MINISTRY OF EDUCATION AND TRAINING MINISTRY OF HEALTH
CENTRAL INSTITUTE OF MALARIOLOGY, PARASITOLOGY AND ENTOMOLOGY

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VU DUC BINH

REAL SITUATION, RISKS FOR REPRODUCTIVE TRACT *Candida* sp AND *Trichomonas vaginalis* INFLECTIONS AMONG WOMEN OF REPRODUCTIVE AGE IN TAM NONG DISTRICT, PHU THO PROVINCE AND EFFECTS OF TREATMENT, HEALTH EDUCATION (2011 – 2013)

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The thesis will be defended at the institute-level examination council at Central Institute of Malariology, Parasiology and Entomology at..... o'clock....., day.....month.....year.....

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LIST OF ABBRIVIATED WORDS

AIDS	Acquired Immunodeficiency Syndrome
BCS	Condom
BMTE	Women and children
CBYT	Medical cadre
CDC	Center for Disease Control and Prevention
CSHQ	Performance Index
ĐSD	Genital track
HIV	Human Immunodeficiency virus
HPV	Human Papilloma Virus
NCMT	Drug addiction
NTĐSD	Reproductive tract infection
OR	Odd ratio
PCR	Polymerase Chain Reaction
PTTH	High School
QHTD	Sexual relations
RFLP	Restriction Fragment Length Polymorphism
STI	Sexually Transmitted Infection
THCS	Secondary School
TCCN	Vocational school
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Fund for Population Activities
WHO	World Health Organization

INTRODUCTION

Reproductive tract infections are caused by 3 main reason groups, including: bacterial contamination, parasitic contamination as *Candida* sp and *Trichomonas vaginalis*; virus contamination such as human immunodeficiency virus in AIDS patient, and etc.

According to report of WHO in 1998, there are 499 million people whose reproductive tracts are injected in the world, whereas in Southeast Asia, there are 128 million injected people occupying 25.2%; there are 93 million infected people occupying 18.6% in Sub-Saharan – Africa; there are 126 million infected occupying 25.2% in Latin America and Caribbean. In Vietnam, the most popular reproductive tract infection is vaginitis caused by micro-fungus which is ranked as the 2nd popular reason in reasons of *Candida* sp, *Trichomonas vaginalis, and etc.* However, among 80% women with several clinical symptoms, 2/3 of these women catch reproductive tract infections.

In Phu Tho generally and Tam Nong district particularly, there is not any really sufficient and scaled work until now to evaluate the real situation of reproductive tract infections. Thanks to the support of Central Institute of Malariology, Parasiology and Entomology in Tam Nong district, we conduct the topic **Real situation, risks for reproductive tract *Candida* sp and *Trichomonas vaginalis* infections among woman of reproductive age in Tam Nong district, Phu Tho province, and effects of treatment and health education (2011 – 2013)** will be implemented with targets, as follows:

1. Identifying the real situation of reproductive tract Candida sp* and *Trichomonas vaginalis inflections among married women of reproductive age (18 – 49) in Tam Nong district, Phu Tho province.

2. Identifying several factors related to reproductive tract Candida sp* and *Trichomonas vaginalis inflections.

3. Evaluating effects of treatment and health education 2011 - 2013

The thesis includes 116 pages: 2 pages of introduction and 4

chapters: Chapter I covers 32 pages of overview; Chapter II covers 23 pages of researching objects and methods; Chapter II cover 33 pages of Researching results; Chapter IV covers 24 pages of discussion; 2 pages of conclusion, 1 page of petition.

CHAPTER I
OVERVIEW

1.1. Definition and classification of reproductive tract infections

According to definition of World Health Organization, reproductive tract infections are infections at reproductive organs due to sexually transmitted diseases and other infections at vulva, vagina, cervix which are not transmitted sexually.

The origin of disease introduced by World Women Health Association in 1987 has been used broadly and includes three groups of reasons which cause three disease groups.

1.2. Characteristics of reproductive track *Candida* sp and *Trichomonas vaginalis* infection's pathogen

1.2.1. Several configurational characteristics

***Candida* sp fungi:** Fungi are creatures which have kernels and vegetative cell walls, heterotrophic, and reproduce by spore. It is estimated that there are 1 million fungi species; currently the science has discovered 400 species causing human diseases, in which the most popular pathogenous species is *Candida* sp causing viscera mycosis and mucous membrane – cutaneous mycosis.

***Trichomonas vaginalis* unicellular**

Trichomonas vaginalis is the unicellular which has kernel, whip-like organelles and moves by its whip-like organelles, reproduces esexually, and divides lengthways. Flagellate *Trichomonas vaginalis* has 3 – 5 whip-like organelles forwards and a whip-like organelle bewards, they create a fin film at the middle of body.

1.2.2. Pathogenous capacities

Human is the main infection source and the nidus of most reproductive track infections in general and reproductive tract parasitic infections (*Candida* sp and *Trichomonas vaginalis*) in particular.

1.2.3. Infection way, infection mechanism and sensory block

Infection way: There are 3 infection ways of reproduction tract infections, including: Directly sexually transmitted way; Due to excessive development of microorganisms which live symbiotically in reproductive tract; Due to examining obstetrically or gynaecologically or placing the family planning tools in unsterialized environment or from natural environment.

Infection mechanism: Reproductive tract infections among women have three phases, including: discharge phase, exopathic phase; penetration phase.

***Sensory block*:** When any body has not immunity, it will suffer from disease.

1.3. Several clinical characteristics and diagnosis of reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

1.3.1. Several clinical characteristics

Reproductive tract *trichomonas vaginalis* infection: This disease usually has different clinical symptoms. Initially, the patient may have several acute symptoms as itch at vulva and vagina, much leucorrhoea at vagina, leucorrhoea with yellow or green mycopus and awful smell. She may feel a pricking pain at vagina. Her vagina is swelled, red, inflamed and has some ulcers. After that, the patient transfers to the semi-acute and chronic periods, her vagina is not inflamed but other symptoms frequently happen in a long time.

Reproductive tract *Candida* sp infection: Symptoms of this disease among women include: *leucorrhoea*: is much, milky, unsmelly and forms a thick block sticking on vaginal wall, there are red spots under it; *Itching*: in genital area – anus, patients frequently have an itch and they will scratchm, which makes their vulva scratched and makes fungi spread broadly into perineum, groin and thigh; *Feeling painful when having sexual intercourse*: is a common symptom of patients infected with vaginitis and vulvitis by yeast, normally patients have superficial pain, this pain is different from deep pain when having sexual intercourse because of pelvic inflammatory disease. The patient urinates difficultly because she feels pain when urine passes through the inflamed genital area.

