
ORIGINAL ARTICLE

**Cost-Effectiveness of Breast Cancer Screening with Mammography and Ultrasound:
A Study among Women in Phanat Nikhom District and Network Areas****Piyaporn Chumsri, M.D.**

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Received: January 19, 2026 **Revised:** February 25, 2026 **Accepted:** March 11, 2026

ABSTRACT

BACKGROUND: Breast cancer rates in Thailand are increasing, with a concerning trend of diagnosis in younger women. Early detection increases the survival rate to 94.4%, with economic evaluation studies required to ensure the efficient allocation of budgets and screening tools across different regions.

OBJECTIVES: This cross-sectional analytical research was integrated with an economic evaluation to assess the cost-effectiveness of breast cancer screening using mammography combined with ultrasound (MMG+US).

METHODS: The study focused on 383 high-risk women aged 40–75 years in Phanat Nikhom District and the Chonburi provincial network. A Decision Tree Model was employed to compare opportunistic screening with systematic MMG+US screening. Outcomes were measured in Life-Years Gained (LYG) and the Incremental Cost-Effectiveness Ratio (ICER).

RESULTS: The sample was mostly (70%) aged between 50 and 69. Screening identified BIRADS 4–5 abnormalities in 8.3% of the participants. The proportion of Stage 0 and 1 breast cancer detected in the screened group was significantly higher than in the non-screened group. Consequently, the average life expectancy for the screened group increased from 19.87 to 23.01 years, representing Life Years Gained (LYG) of 3.14 years. The screening cost was 2,400 THB per person, with an Incremental Cost-Effectiveness Ratio (ICER) of 764 THB per LYG, indicating that, based on Thailand's current threshold, the program was cost-effective.

CONCLUSIONS: Among high-risk women who underwent MMG+US screening, earlier stage detection (Stage 0–I) was more frequent than expected under opportunistic screening. Economic modeling based on observed stage distribution indicated that MMG+US screening was highly cost-effective within the Thai context. These findings support the targeted use of combined screening in high-risk women, particularly those aged 50 years and older.

KEYWORDS: breast cancer, mammography, ultrasound, incremental cost-effectiveness ratio (ICER), cost-effectiveness analysis (CEA).

INTRODUCTION

Breast cancer is the most prevalent malignancy among women worldwide and a leading cause of morbidity and mortality. Globally, 2.26 million new cases are reported annually, accounting for 11.7% of all cancer diagnoses. The age-standardized incidence rate is 46.8 per 100,000 women, resulting in nearly 685,000 annual deaths¹. In Thailand, 22,158 new cases and 8,266 deaths are reported annually. The mortality rate exhibited a continuous upward trend between 2019 and 2021, rising from 13.9 to 14.3 and 14.6 per 100,000 population, respectively^{2,3}. Between 2022 and 2024, incidence rates continued to climb, reaching 166, 174, and 175 per 100,000 population, respectively. These figures highlight the increasing disease burden among Thai women⁴. Disease stage at diagnosis significantly dictates prognosis. For instance, early detection in Stage I yields a five-year survival rate as high as 94.4%, whereas this rate declines sharply to 28.3% for Stage IV diagnoses⁵. Breast cancer imposes a medical burden and also profound familial and socioeconomic vulnerabilities, with most patients being elderly individuals or working-age women. Major risk factors for breast cancer include those aged over 40, family history of cancer, early onset of menstruation, and nulliparity.

Other significant risk factors include genetic variations, exposure to chemicals and radiation, as well as hormonal imbalances and chronic stress⁶⁻⁸. These factors contribute to cellular changes within the breast tissue, eventually leading to malignancy. Screening is a crucial strategy for reducing the severity of the disease.

The National Health Security Office provides benefits for mammography and ultrasound in high-risk groups, with screening access in Health Region 6, specifically in Phanat Nikhom District, Chonburi,

consistently remaining below the national average and showing irregular trends over several years. The disease burden begins to rise in the 40–49 age group, peaking in those aged 50 and older, with an increasing incidence also observed in women under 40. This trend reflects a worsening situation and underscores the urgent need to develop screening models tailored to the specific local context^{9,10}. Under resource constraints such as limited specialized personnel and equipment, breast self-examination remains a vital supplemental approach for raising awareness. However, decisions regarding investment in equipment and the appropriate screening methods rely on empirical evidence. International research suggests that biennial mammography for women aged 40–74 years offers the highest health economic value¹¹. However, such guidelines cannot be fully implemented in Thailand due to structural health constraints and budgetary limitations.

