

ORIGINAL ARTICLES

Cervical cancer screening by co-testing method for Vietnamese women 25 to 55 years old: A Cost – Effectiveness Analysis

Bui Thu Hien^{1*}

ABSTRACT

Objective: “Cervical cancer screening by co-testing method for Vietnamese women 25 to 55 years old: a cost – effectiveness analysis”, two objectives were set as follows: (1) To conduct literature review on cost-effectiveness analysis of concurrent cervical cytology and HPV testing (co-testing) for screening cervical cancer for women worldwide to find research-based data for modeling analysis. (2) To analyze cost-effectiveness of screening cervical cancer by concurrent HPV testing and cervical cytology (co-testing) compared with cervical cytology alone for women 25 to 55 years old in Vietnam.

Methods: The study applied cost-effectiveness analysis method using Markov modelling to analyze efficiency of the co-testing method in CC screening for Vietnamese women from 25 to 55 years old.

Finding: CC screening by 3 times consecutive co-testing was not cost-effective compared to CC screening by 5 times cytology. In the DSA, the researcher found out that the ICER was the most sensitive of the transition probability from HPV hr(-) state to HPV hr(+) state, the prevalence of HPV hr in general women population and the number of CC screening times. This research proposed an age interval from 25 to 55 years for cervical cancer screening while national guidelines from other countries target women from 21 to 65 or even 79 years in their screening programs. The research did not consider effects from HPV vaccination on the transition probabilities of the Markov model. The 21 transition probabilities that used in the Markov model, only one assumption about the lower and upper ranges are made.

Conclusions: The 3 times consecutive CC screening by the co-testing method is dominated by 5 times consecutive CC screening by the cytology method. Although the co-testing method proves being cost-effective in the second scenario under the DSA, saving ranges from 16 to 64 USD for 1 QALY gained be a considerable offer for both healthcare decision makers and users. In addition, 3 times consecutive CC screening by co-testing significantly increase referral cases and unnecessary treatment of healthy women.

Keywords: cancer, women 25 to 55 years old, co-testing method, A Cost – Effectiveness Analysis.

BACKGROUND

Previously, the concept of healthcare was a “non-productive” field that opposed productive fields such as agriculture and industry. This point of view led to low investment from the public budget and considered that healthcare investment was a waste of sources due to not

creating value and use-value. It conceptualized that healthcare facilities were merely “revenue-generating public service delivery units”. The Party and Government of Vietnam have had many policies to facilitate the development and improvement of medical examination and treatment quality in public healthcare facilities, such as Decree 69/2008/ND-CP dated May



Corresponding author: Bui Thu Hien
Email: mph2030014@studenthuph.edu.vn
¹Hanoi University of Public health

Submitted: 12 July, 2022

Revised version received: 24 August, 2022

Published: 30 August, 2022

DOI: <https://doi.org/10.38148/JHDS.0604SKPT22-049>

services costs covered by health insurance (HI) among hospitals at the same level nationwide and guiding the application of cost and payment for healthcare services in some cases (3). To date, the obstacles and challenges in healthcare finance have not been resolved that leads to difficulties in implementing the renovation progress. In the current political and economic context of our country, one of the biggest problems is determining basic characteristics of healthcare services (4). Due to low income, most people are unable to pay for healthcare services, especially on-demand health services. Therefore, healthcare finance must be aimed at equity and social security assurance. In addition, the healthcare finance mechanism must create conditions to promote all potentials of healthcare including physical facilities to human resources; along with creating conditions for medical units to fully promote their internal resources; promote human creativity and use resources effectively (4).

To implement the healthcare finance strategy for the period 2016 - 2025 established by the Ministry of Health, public hospitals, especially grassroots hospitals are facing huge challenges in terms of management and administration of financial independence (5). It posed a challenge for grassroots healthcare facilities to find solutions for future development. Thanh Thuy DHC is a two-function health center in Thanh Thuy district, Phu Tho province. This is a mountainous district with over 90,000 people, of which ethnic minorities account for 6.8% and poor households account for 3.17% (6). The hospital's main financial sources in recent years have been the state budget (SB) allocated to the hospital bed and public service revenue generated from hospital fee and other service that includes income from health insurance (HI) and from patients without health insurance cards. In addition, the hospital has several additional revenues from other services such as parking services

and canteens. With the goal of improving the efficiency of the hospital in financial management, the leaders of Thanh Thuy DHC have realized that financial management is an extremely important task that determines the development and survival of the hospital. Stemming from the theoretical requirements, and realizing the importance and urgency of the problem, we conducted the study, titled: **“Situation analysis of financial revenue and expenditure of Thanh Thuy District Health Center from 2017 to 2019”** to provide practical and scientific evidence for the financial management of the hospital. There were two objectives for the study, which included: (1) To describe the current situation of financial revenue and expenditure of the Thanh Thuy Health Center in Thanh Thuy district, Phu Tho province from 2017 to 2019; (2) To determine factors affecting the financial revenue and expenditure of the Thanh Thuy Health Center in Thanh Thuy district, Phu Tho province from 2017 to 2019.