1.3.2. Diagnosis of reproductive tract infections caused by *candida* sp and *Trichomonas vaginalis*

The diagnosis of reproductive tract infections is frequently based on the combination of clinical and para-clinical diagnoses.

Clinical diagnosis: For each reason, the patient has different symptoms, thus the diagnosis is frequently based on syndromes, such

as: characteristics of succus, color and smell of leucorrhoea, position of hurt and other symptoms of patient.

The patient infected by *Candida* fungi at vagina may have much white leucorrhoea forming a layer which makes her feel unpleased and itching. Sometimes the patient urinates difficultly. However, some patients do not have these symptoms.

The patient infected by *Trichomonas vaginalis* has symptoms of itching at vulva, she will scratch and thus her vulva will be scratched, the inflamed area can spread to the groin. The leucorrhoea is white as flour. The vagina is inflamed and read, has much white leucorrhoea as milk residue. The cervicl uterus is inflamed, bleeds when touching, applying lugol hackly.

Paraclinical diagnosis: Patients infected by unicellular *Trichomonas vagilanis* are often applied the fresh testing technique with saline. Patients infected by *Candida* sp are used many methods as: Fresh test in the saline environment, gram dyeing, growing in selected Sabouraud environment, and then identifying species by species identification keys or by Polymerase Chain Reaction (PCR) technique.

Fresh testing technique for diagnosing *Candida* sp and *Trichomonas vaginalis*

Growing fungi in Sabouraud environment

PCR technique for identifying fungi causing reproductive tract infections.

1.4. Treatment of reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

- Treating *Candida* sp infection: Fluconazol 150mg/day x 07 days, placing at night before sleeping and after cleaning.

According to recommendation, drinking fluconazole weekly with dose of 150 mg can control symptoms for > 9% patients.

- Treating *Trichomonas vaginalis* infection: Metronidazole 2g, drinking a unique dose.

+ Do not drink wine, beer in the treatment process and after 24 hours.

+ Avoiding sexual intercourse or using condom when having sexual intercourse.

+ Do not douche vagina, this action may increase the re-infection risks.

According to recommendation of US for Trichomonas infection treatment. In random clinical tests, metronidazole schemes have the recovery rate of 90% -95%

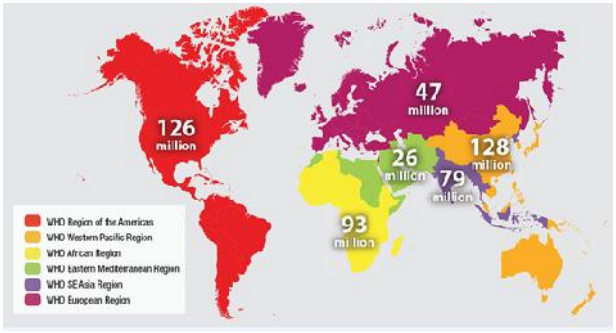
1.5. Reproductive tract infection control and prevention

1.5.1. Common principle

Intervention must affect three steps of transmission process: infection source; infection way, sensory block.

2. Real situation of reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

2.1. In the world



Fingure 1.7. Reproductive tract infection cases in 2008 in the world

(Source: WHO)

2.1.1. In Asia, Africa, and Latin America

According to WHO in 2008, over the world, there were 499 million people infected by reproductive tract infections, whereas in Southeast Asia there were 128 infected people occupying 25.6%; in Sub-Saharan Africa there were 93 million infected people occupying 18.6%; in Latin America and Caribbean there were 126 infected people occupying 25.2%.

2.1.2. In Europe, Oceania, North America

In several developed countries as Spain, during 9 years (1993 – 2002), the rate of lower reproductive tract infections among prostitutes was from 3.6% - 13.3% and increased fast from 25% to 50%.

In England, there are about 400,000 people infected with syphilis, gonorrhoeae, *Chlamydia trachomatis* and HPV in each year;

In America, it is estimated 126 million people 14 – 49 years of age infected with sexually transmitted diseases. In which there are about 3.7 million people infected by *Trichomonas vaginalis.* Therefore, in Europe, Oceania, North America, the economy develops strongly, their cultural and material lives and education levels are high, but the sexually transmitted diseases are also high.

2.2. In Vietnam

According to estimation of World Health Organization, Vietnam has about 1 million people suffering from sexually transmited diseases.

3. Risky factors of reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*:

Factor on personal; Factor on labor; Factor on sanitation; Risky factor on reproduction, abortion and family planning.

4. Methods and effects of community-based intervention for preventing from reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

4.1. In the world

In 2006, WHO introduced a global strategy for preventing from and controlling sexually transmitted infections in the period of 2006 – 2015, in order to adjust fast to works of preventing from and controlling sexually transmitted infections. In which, there are several methods: Improving knowledge on contamination and prevention; Improving information for developing policies and programs through supervising, monitoring and evaluating to ensure that actions follow plan, time and resources in the budget scope.

4.2. In Vietnam

The population and reproductive health strategy in period of 2011 – 2020 shows: "....reduce reproductive tract infections, sexually transmitted infections; actively prevent, discover and treat early... reproductive tract infections among women 30 – 54 years of age with several basic criteria as follows:

- Criterion 1: Reducing 15% reproductive tract infection cases in 2015 and 30% in 2020.

- Criterion 2: Reducing 10% sexually transmitted infection cases in 2015 and 20% in 2020.

In implementation methods of strategies, 3 main solutions are clarified:

- Establishing and increasing capacities of sexually transmitted disease management, supervision, diagnosis system.
- Increasing early diagnosis and treatment of sexually transmitted diseases.
- Increasing prevention activities for sexually transmitted diseases.

CHAPTER II
RESEARCH OBJECT AND METHOD

2.1. Research object, place and time

2.1.1. Research object: Women are in reproductive age from 18 to 49 years old, married and working in the locality, and participating voluntarily into the study.

2.1.2. Research place: Te Le, Quang Huc and Tho Van communes of Tam Nong district, Phu Tho province.

2.1.3. Research time: The study is conducted from 2011 to 2013.

2.2. Research method

Cross-sectional descriptive method with analysis and community-based intervention, pre – post evaluations.