This study describes the demographic characteristics, breast cancer risk, and mammography combined with ultrasound (MMG+US) screening findings among high-risk women aged 40–75 years in Phanat Nikhom District and its healthcare network. The stage of breast cancer detected through MMG+US screening was evaluated, and the cost-effectiveness of MMG+US screening compared with opportunistic screening was assessed using a Decision Tree economic model based on the stage-shift outcome.

METHODS

Research Design: This study employed an evaluative research design. The protocol was approved by the Human Research Ethics Committee of the Chonburi Provincial Public Health Office (Approval number CBO Rec 2568-001).

Population and Sample

The target population included women aged

40–75 years residing in Phanat Nikhom, Ko Chan, Bo Thong, and Phan Thong Districts, Chonburi. The 2025 Health Data Center (HDC) recorded a target population of 62,911 (27,965 in Phanat Nikhom). The screening coverage across these four districts was 40.8% (25,613 out of 62,839), and 420 individuals participated in the screening program.

Inclusion Criteria: Women aged 40–75 years who voluntarily participated in the Kanchanabaramee Foundation's mobile screening project and provided informed consent.

Exclusion Criteria: Out of the 420 initial participants, 37 were excluded because they did not meet the age criteria or had a prior history of breast cancer treatment/mastectomy. They were categorized as follow-up patients rather than screening subjects. The sample size was determined using the Krejcie & Morgan (1970) formula. Based on a 95% confidence level ($\chi^2=3.8416$), a population proportion (p) of 0.5, and a 5% permissible margin of error, the required sample size was calculated as 383 participants.

The opportunistic screening comparison group was constructed from secondary national data sources and used exclusively for economic modeling rather than direct enrollment. By contrast, the intervention cohort was prospectively recruited through a structured, community-based coordination process. Public health networks facilitated awareness and access to mobile screening services across the four districts. Eligibility was carefully assessed prior to participation to ensure compliance with predefined criteria. Written informed consent was obtained from all eligible participants, thereby upholding ethical standards and methodological rigor.

Data Collection: Data were collected via a structured interview form developed based on a comprehensive literature review and the conceptual

framework. The instrument's content validity was verified by five experts (IOC of 0.8), and reliability was confirmed with a Cronbach's $\alpha > 0.80$. The tool consisted of three primary sections.

Data collected included demographic characteristics, reproductive and clinical risk factors, Gail Model risk estimates, MMG and ultrasound findings (BI-RADS classification), and screening-related costs. Pathological confirmation was recorded when available.

Research Implementation: This quantitative study was divided into two phases:

Phase 1: Field Data Collection: Data were collected from 383 women aged 40–75 in Phanat Nikhom and its network in Chonburi who participated in the Kanchanabaramee Foundation's screening project (January–February 2025). Human subjects were protected, and written informed consent was obtained from all the participants.

Phase 2: Economic Modeling: A Decision Tree Model was utilized to compare the cost-effectiveness of combining mammography and ultrasound screening versus opportunistic screening. The analysis focused on disease stage transition and health outcomes.

Data Analysis

The data were analyzed using SPSS for statistical calculations, with specialized calculations performed using Microsoft Excel and TreeAge Pro (optional for economic modeling), as follows:

1. Descriptive Statistics: Demographic and health data were analyzed and presented using frequencies, percentages, means, and standard deviations.

2. Risk Level Analysis: The National Cancer Institute (NCI) Breast Cancer Risk Assessment Tool (Gail Model) was utilized to categorize participants into low-risk and high-risk groups.

3. Health Economic Evaluation: Life Years Gained was calculated based on the 5-year survival rates for each cancer stage, applying a discount rate of 3% for costs and outcomes., Incremental Cost-Effectiveness Ratio (ICER): Calculated to compare the additional cost per unit of health outcome. The results were evaluated against the Thai cost-effectiveness threshold of 160,000 THB

per QALY/LYG.

4. Comparative Analysis: Statistical tests were employed to compare the variables between groups, such as screening outcomes across different risk categories, and a comparison of actual costs against the Health Intervention and Technology Assessment Program (HITAP)¹².