METHODS

Design: This was a cross-sectional study, including 2 parts: quantitative research and qualitative research.

Location and time: This study was conducted at the Thanh Thuy DHC in Phu Tho province. Data collection period was from June 2019 to December 2019. The study used data from the hospital's documents and financial reports from January 2017 to December 2019.

Objects: Secondary data were from the hospital financial reports on revenue and expenditure sources and a cross-sectional descriptive research was applied, retrospective secondary data were combined with qualitative information by questionnaires and in-depth interviews (Members of the Board of Directors, Heads of Departments, Chief

Accountant), group discussion including Heads of Department, Doctors at Thanh Thuy DHC, Phu Tho.

Sample size, sample selection: Representatives of hospital leaders, leaders of departments, members of the fee collection council, and medical service providers.

Variables/indexes/contents/ research topics: Total revenue, public budget sources, hospital revenue, health insurance revenue, other revenues, total expenditures, personal payments, expenditure for healthcare services, expenditure for purchase and repairment, spending on human resources, list of balance.

Data collection techniques, tools, and processes: The in-depth interview guide and group discussion guide are designed for each group of interviewees.

Data processing and analysis: Data was

inputted and analyzed by Excel according to a number of relevant metrics. We used the 2019 value-adjusted formula for the consumer price index (CPI) to compare data among years.

Research ethics: The researcher was always honest during the process of collecting data to ensure the reliability of the collected data. The study was conducted immediately after the approval of the Ethics Committee of the Hanoi University of Public Health with number: 273/2020/YTCC-HD3, June 29, 2020. The study was for research purposes only.

RESULTS

General information about Thanh Thuy District Health Center in 2017-2019

The situation of hospital human resources

Table 1. Hospital human resource from 2017 to 2019, Thanh Thuy DHC

No.	Indicator	Unit	2017	2018	2019
1	TotalMe employees	Person	170	173	263
	Doctor	Person	44	51	82
2	Hospital bed-plan	Item	250	300	400
3	The average number of medical staff per hospital bed	Person	0.68	0.58	0.66
4	The average number of doctors per hospital bed	Person	0.18	0.17	0.21

Table 1 shows that there was a change in human resources from 2017 to 2019 with 170 and 263 staff, respectively. However, the average number of medical staff per hospital bed was around 0.18 in 2017 and 2018, and it

increased to 0.21 in 2019.

General information about the number of patients, inpatients, and treatment days

Table 2. General information about patients examined, inpatient treatment, treatment date, period of 2017-2019, Thanh Thuy DHC

Year		2017	2018	2019
Number of inpatients	Service	1,936	1,606	1,839
	Health insurance	14,237	16,342	20,361
	Total	16,173	17,948	22,200
Number of medical visits	Service	12,397	16,502	16,124
	Health insurance	34,987	49,575	68,454
	Total	47,384	66,077	84,578
Number of treatment days	Service	8,648	8,532	8,034
	Health insurance	117,221	119,068	134,957
	Total	125,869	127,600	142,991

Table 2 shows that the number of patients coming for medical examination under the health insurance scheme increased from 34,987 in 2017 to 49,575 in 2018 and over 68,000 in 2019. While it's service sector raised from 12,397 in 2017 to around 16,000 in 2019. The number of inpatients at the hospital also grew from around 16,000 to over 22,000 in 2019.

Results of financial revenue of Thanh Thuy DHC from 2017 to 2019

Revenue sources

Financial revenue sources: public budget, health insurance, hospital fees, service.

Structure and trends of financial revenue sources.

Table 3. Structure of regular revenue sources of Thanh Thuy

Financial revenue sources	2017		2018		2019	
	Million dong	Percentage	Million dong	Percentage	Million dong	Percentage
Public budget	9,325	13.8	7,642	9.2	5,839	5.2
Health insurance	36,772	54.5	49,917	60.4	65,428	58.8
Hospital fee	16,891	25.1	11,565	14.0	13,329	12.0
Service	4,435	6.6	13,510	16.3	26,640	23.9
Total revenue	67,423	100.0	82,634	100.0	111,236	100.0

Table 3 shows that only revenue from health insurance and service experienced growth from 2017 to 2019. The rest of the revenue sources (public budget and hospital fees) decreased gradually. The revenue from

health insurance accounted for the highest proportion of the revenue structure of Thanh Thuy DHC which varied from 54.5% to 60.4% with the highest proportion point in 2018. The total revenue from this source

in 2019 was over 65 billion VND. Overall, the total revenue in 2019 (111 billion VND) of Thanh Thuy DHC had nearly doubled in

2017 (67 billion VND).