2.3. Research sample size

2.3.1. Sample size and cross-sectional researching sample selection method to identify the rate of reproductive tract infections.

The study is conducted among 532 married women aged 18 – 49 years in 3 communes in Tam Nong district, Phu Tho.

2.3.2. Sample size and researching sample selection method describing knowledge, behavior, practice of women in productive age related to situation of reproductive tract infections.

Sample selection method: based on the initial survey list and examining and testing results, selecting in random 260 people infected by reproductive tract infections and uninfected.

2.3.3. Size of intervening sample: The intervening sample is the entire sample. If all infected women are treated by vaginal tablets, orally administered medicine combined with using sanitary solution. The intervention results are evaluated after 6 months and 18 months.

2.4. Data collection method and technique applied in the study

The community interviewing technique; Intervention in community: Treating infected people and husbands of patients; Intervened by health propagandizing and educating; Evaluating the intervention results.

2.5. Evaluation index

Evaluating the situation of parasitic reproductive tract infections; the rate of women infected with each kind of *Candida sp* by PCR molecule biological technique; Identifying risky factors on Knowledge – Behavior – Practice related to reproductive tract infections.

2.6. Date analyzing and processing method:

By software Epi – Info 6.04 and software Stata.

2.7. Researching ethics:

The study complies strictly with regulations in medical – biological researching.

2.8. Limitation and shortcoming of study:

Because the human resource and investment time for implementing the thesis are limited, the researching scope of thesis is limited in the permitted condition.

Chapter III
RESEARCH RESULT

3.1. Situation of *Candida* sp and *Trichomonas vaginalis* infections among married women of reproductive age (18 - 49) in Tam Nong district, Phu Tho province.

3.1.1. Several characteristics of researching object:

532 married women of reproductive age (18 – 49) in 3 communes have several characteristics, as follows:

Table 3.1. Several information on researching object

Personal characteristics		Quantity	Rate (%)
Age group	18 – 25	45	8.5
	26 – 35	117	22.0
	36 – 49	360	69.5
	Total	532	100.0
	Average age: 35.48 ± 5.79		
	Value p: (1: 2; 3) < 0,01		
Education level	Illiterate (1)	102	19.2
	Primary school (2)	30	5.6
	Secondary school (3)	300	56.4
	High school (4)	70	13.2
	Professional high school and university (5)	30	5.6
	Total	532	100.0
	Value p (3: 1; 2; 4; 5) < 0,01; p (2: 5) > 0.05		
Occupation	Agriculture and forestry	430	81.7
	Officials and public servants	50	9.4
	Trading and services	47	8.9
	Total	532	100.0
	Value p (1: 2; 3) < 0,01; (2: 3) > 0.05		

Remarks: There is a difference between the number of women who examine medically their reproductive tracts among age groups 18 – 25, 26 – 35 and 36 – 49 and correlative rates of 8.5%, 22.0% and 69.5% and p < 0.01. The average ages of women who examine medically their reproductive tracts in Tam Nong district, Phu Tho province are 35.48 ± 5.79.

The rate of women with education level of secondary school occupies the highest rate of 56.4% and especially the rate of illiterate women aged 18 – 49 years is 19.2%. There is a difference between the rate of agricultural – forestry women and women as public servant and businessmen (81.7% in comparison with 9.4% and 8.9% with p < 0.01). There is not any difference between the rate of women as public servant and agricultural – forestry women (9.4% in comparison with 8.9% with p > 0.05).

3.1.2 Situation of common reproductive tract infections among married women of reproductive age (18 – 49) in Tam Nong, Phu Tho province

- Situation of common reproductive tract infections among objects

Table 3.2. Situation of common reproductive tract infections through clinical examination among researching objects

Clinical examination		Quantity	Rate (%)	Value p
Result of clinical examination	Have clinical syndromes on infection (1)	420	78.95	(1: 2) < 0.01
	Have not any clinical syndrome (2)	132	21.05	
Total			100.0	

Remarks: The rate of women aged 18 – 49 years and suffering from reproductive tract infections when examining clinically is: 78.95%. There is a difference between the rate of women aged 18 – 49 years infected and those not infected when examining clinically (78.95% compared with 21.05% with $p < 0.01$).

3.1.3. Situation of reproductive tract infections caused by *Candida* sp and *T. vaginalis* among researching objects

Table 3.3 Rate of *Candida sp* reproductive tract infections through saline testing and growing methods

Testing method	*Candida* sp reproductive tract infections (n=532)		Value p
Saline solution discovers *Candida* sp(1)	Number (+)	75	(1: 2) <0.05
	Rate (%)	14.0	
Growing fungi in Saboraud environment (2)	Number (+)	135	
	Rate (%)	25.3	
Both methods	Number (+)	162	
	Rate (%)	30.5	

Remarks: The rate of reproductive tract infections when testing by saline method is lower than by growing method in Sabouraud environment. This difference has the statistical meaning, with values of 14.0% compared with 25.3% with $p < 0.05$.

- The rate of reproductive tract Candida sp and T. vaginalis one-infection and two-infection among objects according to age groups.

Table 3.4. Rate of *Candida* sp and *T. vaginalis* infections among objects

Reproductive tract parasite	Infection rate in age groups					Value p
	Age	18-25 (1)	26-35 (2)	36-49 (3)	Total	
	Test No.	45	117	370	532	
Candida sp infection	No. (+)	05	17	113	135	(3: 1; 2 < 0.01)
	Rate (%)	11.11	14.53	30.54	25.37	(1: 2 > 0.05)
T. vaginalis infection	No. (+)	06	05	16	27	(1: 2; 3< 0.01)
	Rate (%)	13.33	4.30	4.32	5.10	(2: 3 > 0.05)
Candida sp and *T. vaginalis* infection	No. (+)	11	22	129	162	(3: 1; 2 < 0.01)
	Rate (%)	24.44	18.80	35.86	30.50	(1: 2) > 0.05

Remarks: The rate of *Candida sp* and *T. vaginalis* infections among women aged 36 – 49 years is higher than rate among women aged 26 – 35 years and 18 – 25 years, with values 35.86% compared with 18.80% and 24.44% with $p < 0.01$. The rate of *Candida* sp infection has same result; the higher infection rate is, the higher age is (30.54% compared with 14.53% and 11.13% with $p < 0.01$). The rate of *T. vaginalis* infections among women aged 18 – 25 years is higher than the rate among women aged 26 – 35 years and 36 – 49 years (13.33% compared with 4.30% and 4.43% with $p < 0.01$).

