

4.2. Cost - effectiveness of interventions for the treatment and management of hypertension in the age group 45 - 64 in Dien Bien district, Dien Bien province, 2015 - 2016

After 1 year of implementing interventions for management in the intervention communes, the intervention effectiveness has significantly improved compared to the control commune without any additional intervention. The rate of achieving target blood pressure of intervention communes were much higher than the control commune (55.9% and 23.4%). Intervention effectiveness were 29.6%. Intervention also had an effectiveness on BP decrease including systolic and diastolic with 7.3 mmHg and 1.5 mmHg, respectively. To date, WHO continues to confirm the role of maintaining BP within the allowable limits (target blood pressure) to limit coronary artery disease and brain stroke, limiting the disease burden of hypertension.

The intervention effectiveness with an increase in QALY (quality adjusted life year) is 0.662. In this study, the intervention effectiveness when converting to QALY was still modest due to the short duration of interventions (1 year) and the number of small recipients (320 people). The results also suggested to assess additional factors affecting the intervention, especially the factors to maintain the coordination between the person who need to be managed (people with hypertension) and the service provider (medical staffs and medical facilities).

In terms of cost/effectiveness ratio, in the intervention group,

the average cost was 156.7 thousand VND/1 mmHg decrease. Our study was similar to the report of Yamin Bai et al (2013) in China which cost-effective ratio was 0.73 USD/1 mmHg decrease. The study also showed great potential in reducing costs and increasing the decrease of SBP and DBP through widely implemention inventions in the community. The cost of this study was lower than other studies of Nguyen Thi Phuong Lan (2016) in Vietnam and Andrew E. Moran (2015) in the US.

The rate of cost/effectiveness in CC was 230,9 VND/reduced mmHg which was 1,47 times higher than in IC with 156,7 VND/reduced mmHg. The ICER was 130,5 VND/reduced mmHg and 488.416,9 VND/increased QALY. This result might be influence by the analysis in a year, the cost might reduce if this analysis for 10 years or lifelong.

CONCLUSION

1. Current situation of hypertension and some related factors in the age group 45-64 in Dien Bien district, Dien Bien province, 2014

1.1. The prevalence of hypertension in the age group 45-64 in Dien Bien district, Dien Bien province, in 2014 was quite high, accounting for 35.5%. Of which, the hypertension rate in men were higher than women, 37.2 % and 33.9%, respectively. The prevalence of hypertension in the age group of 55 - 64 was 66.9%, higher than the age group of 45 - 54 with a hypertension rate of 4.7%. The prevalence of hypertension in the Thai group was 35.5%, the Kinh and other ethnic groups were 35.6%. Stage 1 hypertension accounted for mainly 65.0% while stage 2 hypertension resulted in 35.0%. There were 31.3% subjects did not know they had hypertension.

1.2. Age group; overweight, obesity; eating fruits and vegetables and smoking were statistically relevant to hypertension with OR respectively 37.7; 4.29; 2.2 and 2.59.

2. Cost-effectiveness of interventions for treatment and management of hypertension in the age group 45 - 64 in Dien Bien district, Dien Bien province, 2015 - 2016

2.1. Management of hypertension treatment in the Health target program on the age group 45 - 64 implemented in two communes of Noong Het and Thanh Luong, Dien Bien district had achieved initial effectiveness after 1 year including: (i) Changing knowledge of hypertension, with the effective intervention at 44,2%, in which commune with intervention and adding activity having effectiveness at 46,3%, higher than CC at 2,1%. (ii) Increasing the rate reached blood pressure tagret, in IC having this rate ay 45,9%, higher than CC at 16,3% with the effective intervention at 29,6%. (iii) Reducing systolic blood pressure average index, the effective intervention at 5,5 mmHg; reducing the diastolic blood pressure average index, the effective intervention at 1,2 mmHg.

2.2. Regarding to cost-effectiveness analysis, by comparing the hypertension management according to the national target health program (control group) with the additional intervention plus national target health program (intervention group), we found that it was cost-effectiveness. Costs to reduce 1mm Hg was 156.7 thousand VND and 230.9 thousand VND in intervetion and control group, respectively and the increamental cost for the reduction of additional 1 mm Hg was 130.5 thousand VND. If we spend 488,416.9 thousand VND by conducting the intervention, we will gain 1 quality adjusted life year.

LIMITATION OF THIS STUDY: Due to limited study size, the research only studied in the age group of 45 - 64 and conducted in 1 district, the results were not comprehensive and the representation is not high. The behavior assessment and lifestyle of study subjects in preventing and fighting against hypertension

were only conducted by interviews without direct observations. The study evaluated the initial results after 1 year of intervention, so it was only possible to use the blood pressure index as the intermediate result of the intervention, and to use the results of research on utility from other research to transfer change to the index of final results. Besides, the cost analysis in this study has a relatively narrow scope (in time) so it was impossible to estimate the whole value of the intervention. These factors could affect the completeness of research results.

RECOMMENDATION

1. Consideration to expand the intervention in communes in district and other areas with similar condition in order to enhance the effectiveness and the sustainability of the intervention method. However, several factors are needed to be consider in planning to expand intervention as checking blood pressure and doing some extra medical testing. The health communication activity need to be active to reduce the risk factor in prevetion of hypertension.
2. The management treatment of hypertension need to be enhance at the commune level to reach the target blood pressure.
3. Implemention to expand heal economic evaluation in intervention for preventing hypertension at larger scale to give the proof of statistic economic burden of this disease as well as to decide allocating resource, increasing effective intervention in the cost to control blood pressure in the future.

LIST OF PUBLICATION

1. Pham The Xuyen, Nguyen Thi Bach Yen, Duong Thi Hong, Tran Thi Lanh (2017), "Reality of hypertension in age of 45-64 year in Dien Bien district in 2014 ", Journal of Preventive Medicine, 27(7), p.67-73.

2. Pham The Xuyen, Nguyen Thi Bach Yen, Duong Thi Hong, Tran Thi Lanh (2017), "Costs analysis of inpatient and outpatient hypertension treatment in Dien Bien district general hospital in 2016 ", Journal of Preventive Medicine, 27(9), p.89-97.

3. Pham The Xuyen, Nguyen Thi Bach Yen, Duong Thi Hong, Nguyen Thi Phuong Lan (2018), "Cost-effectiveness analysis of combined intervention on management and treatment of hypertension in patient age group 45-64 in Dien Bien district, 2016", Journal of Preventive Medicine, 28(11), p.189-199.