RESULTS

Part 1 Baseline and Personal Health Demographic Profile Characteristics:

Table 1 Demographic Profile Characteristics

Demographic Profile Characteristics	Low Risk		High Risk	
	Gail Model (n=373)		Gail Model (n=10)	
	No MMG (n=294)	MMG (n=79)	No MMG (n=5)	MMG (n=5)
Age (year), mean (SD)	55.6 (7.8)	58.2 (8.2)	59.2 (6.6)	59.2 (3.1)
Healthcare Coverage, n (%)				
- UC (Universal Coverage Scheme)	213 (73.5)	58 (73.4)	3 (60.0)	3 (60.0)
- Civil Servant Medical Benefit Scheme	34 (11.6)	15 (19.0)	1 (20.0)	2 (40.0)
- Social Security Scheme (SSS)	44 (15.0)	6 (7.6)	1 (20.0)	0 (0.0)
Body Mass Index (Kg/m ²), mean (SD)	26.0 (4.6)	25.0 (3.5)	23.4 (3.9)	22.8 (2.0)
Current Symptoms, n (%)				
- None / Asymptomatic	213 (72.4)	49 (62.0)	3 (60.0)	4 (80.0)
- Present / Symptomatic	81 (27.5)	30 (38.0)	2 (40.0)	1 (20.0)
Number of Children, median (range)	2 (0, 4)	2 (0, 4)	1 (0, 2)	2 (0, 2)
Postmenopausal HRT use >5 years, n (%)				
- No	292 (99.3)	78 (98.7)	5 (100.0)	5 (100.0)
- Yes	2 (0.7)	1 (1.3)	-	-
Oral contraceptive use >10 years, n (%)				
- No	261 (88.8)	68 (86.1)	5 (100.0)	4 (80.0)
- Yes	33 (11.2)	11 (13.9)	0 (0.0)	1 (20.0)
History of benign breast biopsy, n (%)				
- No	286 (97.3)	75 (94.9)	4 (80.0)	5 (100.0)
- Yes	8 (2.7)	4 (5.1)	1 (20.0)	0 (0.0)
Correct performance of breast self-examination (BSE), n (%)				
- No	119 (40.5)	25 (31.7)	2 (40.0)	1 (20.0)
- Yes	175 (59.5)	54 (68.3)	3 (60.0)	4 (80.0)

Table 1 Demographic Profile Characteristics (Continue)

Demographic Profile Characteristics	Low Risk		High Risk	
	Gail Model (n=373)		Gail Model (n=10)	
	No MMG (n=294)	MMG (n=79)	No MMG (n=5)	MMG (n=5)
Regular monthly breast self-examination (BSE), n (%)				
- No	126 (42.9)	30 (38.0)	2 (40.0)	1 (20.0)
- Yes	168 (57.1)	49 (62.0)	3 (60.0)	4 (80.0)
Prior breast self-examination (BSE) training/instruction, n (%)				
- No	39 (13.3)	6 (7.6)	0 (0.0)	1 (20.0)
- Yes	255 (86.7)	73 (92.4)	5 (100.0)	4 (80.0)
Channels of BSE training, n (%)				
- None / Never trained	37 (12.6)	6 (7.59)	0 (0.0)	1 (20.0)
- Village Health Volunteers (VHV)	40 (13.6)	15 (19.0)	2 (40.0)	0 (0.0)
- YouTube	18 (6.1)	3 (3.8)	0 (0.0)	1 (20.0)
- TikTok	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
- Others	198 (67.4)	55 (69.6)	3 (60.0)	3 (60.0)
Risk Assessment Results, n (%)				
- High Risk Group	128 (43.5)	43 (54.4)	5 (100.0)	4 (80.0)
- Average Risk Group	166 (56.5)	36 (45.6)	0 (0.0)	1 (20.0)
History of BRCA1/BRCA2 mutations or other hereditary cancer syndromes, n (%)				
- Yes	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
- Unknown	293 (99.7)	79 (100.0)	5 (100.0)	5 (100.0)
Number of first-degree relatives with breast cancer, median (range)	0 (0, 1)	0 (0, 1)	1 (1, 1)	1 (0, 1)
Lifetime Risk of Developing Breast Cancer, n (%)				
- Low Risk (<15%)	294 (100.0)	79 (100.0)	5 (100.0)	5 (100.0)
- High Risk (≥15%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Part 2 Clinical Findings from Mammogram and Ultrasound: Clinical evaluation using mammography and ultrasound, categorized by the Breast Imaging-Reporting and Data System (BI-RADS), revealed that BI-RADS 2 was the most prevalent classification, accounting for 46.2% of all cases. This was most frequently observed in the 50–59 age group (16.9%), with BI-RADS 1 following at 30.8%, and predominantly found in participants