- Rate of fungal components causing reproductive tract diseases through PCR implementation result in section DNA of ITS genetic area of sample groups:

Table 3.5. Summary of fungal species classification by PCR technique

Commune	Fungal sample for PCR test	Result of testing by PCR technique			
		Sample number (+)		Sample number (-)	
		Sample number (+)	Rate (%)	Sample number (-)	Rate (%)
Quang Huc (1)	52	42	80.76	10	19.24
Te Le (2)	19	14	73.68	05	26.32
Tho Van (3)	22	13	59.09	09	40.91
Total	**93**	**69**	**74.20**	**24**	**25.80**
Value p		(1: 3)< 0.01; (2: 3) > 0.05		(1: 3) < 0.01; (2: 3) > 0.05	

Remarks: The rate of fungi discovery (+) by PCR technique with common ITS1 – ITS4 pair is 74.20%. There is a difference between PCR discovery rate of Quang Huc commune and Tho Van commune (80.8% compared with 68.2% with $p < 0.01$)

Table 3.6. Number of PCR ITS1-ITS4 products before and after cutting by *Msp I*

No.	Dimension ITS1-ITS4 (bp)	Dimension of cutted product (bp)	Name of species *Candida* sp	Quantity	Rate (%)
1	871	557. 314	*C. glabrata*	30	43.47
2	524	340. 184	*C. tropical*	24	34.78
3	535	297.238	*C. albicans*	10	14.49
4	510	261. 249	*C. krusei*	3	4.34
5	520	176.243	*C. parapsilosis*	02	2.92
Total			5 species	69	100

Remarks: Species *C. glabrate* predominates with 43.5%, next rate of *C. tropical* species is 34.8% and rate of *C. krusei* is 4.3% and the rate of *C. parapsilosis* is at least 2.8%. The rate of *Candida albicans* in our study is 14.6%.

3.2. Several factors, risks on knowledge, behavior and practice related to *Candida sp and T. vaginalis* reproductive tract infections.

3.2.1. Knowledge and attitude of researched objects about reproductive tract disease caused by Candida sp and T. vaginalis

Table 3.7. Knowledge on reasons of reproductive tract *Candida sp* and *T. vaginalis* infections among researched objects before intervention

Knowledge	Interview result			Value p
	Interview No. (n)	No. of exact answer	Rate (%)	
Using condom (1)	260	188	72.30	(1:2;3;4) > 0.05 (5:2;3;4) < 0.01
Faithful spouses (2)	260	208	80.00	
Daily genital cleaning (3)	260	229	88.07	
Menstruation cleaning (4)	260	225	86.53	
Periodically gynaecological examination (5)	260	149	57.30	

Remarks: The rate of understanding exactly reasons of *Candida* sp and *T. vaginalis* reproductive tract infections, periodically gynecological examination occupies 57.30%, lower than knowledge caused by other reasons as: Using condom is 72.30%, faithful spouses is 80.00%; daily genital cleaning is 88.07% and menstruation cleaning is 86.53%.

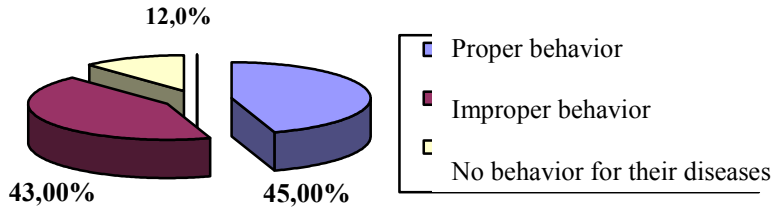


Figure 3.1. Rate of behaviors among women suffering from reproductive tract *Candida* sp and *T. vaginalis* infections

Remarks: Only 45.00% (117/260) interviewed women with exact behaviors; 43.0% women with inexact behaviors when suffering from diseases: hiding their diseases, feeling ashamed, do not go to medical stations for medical examination and 12.0% women who do not have any behavior for their diseases.

Table 3.8. Behaviors of women when suffering from reproductive tract *Candida* sp and *T. vaginalis* infections

Evaluation criteria	Commont		Value p
	Qnt	Rate (%)	
Self-buying medicine (1)	107	41.20	(1: 2; 3; 4; 5; 6)< 0.01 (3: 4; 5) > 0.05 (4: 5; 6;) > 0.05
Examining and treating in medical station (2)	81	31.15	
Examining and treating in private surgery (3)	27	10.32	
Do not examine and treat (4)	23	8.80	
Examining and treating in hospital (5)	17	6.53	
Saying to husband or lover (6)	06	2.30	
Total	260	100	

Remarks: Women who buy medicine occupy the highest rate of 41.20%, the rates of women who examine in medical station and private surgery are 31.15% and 10.32% correlatively. And 8.80% women do not examine and treat medically. The rate of women who examine and treat in hospital is very low, only 6.53%, only 2.30% women say their diseases to husbands or lovers.

3.2.2. Several factors on sanitation condition, parturition, abortion and usage of contraceptive methods related to reproductive tract *Candida* sp and *T. vaginalis* infection situation

3.2.2.1. Factors on sanitation condition

Table 3.9. Risks for sanitation conditions related to *Candida* sp and *T. vaginalis* reproductive tract infection situation

Survey factors		*Candida* sp and *T. vaginalis* reproductive tract infection situation		Total
		Infected	Un-infected	
Soaking body under water when working	Soak	54	81	135
	Do not soak	30	95	125
	Total	84	176	260
	OR = 2.12; p < 0.01; 95% CI: 1.19 – 3.75			
Genital tract cleaning in each day	Yes	51	80	135
	No	33	96	125
	Total	84	176	260
	OR = 1.85; p < 0.05; 95%CI: 1.06 – 3.27			

Remarks: There is a relation between *Candida* sp and *T. vaginalis* reproductive tract infection situation and risks for soaking body under water when working and cleaning their genital tracts inexactly with correlative values: (OR = 2.12; 95% CI: 1.19 – 3.75; p < 0.01); (OR = 1.85; 95% CI: 1.06 – 3.27; p < 0,05). Women who soak their bodies under water when working and cleaning their genital tracts inexactly have risks for *Candida* sp and *T. vaginalis* reproductive tract infections 1.12 and 1.85 times as high as women who do not soak their bodies under water when working and women who clean inexactly in menstruation time.