Financial capacity for hospital beds

Table 4. The allocated public budget for the hospital bed-plan, comparison between projected and actual plan, to know available budget for the hospital bed operation (Thanh Thuy DHC, 2017 – 2019)

Unit: million dong

Year	Public budget	Projected bed-plan	Average Public budget / Projected bed plan	Comparison with previous year (%)	Actual bed-plan	Average Public budget / Actual bed plan	Comparison with previous year %
2017	7,914	250	32	84.0	263	30	83.0%
2018	7,242	300	24	75.0	328	22	69.0%
2019	5,637	400	14	58.0	425	13	59.0%

It was shown in Table 4 that public budget for the Thanh Thuy DHC tended to decrease over the years. Specifically, this source went down from 7.9 billion to 5.6 billion in 2019.

Results of expenditure activities in the period 2017 – 2019

Table 5. Structure of expenditure activities at Thanh Thuy DHC 2017 – 2019

Unit: million VND

No	Spending activities	2017	2018	2019
1	Personal payment	15,538	16,971	19,084
2	Medical payment	20,813	22,585	36,692
3	Procurement of fixed assets and repair	4,856	6,510	8,178
4	Others	10,496	12,635	30,510
Total		51,702	58,702	94,464

Table 5 shows that the total amount of budget for expenditure activities increased significantly in the research period. The majority of expenditure rooted from the medical payment.

Effective analysis of the financial resources utilization

The implementation of non-business revenue estimation over the years

Table 6. The implementation of non-business revenue and service revenue estimation (Thanh Thuy DHC 2017 – 2019)

Unit: million VND

Year	Revenue generating public service delivery units			Revenue generating service delivery units		
	Estimation	Performance	Target achievement %	Estimation	Performance	Target achievement %
2017	52,000	53,663	103	4,000	4,435	111
2018	60,000	61,482	102	12,000	13,510	113
2019	75,000	78,757	105	25,000	26,640	107
Total	187,000	193,902	104	41,000	44,585	109

In comparison with the estimation plan, the revenue generating public service delivery units and the revenue generating from service delivery units exceeded the set plan. For example, service revenue in 2018

exceeded 113% of the plan and achieved 13.5 billion VND.

Balance revenue-expenditure and set up funds

Table 7. The balance table of revenue and expenditure (Thanh Thuy DHC 2017 – 2019)

Unit: million VND

No.	Target	2017	2018	2019
1	Total revenue	67,423	82,634	111,236
2	Total expenditure	51,702	58,702	94,464
3	Balance	15,721	23,932	16,772

During the research period, total revenue increased remarkably from 67.4 billion in 2017 to 111.2 billion in 2019, a similar trend was also seen in the total expenditure. The highest balance was observed in 2018 while a balance of 15.7 billion VND was in 2017 and 16.7 billion VND in 2019 (Table 7).

Research results showed that from 2017 to 2019, there were no change in the DHC facilities and structure of the department; yet there was an increase in human resources from 173 staff in 2017 to 263 staff in 2019. The average number of health workers per hospital bed in 2017 and 2018 was equivalent to about 0.18 and increased to 0.21 in 2019.

DISCUSSION

General characteristics of Thanh Thuy DHC

The number of patients under the health insurance scheme increased from 34,987 in 2017 to 49,575 in 2018 and over 68,000 in 2019. The number of patients following

service units also went up from 12 thousand in 2017 to around 16 thousand in 2018 and 2019. Something similar happened in the number of inpatients at the hospital, it increased from about 16-17 thousand in 2017-2018 to over 22 thousand in 2019.

Actual situation of financial revenue and expenditure of Thanh Thuy DHC in 2017-2019

Actual situation of financial revenue

The tables showed that only revenue from health insurance and service experienced a growth from 2017 to 2019. The rest of the revenue sources (public budget and hospital fees) decreased gradually. The revenue from health insurance accounted for the highest proportion in the revenue structure of Thanh Thuy DHC which varied from 54.5% to 60.4% with the highest proportion point in 2018. The total revenue from this source in 2019 was over 65 billion VND. Overall, the total revenue in 2019 (111 billion VND) of Thanh Thuy DHC had nearly doubled in 2017 (67 billion VND).