aged 50–59 (14.1%) and 60–69 (11.0%). BI-RADS 3 was recorded in 14.6% of the cohort, with the majority again within the 50–59 age bracket (6.3%). The high-risk findings BI-RADS 4 and BI-RADS 5 accounted for 7.0% and 1.3%, respectively. BI-RADS 4 findings peaked in the 60–69 age group (3.1%), followed by the 40–49 age group (2.3%). A total of 32 participants (8.3%) were identified with suspicious findings (BI-RADS 4 or 5), and all required further

pathological investigations.

Part 3 Health Economic Evaluation:

Economic Evaluation of Breast Cancer Screening using a Decision Tree Model: Comparing Opportunistic Screening vs. Mammography and Ultrasound in High-Risk Women.

1. Economic Cost-Effectiveness Analysis of Breast Cancer Screening. Risk assessment of

women in Phanat Nikhom District and its network revealed that 53% were at moderate risk and 47% were at high risk. Nearly half of the population fell into a category that could directly benefit from combined MMG+US screening. This economic evaluation compared the cost-effectiveness of MMG+US screening against conventional opportunistic screening.

Table 2 Number of Breast Cancer Patients Classified by Age, Chonburi Province, 2023–2025

Age Group (Years)	2023	2024	2025
15-39	53/211,042	52/205,535	54/215,934
40-49	314/98,305	297/95,332	301/98,526
50-59	595/93,912	644/92,059	680/95,359
60 years and older	1,042/115,272	1,095/115,941	1,317/129,620
Total	2,004/518,531	2,088/511,867	2,352/539,439

Analysis of patient data from 2023 to 2025 showed a continuous upward trend in breast cancer cases across almost all age categories. This trend was particularly evident in the elderly group, which exhibited the highest morbidity rate. In 2023, there were 2,004 cases out of a target population of 518,531. The highest prevalence was observed in the 60 years and older age group, with 1,042 cases, followed by the 50–59 age group with 595 cases. By contrast, the younger age group (15–39 years) had

the lowest number of patients at 53 cases. In 2024, the total patient count rose to 2,088, with significant increases in the 50–59 and 60 years and older age groups. Conversely, the 15–39 age group showed a slight decrease compared to the previous year. In 2025, the number of patients reached a three-year peak of 2,352, while the 60+ age group surged substantial from 1,095 cases in 2024 to 1,317 cases in 2025 (Table 2).

Table 3 Discounted Lifetime Life Years (LY) by Breast Cancer Stage Estimated Using 5-Year Survival and Annual Discount Rate of 3%

Stage	S ₅ (5-year survival)	$\lambda = -\ln(S_5)/5$	$\lambda + r$	Discounted lifetime LY = $1/(\lambda + r)$
0	0.99	0.00201	0.03201	31.25
I	0.944	0.01152	0.04152	24.08
II	0.85	0.03250	0.06250	16.00
III	0.566	0.11360	0.14360	6.97
IV	0.283	0.25240	0.28240	3.54

The lifetime expectancy was classified by the stage of breast cancer using an exponential survival model, with a 3% annual discount rate. Mortality rates were derived from 5-year survival rates (Table 3).

The results indicated a significant decline in lifetime expectancy as the cancer stage progressed, decreasing from 31.25 years for Stage 0 to 3.54 years for Stage IV. There was a substantial disparity in

lifetime Life-Years (LY) between the early stages (0–II) and late stages (III–IV). Patients diagnosed at an early stage had a higher life expectancy compared

to those diagnosed at an advanced stage. Effective screening facilitated stage migration, leading to Life-Years Gained (LYG).

Table 4 Calculation of Expected Lifetime LY and LYG Resulting from Stage Shift in MMG+US Screening Compared with Opportunistic Screening (n=383)

Stage	Lifetime LY (year)	Opportunistic p	LY contribution	MMG screening p	LY contribution
0	31.25	0.1188	3.71	0.1606	5.02
I	24.08	0.3632	8.75	0.5112	12.31
II	16.00	0.3857	6.17	0.2453	3.92
III	6.97	0.0605	0.42	0.0449	0.31
IV	3.54	0.0717	0.25	0.0380	0.13
Expected LY	-	-	19.87	-	23.01

The calculation of lifetime expectancy based on disease stage distribution revealed that MMG+US screening increased the mean life expectancy from 19.87 to 23.01 years, resulting in 3.14 Life-Years Gained (LYG). This finding reflected the survival

benefit of screening, as a direct consequence of a higher detection rate of breast cancer at early stages, compared to opportunistic screening (Table 4).