3.2.2.2. Risks for parturition, abortion and usage of contraceptive methods

Table 3.10. Risks for parturition, abortion and Usage of contraceptive methods

Survey factors		Reproductive tract *Candida* sp and *T. vaginalis* infections		Total
		Infected	Uninfected	
Time of abortion	≥ 3 time	31	39	70
	< 3 time	53	137	190
	Total	84	176	260
	OR = 2.05; p < 0.01; 95%CI: 1.11-3.76			
Placing tools in uterus	Use	68	91	149
	Do not use	16	85	111

	Total	84	176	260
	OR = 3.97; p < 0.01; 95%CI: 2.07-7.89			

Remarks: There is a relation between abortion > 3 times with value (OR = 2.05; p < 0.01) and placing tools in uterus (OR = 3.97; p < 0.01) with situation of reproductive tract *Candida* sp and *T. vaginalis* infections among researched objects. Aborting women and women placing uterine tools have risks for reproductive track *Candida* sp and *T. vaginalis* infections 2.05 and 3.97 times as high as women who do not abort > 3 times and do not place uterine tools.

3.3. Effects of community-based intervention

3.3.1. Rate of *Candida* sp and *T. vaginalis* infections before and after intervening among researched objects

Table 3.11. Rate of reproductive tract *Candida* sp and *T. vagialis* infections before and after intervening

Time	Before treating (1)		After 10 treating days (2)		After 6 treating months (3)		After 18 treating months (5)	
Infection situation	No. (+)	TL (%)	No.(+)	TL (%)	No.(+)	TL (%)	No.(+)	TL (%)
	162	100	05/162	3.09	27/162	16.7	71/162	43.83
Effect (PV)	0.0%		97.0%		83.3%		56.0%	
Value p	(2: 3; 5) < 0.01							

Remarks: Effect of treating by vagina tablet after 10 days is 97.0%. There is a difference between effect of parasitic reproductive tract infection treatment (*Candida* sp and *T. vaginalis*) after 10 treating days and after 6 and 8 months, their correlative values are 97.0% compared with 83.3% and 56.0% with p < 0.01. The rate of re-infection increases fast from 5 cases (+) 3.09% after 10 treating days to 27 cases (16.7%) after 6 treating months and 71 cases (43.83%) after 18 treating months.

The treatment efficiency decreases fast from 97.0% after 10 treating days to 83.3%, 56.0% after 6, 18 treating months.

3.3.2. Effect of health education on prevention from reproductive tract infections caused by *Candida* sp and *T. vaginalis*

Effects before and after health education intervention after 6 and 18 months on factors:

- ***Understanding pathogenic reasons***:

The rate of women understanding that abortion is a pathogenic reason is (19.6% compared with 34.6% and 47.3% with p < 0.01), effect (PV1= 76.5%; PV2 = 90.0%); The rate of women understanding that infections are caused by using dirty water source: (10.4% compared with 30.0% and 45.8% with p < 0.01); effect (PV1= 54.6%; PV2 = 84.6%); The rate of women understanding that infections are caused by insanitation in sexual relations: (13,8% compared with 28,0 and 37.3% with p < 0.01), effect (PV1= 18.0%; PV2 = 57.0%). Especially, the rate of women who do not hide their infections and tell their relatives when their diseases have increased fast before and after 6, 8 intervening months, with correlative values: (41.1 compared with 73.8 and 77.7 with p < 0.01), effect (PV1 = 76.5%; PV2 = 89.0%).

- ***Behavior when infected***:

The rate of women who tell their relatives before intervening is 41.15%, the rate of those after 6 months increases 73.84% and after 18 months is 77.69% (Intervention effect PV1 = 79.5%; PV2 = 89.0%).

The rate of women who go to medical units to examine and consult about their reproductive health before intervening is 77.30%, the rate of those after 6 months increases to 81.92% and after 18 months is 90.76% (intervention rate PV1 = 6.0%; PV2 = 18%).

The rate of women who hide their infections before intervening is 53.84%, the rate of those after 6 intervening months increases to 59.23% and after 18 months is 61.15% (intervention effect PV1 = 9.9%; PV2 = 13.7%).

- ***Factors on practice when infected***:

The rate of women who examine their health periodically before intervening is 57.30%, the rate of those after 6 months increases to 70.76% and after 18 months is 74.61% (intervention effect PV1 = 63.3%; PV2 = 78.1%).

The rate of women who clean and improve their water sources before intervening is 46.61%, the rate of those after 6 months increases to 79.61% and after 18 months is 81.84% (intervention effect PV1 = 57.6%; PV2 = 60.0%).

The rate of women who clean properly when working before intervening is 46.53%, the rate of those after 6 months increases to 90.0% and after 18 months is 92.7% (intervention effect PV1 = 93.1%; PV2 = 98.2%).

The rate of women who change their methods of cleaning reproductive tracts before intervening is 50.0%, the rate of those after 6 months increases to 88.07% and after 18 months is 91.15% (intervention effect PV1 = 76.0%; PV2 = 82.2%).

Chapter IV
DISCUSSION

4.1. Real situation of *Candida* sp and *Trichomonas vaginalis* infections among married women of reproductive age (18 – 49) in Tam Nong district, Phu Tho province

4.1.1 Several common characteristics of researched objects

- The average age of women, who examine their reproductive tracts in Tam Nong district, Phu Tho province is 35.48 ± 5.79. There is a difference on rates of women who examine their reproductive tracts between age groups 18 – 25; 26 – 35 and 36 – 49, they are 8.5%; 22.0% and 69.5% correlatively with $p < 0.01$. About education level, the rate of illiterate women who examine their health in age group of 18 – 49 is still 19.2%. There is a difference between rate of agricultural – forestry women and women as public servants and businesswomen (81.7% compared with 9.4% and 8.9% with $p < 0.01$).

Our researching and judgment results are absolutely suitable to studies of author Pham Van Hien and co-workers (2000), Tran Thi Phuong Mai (2001), Le Thanh Son (2005), Mirzabalaeva AK (2007), Patel DA (2005), Sobel JD et al (1985), Wilson J.S. and et al (2002).