The results showed that it was consistent with Circular 14/2019/TT-BYT dated July 5th, 2019 stipulating the maximum level of the price bracket for medical examination and treatment services that are not within the scope of payment of the Health Insurance Fund in State-owned medical examination and treatment establishments and guidelines for application of prices and payment of medical examination and treatment expenses in some cases that shall be promulgated by the Minister of Health. Hospital fees increased significantly. For more details, fee for clinical examination increased from 2,000 VND to 5,000 VND, i.e the increase was about 250%, the price of hospital beds increased from 5,000 VND to 19,000 VND, that was, it increased by 380%; On average, the price of technical services increased by

16% in comparison with 2017 and 2019, so the revenue from medical examination and treatment increased significantly (7).

Current situation of expenditure activities

The expenditure for medical sector accounted for the highest proportion in comparison with other expenditure activities in Thanh Thuy DHC. In general, the total expenditure for all activities in 2019 nearly doubled in 2017. Because the hospital focused on improving the healthcare quality in order to meet people need in medical examination and treatment services. Therefore, the expenditure for the medical group was higher than other groups to improve the quality of medical examination and treatment services.

Current situation of revenue and expenditure balance

The presented results showed that the revenues and expenditures varied considerably in different sources in 3 years. However, the DHC still balanced revenues and expenditures. The balance of payment was in surplus in 3 years (approximately > 10% per year) and this amount of money was transferred to the hospital funds. Thereby, we can recognize that the financial situation of the DHC was always fluctuating. The revenue from public budget decreased, but in return, the revenue from medical treatment increased notably which could ensure fundamental sources for the operation of the DHC.

Effective analysis of financial resources utilization

During the research period 2017-2019, total revenue increased clearly from 67.4 billion in 2017 to 111.2 billion in 2019, a similar trend was also seen in the total expenditure. The highest balance between revenue and expenditure was documented in 2018 and the balance was similar in 2017 and 2019 with

around 15 -16 billion VND. The revenue-expenditure effectiveness in 2018 was superior, although the total revenue in 2018 was not higher than in 2019. However, the total expenditure was not high in 2018 because of the savings in expenses. In contrast, the total revenue and expenditure were the highest in 3 years in 2019, so revenue and expenditure effectiveness was low.

In the group of developing countries, Jordan is one of the countries facing difficulties in funding the health system, especially in public hospitals. An intervention study by Dwayne A. Bank et al. carried out in two public hospitals namely Princess Raya in the Irbid area and Al Karak Hospital in two years from 2000 to 2001, showed that increasing hospital autonomy had obvious efficiency in many aspects including improvement in management and economic autonomy (7). Thus, the results of this study are consistent with the results of the intervention study of Dwayne A. Bank et al.

CONCLUSION

From 2017 to 2019, the DHC ensured the balance of revenue and expenditure and has a balance surplus in financial activities, although the financial situation of the DHC was always fluctuating. The revenue from the public budget decreased, but it was compensated by the revenue from health insurance which ensured the essential sources for the DHC operation and the balance between revenue and expenditure. A balance between revenue and expenditure will not cause any imbalance which influences and delays the DHC operation.

The Policies from the Party and Government prioritize the allocation of public budget to disadvantaged areas, especially hospitals at the district level; hence, they can partly

meet the regular sources to pay for medical services and personnel activities. The public budget allocation according to the hospital beds and population is not suitable for the actual operation of the DHC and does not encourage an increase in technical efficiency. The implementation of the health insurance policy and a number of legal documents are inconsistent, leading to the fact that the reimbursement from the health insurance scheme is not appropriate to ensure equity in healthcare.

Recommendations: For the Ministry of Health and Vietnam Social Security: make recommendations to the Government and the National Assembly in terms of adjusting the cost of medical services following an appropriate price calculation so that patients with health insurance cards have more opportunities to receive high-quality medical services.

For the Provincial Party Committee, People's Council, Provincial People's Committee and Department of Health: Continue to facilitate the promulgation of policies, and support in the process of attracting and treating highly qualified staff with long-term employment opportunities in the Phu Tho province; provide financial support and mobilize other funding sources for the construction of a new high-quality Center at the same time.

For Thanh Thuy DHC: Continue to attract and train domestic and foreign medical staff to improve the professional competencies of medical staff; increase expenditure on investment in infrastructure development, investment in procurement, public-private mix in the installation of cutting-edge medical equipment; apply information technology solutions according to the model of Smart Hospital; improve the effectiveness of revenue and expenditure management in the DHC at the same time.

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