Table 5 Budget Impact of Breast Cancer Screening with MMG+US Linked to Life Years Gained (LYG), Categorized by Age Group, Chonburi Province and Phanat Nikhom Hospital, 2025

Age Group (Years)	Number of Cancer Patients (Cases/Year)	Screening Cost per Person (THB)	Total Cost (THB)	Population LYG (Life Years/Year)	Cost per Life Year Gained (THB/LYG)
Chonburi Province					
40–49	301	2,400	722,400	945	764
50–59	680	2,400	1,632,000	2,135	764
≥60	1,317	2,400	3,160,800	4,135	764
Total	2,298	-	5,515,200	7,215	≈764
Phanat Nikhom Hospital (Screened Population/Not Diagnosed Cases)					
40–49	85	2,400	204,000	266.90	764
50–59	149	2,400	357,600	467.86	764
60–69	138	2,400	331,200	433.32	764
70–75	11	2,400	26,400	34.54	764
Total	383	-	919,000	1,202.02	≈764

Screening with combined MMG+US incurred an incremental cost of 2,400 THB per patient compared to opportunistic screening. When evaluating this incremental cost alongside the LYG,

the Incremental Cost-Effectiveness Ratio (ICER) was 764 THB per life-year gained. Results demonstrated that MMG+US screening was highly cost-effective on an individual lifetime basis, reflecting the survival

benefits of early detection. At the population level for Chonburi Province, implementing this screening model would require an annual budget of 5.5 million THB. This investment was estimated to generate 7,215 life-years annually, at a cost per LYG of less than 1,000 THB. At Phanat Nikhom Hospital, implementing this screening model would require an annual budget of 919,000 THB. This investment would generate 1,202 life-years annually, at a cost per LYG of less than 1,000 THB (Table 5).

DISCUSSION

The study findings highlight a critical paradigm shift. Breast self-examination (BSE) functions not merely as a physical check-up but also as a vital Entry Point into the healthcare system. This is particularly significant in peri-urban and rural contexts where income constraints and accessibility remain challenges. Research indicates that women who consistently practice BSE are more likely to seek advanced screening (MMG+US) sooner, leading to a distinct Stage Migration from advanced to early stages (Stage 0–II).

BSE has proven to be essential for women under the age of 40, a group not typically covered by standard screening protocols, facilitating early detection and diagnosis, and aligning with global trends showing a rising incidence of breast cancer. This study challenges the traditional view among younger Asian women that BSE is insufficient, arguing instead that in the Thai healthcare context, BSE serves as a Trigger that heightens sensitivity to abnormalities and indirectly reduces mortality rates.

From an economic perspective, MMG+US screening incurs a higher unit cost compared to opportunistic screening, but the Lifetime Analysis revealed maximum cost-effectiveness in the 50+ age group due to higher incidence rates and significant Life-Years Gained (LYG). Early detection mitigated

the financial burden of complex treatments, such as targeted therapies or high-cost radiotherapy. This represents a strategic shift from curative spending toward more sustainable preventive investment. Systematic MMG+US screening, combining proactive BSE promotion, was proven to be the most effective strategy for reducing breast cancer mortality. The three key conclusions were:

BSE was a Key Catalyst by enhancing health awareness and accelerating clinical consultation, thereby enabling early-stage detection in younger populations. Clinical Effectiveness: MMG+US screening facilitated a Stage Shift toward curable stages, significantly extending patients' life expectancy. Systemic Value: Despite the higher initial investment, the long-term reduction in costs for treating advanced-stage cancer was substantial, particularly when prioritized for the high-risk group aged 50 and older.

Benefits and Practical Applications

The study findings provide strong empirical support for implementing targeted and risk-based breast cancer screening policies in Chonburi Province, where incidence rates remain high. Prioritizing women aged 50–75 for routine, high-coverage screening would maximize health outcomes and ensure efficient allocation of public health resources. For women aged 40–49, shifting from universal to risk-based screening would enhance cost-effectiveness while maintaining early detection among high-risk individuals. At the managerial level, decentralizing mammography services to district hospitals can generate economies of scale and reduce both direct and indirect costs for the population. This strategy is particularly beneficial for women in remote areas who face travel and opportunity costs. Strengthening community-level prevention through standardized self-risk assessment tools and structured breast self-examination training can enhance early detection capacity.