4.1.2 Common situation of reproductive tract infections

4.1.2.1 Clinical examination

The rate of women aged 18 – 49 years with clinical reproductive tract syndromes (infections caused by each of agents as fungi, unicellullar agents, and bacterium) when examining clinically is 78.95%, the rate of women who have not found any pathogenic reason (without clinical syndrome) is 21.05%.

Our study has results similar to researching results of Ms. Nguyen Thi Lan Huong (1996) in Institute for Protection of Mother and Newborn. The rate of women suffering from lower reproductive tract infections is 79.5% and higher than studies of authors inside and outside the country, such as: Study of Vu Ba Hoe (2008) among 800 women aged 15 – 49 years in Vinh Bao district, Hai Phong city, the rate of women suffering from reproductive tract infections is 62.9%. The study of authors Zhang X. J and Cs (2009) conducted in An Huy province, China shows that the rate of women suffering from lower reproductive tract infections is 58.1%.

Our researching results are lower than results of Le Hoai Chuong's study (2011). Survey on several factors related to lower reproductive tract infections in National Hospital of Obstetrics and Gynecology shows that the rate of women suffering from infections is 83.1% and the study of Tran Uy Luc shows that the rate of women who suffer from reproductive tract infections and examine gynecological in Hai Phong Hospital of Obstetrics and Gynecology is 94.5%.

4.1.2.2 Real situation of reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

- The fungi and unicellular testing results by fresh testing method with saline and growing methods in Saboraud environment

The rate of reproduction tract fungal infection discovery when testing by saline method is lower than by growing method. This difference has the statistical meaning, with values 14.0% compared with 25.3% with $p < 0.05$.

About pathogenic reasons through testing, the rate of women suffering from *Candida* sp infections in our study is similar to study of Pham Thu Xanh and co-workers (2014), the rate of married women suffering from lower reproductive tract infections from 18 – 49 years old in coastal area is 31.3%; According to the study of Bui Thi Thu Ha (2007) among 380 women aged 18 – 49 years in Hanoi, the rate of women infected with *Candida* sp is 31.8%; the study of Claeys and co-workers (2001) conducted in Azervaijan shows that this rate is 33.1%.

The rate of women infected with *Candida* sp in our study is higher than studies: the rate of women who examine in general hospital of Hong Linh town, Ha Tinh (2011) and infected with *Candida* sp is 24.59%; Ngo Duc Tiep (2011) in Le Chan district, Hai Phong, the rate of women infected with *Candida* sp is 18.3%; The study of Do Thi Uyen conducted in 4 communes of An Lao district, Hai Phong (2012) shows that the rate of women infected with *Candida* sp is 17.2%.

There is a difference between the rate of women infected with *Candida* sp in our study and in other studies, which can be

explained by difference on appearance characteristics, occupations and economic conditions of objects in researching areas.

- The rate of women infected with *Candida* sp and *T. vaginalis* in the age group 36 – 49 is higher than in age groups 26 – 35 and 18 – 25, with values 35.8% compared with 18.8% and 24.4% with $p < 0.01$.

- The comparison of rate of women infected with *Candida* sp has same result. The older women are, the higher the rate of infection is (31.3% women aged 36 – 49 years compared with 14.5% women aged 26 – 35 years and 11% women aged 18 – 25 years with $p < 0.01$).

Our conclusion is similar to study of Le Thanh Son (2005) in Ha Tay. It shows that age affects clearly the situation of reproductive tract infection, the rate of infection increases highest among women aged 30 – 39 years, the study shows the difference on rate of women infected with *Candida* sp, *Trichomonas vaginalis* between women who use soap when bathing and women who do not use soap (4%, 3% compared with 11%, 6%).

+ For situation of *T. vaginalis* infection, the rate of infected women in age group of 18 – 25 is higher than in age groups of 26 – 35 and 36 – 49 with correlative rates (13.3% compared with 4.4% and 4.3% with $p < 0.01$). This is suitable to reality in the researching locality: Women aged 18 – 25 years are the main labor force in agriculture, they frequently contact risky factors as soaking bodies under water and they are in age of sexual relations and parturition, and etc., which make the rate of women in this age group infected with *T. vaginalis* increase higher than in other age groups.

- Personal factor group: Age, occupation and sexual intercourse situation have the strongest influence on reproductive tract parasitic infections. Our judgment is similar to researching result of National Hospital of Dermatology (1999), among 1991 women, it shows that: the rate of parasitic infections among women aged above 20 years is higher than in other age groups, especially the highest rate of *Candida* sp infections is among women in age group of 20 – 39 years. The rate of *T. vaginalis* infections among women aged 40 – 49 years is 5 times to 8 times as high as among women aged below 19 years. This conclusion compares with our researching results: rate of *T. vaginalis* infected women in age group 18 – 25 is

higher than rate of women infected *T. vaginalis* in age groups of 26 – 35 and 36 – 49 with rates 13.3% compared with 4.3% and 4.4% with $p < 0.01$.

Result of *T. vaginalis* infections is similar to domestic and foreign studies: Study of Boselli F, Chiossi G (2004), in Italia among 1644 women, the rate of women infected with *T. vaginalis* is 6.7%. The study among women aged 12 – 49 years in rural areas in North Brazil (2007) shows that the rate of women infected with *T. vaginalis* is 4.1%; In China, the study of Zhang X. J and co-workers (2009), the rate of women infected with *T. vaginalis* is 4.5%. The study of Vu Ba Hoe in Vinh Bao, Hai Phong (2008), the rate of women infected with *T. vaginalis* is 4%. The study of Nguyen Minh Quang in Hanoi Center For Treatment – Education – Society No. 2 (2013), the rate of women infected with *T. vaginalis* is 4.4%. Therefore, the rate of women infected with *T. vaginalis* in our study is suitable to infection rate in several countries in range of 2% - 25%.s

- Species identification by ITS1-ITS4 PCR technique:

With 135 samples grown in Saboraud environment, fungi grow into colonies, we implement PCR technique with common bait pair ITS1-ITS4: ITS1 5.8S (5’ TCC GTA GGT GAA CCT GCG G 3’); ITS4 with order (5’ TCC TCC GCT TAT TGA TAT GC 3’) for 93 samples.

Consequently, 74.2% (69/93) samples with result (+) are *Candida* sp. The result of our study is similar to study of author Yu-Ping, Jie Feng and Cs (2010), it studies the rate, components of reproductive tract fungi among 1102 women of reproductive age in rural areas of Lan Chau district, China. The rate of fungal samples with result (+) is from 77.1% to 89.6%.

Our study discovers 5 *Candida* species with rate of species components as follows: *C. glabrata* 43.5%; *C. tropical* occupies 34.8%; *C. albicans* 14.6%; *C. krusei* 4.3%; *C. parapsilosis* 2.8%. Therefore, the statistics shows that *Candida albicans* occupies 14.6% lower than *Candida non albicans* which occupies 85.4%. This result is similar to study in Tu Du Hospital of Obstetrics and Gynecology, Ho Chi Minh City (2005), it shows that *Candida albicans* causing vaginitis occupies 15%, and suitable to studies of Sandra S and Cs (2005), Sobel JD and Cs (1985). Against studies of Yu-Ping, Jie Feng and CS (2010) *Candida albicans* occupies 89.63%; Nguyen Khac

Luc, Do Ngoc Anh and CS (2014) studies among 58/60 species of *Candida* sp, in which *C. albicans* occupies 39%.

Our researching result is different from results of previous studies in Vietnam when PCR technique has not been used to name fungi, in our opinion, the reasons of this difference are:

+ In the past time, most authors define that reproductive tract infections among women are caused by *Candida albicans,* and then other *Candida* species as: *C. glabrata*; *C. tropical*; *C. krusei* ; *C. parapsilosis*… It is shown clearly through results of recent studies of authors:

+ The study of Tran Thi Phuong Mai (2001) among women aged 18 – 44 years in Hanoi Surgery of Obstetrics, the result of testing microorganism shows that 11.1% women are infected with *Candida* sp, in which *Candida albicans* is majority.

+ The study of Le Thanh Son (2005), in Ha Tay, the rate of women infected with *Candida albicans* is the highest with 13.84%.

- PCR ITS1-ITS4 product before and after cutting by *Msp I* of fungi causing reproductive tract infections among researching objects:

The result shows that *C. glabrata* is 871 bp and 557,314 bp; *C. tropical* is 524 bp and 340,184 bp; *C. krusei* is 510 bp and 261,249 bp; *C. albicans* is 535 bp and 297,238 bp, *C. parapsilosis* is 520 bp and 176,243 bp. In the study, we see that cutting PCR product by enzyme *Msp I* , we also have SH Mirhendi and CS (2001), S.A Ayatollahi Mousavi and Cs (2007), Alireza Farasat and Cs (2012) which are used to identify *Candida sp* species which causes human diseases.

4.2. Several factors related to situation of reproductive tract *Candida* sp and *Trichomonas vaginalis* infections.

4.2.1. Knowledge and behavior of women on reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

The rate of women knowing exactly that the best way to prevent from reproductive tract *Candida* sp and *T. vaginalis* infections is gynecological examination is 57.3% in comparison with knowledge on other reasons.

Only 45.0% (104/260) women interviewed have proper behaviors, such as: going to medical units to examine and treat when suffering from reproductive tract infections caused by *Candida* sp and *T. vaginalis*. Whereas, 43.0% women have improper behaviors when

suffering from infections as: hiding diseases, feeling ashamed, do not examine in medical units, self-treating and 12.0% women have not any behavior for their diseases, 31.15% women self-buy medicine to cure and especially only 2.3% infected women tell their husbands or lovers, this is a sunk ice on sexually transmitting diseases. This result is similar to judgments of domestic researchers as: Study of author Chunyu Li and co-workers (2003) among countryside women in Hunchun, China, 38.4% women feel ashamed and timid and refuse to examine. Suitably to study of author Vu Quyet Thang (2013) in Quang yen town, Quang Ninh, 36.5% women do not have any behavior for their infections.

4.2.2 Practice of women when suffering from reproductive tract infections caused by *Candida* sp and *T. vaginalis*

The practice of preventing from reproductive tract infections among women in researching points is not good: the rate of women who self-buy medicine to cure is highest with 41.20%, whereas rates of women who examine in medical units and private surgeries are 31.15% and 10.38% correlatively. 8.80% women do not examine and treat. The rate of women who examine and treat in hospitals is low with 6.53%.

Our researching result shows that risky factors relate to risks for *Candida* sp and *T. vaginalis* reproductive tract infections and risky factors: Soaking bodies under water when working and genital tract cleaning methods with values ($\beta = 0{,}360$, $p < 0{,}01$) and ($\beta = 0{,}21$, $p < 0{,}05$); Placing uterine tools and abortion also relate closely to reproductive tract infection situation, with values ($\beta = 0{,}420$, $p < 0{,}01$) and ($\beta = 0{,}310$, $p < 0{,}05$).

Our researching result shows that it is similar to study in Tu Du Hospital of Obstetrics and Gynecology, Ho Chi Minh City (2005) about breeding time, pregnancy times, patients suffering from vaginitis caused by microfungi concentrate into group with 2-4 times, suitably to studies of Sobel JD and co-worker (1985), Margaeiti PA and co-worker (1997).

4..3. Evaluation of intervention effects

4.3.1. Rates of women infected with *Candida* sp and *T. vaginalis* before and after treatment among researched objects

The effect of treatment intervention by vagina tablets after 10 days occupies 97.0%. There is a difference between the treatment effect for reproductive tract parasitic infections (*Candida* sp and *T. vaginalis*) promptly after 10 days and after 6 and 8 months, with

correlative values: 97.0% compared with 83.3%, and 56.0% with p < 0.01. The rate of re-infection increases fast from 5 cases (+) after 10 days to 27 and 71 cases after 6 and 18 treating months. The treatment effect decreases fast from 97.0% after 10 days to 83.3%, 56.0% after 6, 18 intervention months.

This result confirms that fast re-infection situation of parasitic reproductive tract infections, thus the disease prevention and reproductive health education must be implemented frequently, continuously and synchronously with socio-economic methods, and etc. On the other hand, risky factors and infectious sources always exit in the environment.