Study Limitation: This study identified a high rate of suspicious findings (BI-RADS 4 and 5) through MMG+US; however, specific histopathological results (e.g., Benign vs. Malignant ratio) for these 32 cases were not included in the analysis. Future research should integrate pathological confirmation to determine the Positive Predictive Value (PPV) of the screening program in this specific population.

Recommendations for Future Studies: Subsequent research should integrate pathological

findings to determine the Positive Predictive Value (PPV), and derive cost-effective values that accurately reflect health system realities. The costs associated with overdiagnosis should also be incorporated into the economic model.

CONFLICTS OF INTEREST: None

FUNDING SOURCES: None

ACKNOWLEDGEMENTS: The authors would like to express their sincere gratitude to all the experts for their invaluable contributions in reviewing and validating the accuracy and reliability of the questionnaires used in this study.

REFERENCES

1. World Health Organization. Global breast cancer initiative implementation framework: assessing, strengthening and scaling-up of services for the early detection and management of breast cancer: executive summary. Geneva: World Health Organization; 2023.
2. Uraireekul C. Overview of the situation and strategies for breast cancer control [Internet]. 2022 [cited 2024 Dec 5]. Available from: <https://www.chonlatit.com/data/bse/BCSituation.pdf>
3. Strategy and Planning Division. Thai health statistics 2021 [Internet]. 2021 [cited 2024 Oct 10]. Available from: <https://spd.moph.go.th/wp-content/uploads/2022/11/Hstatistic64.pdf>
4. ThaiHealthStat. Mortality rate from breast cancer (female) 2017–2021 [Internet]. 2021 [cited 2024 Nov 26]. Available from: https://www.hiso.or.th/thaihealthstat/area/index.php?ma=1&pf=01818101&tp=13_4
5. Chitapanarux I, Sripan P, Somwangprasert A, Charoentum C, Onchan W, Watcharachan K, et al. Stage-specific survival rate of breast cancer patients in northern Thailand in accordance with two different staging systems. *Asian Pac J Cancer Prev* 2019;20:2699-706.
6. Chhikara BS, Parang K. Global cancer statistics 2022: the trends projection analysis. *Chemical Biology Letters* [Internet]. 2023 [cited 2024 Nov 6];10(1):451. Available from: <https://pubs.thesciencein.org/journal/index.php/cbl/article/view/451/293>
7. Ngamkham J, Thanasitthichai S, Prasitthipayong A, Chaiyamol A, Mas-u-dee M, Boonmark K, et al. Evaluation of vitronectin expression levels from breast cancer patients with different stages. *Thai Cancer Journal* 2021;41:24-36.
8. Kamińska M, Ciszewski T, Łopacka-Szatan K, Miotła P, Starosławska E. Breast cancer risk factors. *Prz Menopauzalny* 2015;14:196-202.
9. Jaihow S, Klayvised J, Sangprajong K, Petsirasan R. Health belief and breast self-examination behavior among female students at a university in Nakhon Si Thammarat. *Journal of The Police Nurses* 2018;10:154-63.
10. Pandee S. The effects of self breast examination program in woman in the responsibility area of Suratthani cancer hospital [Internet]. 2020 [cited 2025 Jan 12]. Available from: <https://www.surat-cancer.go.th/storage/uploads/17-12.pdf>
11. Wilkinson AN, Mainprize JG, Yaffe MJ, Robinson J, Cordeiro E, Look Hong NJ, et al. Cost-effectiveness of breast cancer screening using digital mammography in Canada. *JAMA Netw Open* [Internet]. 2025 [cited 2025 Nov 2];8(1):e2452821. Available from: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2828638>
12. Pannarunothai S, Pilasant S, Saengsri W, Kingkaew P, editors. The health technology assessment manual Thailand 2021 [Internet]. 2021 [cited 2025 Nov 2]. Available from: https://www.hitap.net/th/document/health-technology-assessment-manual-thailand-2021/#more_details