4.3.2 Health education effects on preventing from reproductive tract infections caused by *Candida* sp and *T. Vaginalis*

Our study shows that the effects of health education intervention on preventing from reproductive tract infections caused by *Candida* sp and *T. Vaginalis* before and after 6 and 18 intervention months are dramatically high, in details as follows:

The rate of women knowing that abortion is a pathogenic reason (19.6% compared with 34.6% and 47.3% with p < 0.01), effects (PV1= 76,5%; PV2 = 90,0%); The rate of knowing that using dirty source is a pathogenic reason ((10,4% compared with 30,0% and 45,8% with p < 0,01); effects (PV1= 54,6%; PV2 = 84,6%); The rate of women knowing that insanitation in sexual relations (13,8% compared with 28,0 and 37,3% with p < 0,01), effects (PV1= 18,0%; PV2 = 57,0%). Especially, the rate of women who do not hide their infections and tell their relatives increases fast before and after 6 and 18 intervention months, with correlative values (41,1 compared with 73,8 and 77,7 with p < 0,01), effects (PV1= 76,5%; PV2 = 89,0%).

Our researching result also shows that: There is a basic change on practice of women in preventing from reproductive tract infections before and after 6, 8 intervention months, in details:

The rate of women who practice to examine and treat their infections and care their reproductive health when they suffer from infections before and after 6, 8 intervention months, with values (57.7% compared with 86.1% and 92.3%, with p < 0.01), with effects (PV1= 49.2%; PV2 = 60.0%);

There is a difference between rates of factors: Examining and treating in State medical units; (49.2% compared with 75.0% and

80.0 with p < 0.01), effects (PV1 = 49.2%; PV2 = 60.05). Cleaning and improve water sources: (53.5% compared with 79.6% and 78.8%, with p < 0.01) effect (PV1= 26.1%; PV2 = 52.3%); Cleaning properly when working (53.5% compared with 79.6% and 78.8%, with p < 0.01) effects (PV1= 26.1%; PV2 = 52.3%); Changing reproductive tract cleaning ways (50.0% compared with 88.0% and 91.1%) effects (PV1= 76.0%; PV2 = 82.2%);

This result has confirmed: The health education plays a significantly important and key role in preventing from reproductive tract infections. Only health education changes knowledge of inhabitants, which will lead to changes on behavior and prevention practice.

CONCLUSION

1. Situation of *Candida* sp and *Trichomonas vaginalis* infections among married women of reproductive age (18 – 49) in Tam Nong district, Phu Tho province

The rate of women with clinical syndromes of reproductive tract infections is 78.95%.

The rate of women infected by *T. vaginalis* is 25.37%; *T. vaginalis* is 5.1%.

The rate of women suffering from reproductive tract *Candida* sp and *T. vaginalis* occupies 30.5%.

The rate of women infected by *Candida* sp and tested by PCR technique with common pair ITS1 – ITS4 is 74.19% and identifying 5 reproductive tract fungi species, including: *C. glabrata* fungi occupies 43.5%, *C.tropical* occupies 34.8% and *C.parapsilosis* occupies 2.8%, *C.krusei* occupies 4.3%, *C.albicans* occupies 16.3%.

2. Several risky factors related to reproductive tract infections caused by *Candida* sp and *Trichomonas vaginalis*

The rate of women knowing exactly that condom is used to prevent from diseases caused by *Candida* sp and *Trichomonas vaginalis* is 72.30%; The rate of women having proper knowledge of spousal loyalty is 80.0%; the rate of women cleaning genital parts daily is 88.07%; The rate of women cleaning in menstruation time is 86.53%; The rate of women examining gynecological in period is 57.30%.

43.0% women have improper behaviors when suffering from diseases and 13.0% women have no behavior for their diseases.

The rate of women who do not examine and treat at any medical unit is 5.8%; the rate of women who self-buy medicine is 34.2%;

Soaking body under water when working ($p < 0.01$) and methods of cleaning genital organs have a tight relation to reproductive tract disease ($p < 0.05$). Placing uterus tools ($p < 0.01$) and abortion 3 times and above has the tight relation to the situation of reproductive tract infections ($p < 0.05$).

3. Treatment effects and health education and communication

- Treatment effects:

+ The rate of women infected by *Candida* sp and *T. vaginalis* by vaginal medicine decreases fast from 97.0% after 10 treatment days to 83.3% after 6 months and 56.0% after 18 intervention months with $p < 0.01$.

- Community-based communication:

The rate of women knowing that abortion cause diseases increases from 19.6% to 34.6% and 37.3%. The rate of women knowing that diseases are caused by using dirty water source increases 19.4% to 30.0% and 35.8%; The rate of women knowing that diseases are caused by insanitation in sexual relation increases 23.8% to 28.0 and 37.3%; Especially, the rate of women who do not hide their diseases and tell their relatives when suffering from diseases increases fast 41.1% to 73.8% and 77.7%.

The rate of women practicing to examine, treat diseases and care reproductive heath improves from 57.7% to 86.1% and 92.3%. The rate of women examining and treating in State medical units increases from 49.2% to 75.0% and 80.0%. The rate of women cleaning and improving water resources increases from 53.5% to 79.6% and 81.5%. The rate of women changing reproductive tract cleaning ways increases from 50.0% to 88.0% and 91.1%.

PETITION

1. Increasing to communicate and educate reproductive health, improve knowledge of women about pathogenic reasons, reproductive tract infection prevention methods. Guiding safe sexual intercourse and spousal loyalty.
2. It is necessary to increase to train and re-train medical officers in units, especially midwifes to improve knowledge on reproductive tract infections for medical officers and midwifes.
3. Combining the reproductive health program with health program and other social cultural activities.

LIST OF SCIENTIFIC WORKS PROMULGATED

1. Vu Duc Binh, Cao Ba Loi, Le Thanh Dong (2013), *"Real situation of reproductive tract infections among married women aged 18 – 49 years in Tam Nong district, Phu Tho province in 2011"*. Magazine on prevention from malaria and parasitic diseases. No. III-2013, Pages 3-11.

2. Vu Duc Binh, Tran Thanh Duong, Cao Ba Loi (2013), *"Analysis on relation between reproductive tract infection situation and knowledge, behavior and practice on disease prevention among married women of reproductive age (18 – 49) in Tam Nong district, Phu Tho province"*. Magazine on prevention from malaria and parasitic diseases. No. IV-2013, Pages 75-82.

3. Vu Duc Binh, Tran Thanh Duong, Cao Ba Loi (2014), *"Researching on defining species of fungi causing reproductive tract infections among women of reproductive age (18 – 49) in Tam Nong district, Phu Tho province by PCR method and genetic order analysis in 2013"*. Magazine on prevention from malaria and parasitic diseases. No. II-2013, Pages 27-37.