ORIGINAL ARTICLE

**ความคุ้มค่าของการตรวจคัดกรองมะเร็งเต้านมด้วยแมมโมแกรมและอัลตราซาวด์:
การศึกษาในสตรีอำเภอพนสนิมและพื้นที่เครือข่าย**

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บทคัดย่อ

ที่มาของปัญหา: มะเร็งเต้านมในไทยมีแนวโน้มสูงขึ้นและพบในสตรีอายุน้อยลง ซึ่งการตรวจพบในระยะแรกสามารถเพิ่มอัตราการรอดชีวิตได้ถึงร้อยละ 94.4 แต่ปัจจุบันการเข้าถึงการคัดกรองในพื้นที่พนสนิม ยังติดข้อจำกัดด้านทรัพยากร จึงจำเป็นต้องศึกษาความคุ้มค่าทางเศรษฐศาสตร์เพื่อกำหนดนโยบายจัดสรรงบประมาณและเครื่องมือให้เหมาะสมกับบริบทพื้นที่ เพื่อช่วยลดอัตราการเสียชีวิตและยกระดับคุณภาพชีวิตสตรีไทย

วัตถุประสงค์: การศึกษาวิจัยเชิงวิเคราะห์ภาคตัดขวางร่วมกับการวิเคราะห์ทางเศรษฐศาสตร์เพื่อประเมินความคุ้มค่าของการคัดกรองมะเร็งเต้านมด้วยแมมโมแกรมและอัลตราซาวด์ (MMG+US)

วิธีการศึกษา: ในสตรีกลุ่มเสี่ยงอายุ 40–75 ปี จำนวน 383 ราย ในพื้นที่อำเภอพนสนิมและเครือข่ายจังหวัดชลบุรี การประเมินใช้แบบจำลอง Decision Tree Model เพื่อเปรียบเทียบระหว่างการคัดกรองตามโอกาส (Opportunistic screening) และการคัดกรองด้วย MMG+US โดยวัดผลลัพธ์เป็นจำนวนปีชีวิตที่เพิ่มขึ้น (Life-Years Gained: LYG) และอัตราส่วนต้นทุนต่อประสิทธิผลส่วนเพิ่ม (ICER)

ผลการศึกษา: กลุ่มตัวอย่างส่วนใหญ่อยู่ในวัย 50–69 ปี (ร้อยละ 70) ผลการตรวจคัดกรองพบความผิดปกติระดับ BIRADS 4–5 คิดเป็นร้อยละ 8.3 ซึ่งการคัดกรองช่วยเปลี่ยนระยะของโรค (Stage Shift) จากระยะลุกลามมาเป็นระยะเริ่มต้นได้อย่างชัดเจน โดยสัดส่วนการพบมะเร็งระยะ 0 และ 1 ในกลุ่มคัดกรองสูงกว่ากลุ่มไม่คัดกรอง ส่งผลให้กลุ่มที่ได้รับการคัดกรองมีอายุขัยคาดหวังเฉลี่ยเพิ่มขึ้นจาก 19.87 ปี เป็น 23.01 ปี หรือมีค่า LYG เท่ากับ 3.14 ปีชีวิตในด้านความคุ้มค่าทางเศรษฐศาสตร์ พบว่าการคัดกรองมีต้นทุนต่อคนอยู่ที่ 2,400 บาท และมีค่า ICER ประมาณ 764 บาทต่อปีชีวิตที่เพิ่มขึ้น ซึ่งถือว่ามีความคุ้มค่าสูงเมื่อเทียบกับเกณฑ์มาตรฐานของประเทศไทย

สรุป: การคัดกรองด้วย MMG+US ในสตรีกลุ่มเสี่ยงช่วยเพิ่มโอกาสการรอดชีวิตและลดต้นทุนการรักษาระยะยาวได้อย่างมีประสิทธิภาพ ผลการศึกษานับสนุนการลงทุนในระดับนโยบายเพื่อจัดสรรทรัพยากร เช่น เครื่องแมมโมแกรมและรังสีแพทย์ ให้ครอบคลุมระดับอำเภอ โดยเฉพาะการคัดกรองแบบมุ่งเป้า (Targeted screening) ในกลุ่มอายุ 50 ปีขึ้นไป ซึ่งให้ผลประโยชน์ด้านปีชีวิตสูงสุด

คำสำคัญ: มะเร็งเต้านม, การตรวจแมมโมแกรม, การตรวจอัลตราซาวด์, การวิเคราะห์ต้นทุนต่อประสิทธิผล, อัตราต้นทุนต่อประสิทธิผลส่วนเพิ่ม