Meta-Analysis

Meta-Analysis: Application of Health Belief Model to Breast Self-Examination (BSE)

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ABSTRACT

Background: Breast cancer is a type of non-communicable disease characterized by the appearance of abnormal cells in the breast. Breast self-examination (BSE) is one method of early detection of breast cancer. Health belief model is a health behavior that can predict women's interest in doing BSE. This study aimed to estimate the effect of the health belief model on the practice of BSE with a meta-analysis.

Subjects and Method: This research is a meta-analysis study using PRISMA flowchart guidelines. The article search process was carried out between 2015-2022 using databases from PubMed, Google Scholar and Scopus. Based on the database, there were 9 articles that met the inclusion criteria. The analysis was carried out using Revman 5.3 software.

Results: As many as 9 articles spread across 2 continents, namely Asia and North America. 8 main studies from Asia, 3 from Turkey, 2 from Iraq, 1 from Yemen, 1 from Iran, and 1 from Indonesia. One major study from North America, namely Mexico, reviewed in the meta-analysis showed that perceived benefits were strong (aOR= 1.03; 95%CI= 0.96 to 1.11; p= 0.440; I^2=79%).

Conclusion: The perceived benefits were not statistically significant in predicting the practice of BSE in women.

Keywords: health belief model, perceived benefit, BSE

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BACKGROUND

Breast cancer is a type of non-communicable disease characterized by the appearance of abnormal cells in the breast that continue to grow and can cause damage to breast organ function (Infodatin, 2018). Breast cancer, also known as breast cancer, can grow in the breast glands, milk ducts, connective tissue or fatty tissue in the breast. Based on the WHO survey (2020) it is known that breast cancer ranks first as the most common type of cancer suffered by women in the world.

WHO (2020) also states that breast cancer sufferers in the world reach 2.1 million every year. Deaths from breast cancer in 2018 reached 15% of all causes of cancer deaths in women. The average mortality rate due to breast cancer in Indonesia in 2018 was 17 per 100,000 (WHO, 2018).

In order to detect the presence of breast cancer in women, cancer screening is needed. Breast cancer screening has been

shown to reduce mortality. Breast cancer screening consists of 2 stages, namely breast physical examination and mammography. Breast physical examination is divided into two, namely breast self-examination (BSE) and clinical breast examination (SADANIS) (Fuller et al., 2016).

Breast self-examination (BSE) is an examination to detect breast cancer that can be done independently. This technique is the simplest and cheapest technique (Fajriah et al., 2019). BSE is done by checking the shape of the breast, looking for changes in the shape and size of the breast, checking for lumps, skin, fluid or abnormal pain in the breast (Fajriah et al., 2019).

Special Research Data on Non-Communicable Diseases (RIKHUS PTM) shows that people's behavior in carrying out early detection of breast cancer (BSE) is still low. This is indicated by as many as 70% of breast cancer patients who come at an advanced stage and have a history of never doing BSE (Indonesian Breast Cancer Foundation, 2020). So, it is necessary to have a model that can influence health behavior, one example is the Health Belief Model (HBM).

Health belief model is one of the health theories that can predict health behavior developed by Strecher and Rosenstock (Nugrahani et al., 2017). Research by Fajriah et al (2019) shows that the perception of low barriers and high self-efficacy can be a determinant in doing BSE. Another study conducted by Gonzales et al (2018) stated that there was a significant influence between perceptions of vulnerability and self-efficacy on BSE behavior.

Based on this description, the researcher conducted a study with the aim of estimating the average magnitude of the effect of the perceived benefits of the Health Belief Model on the practice of BSE based on the estimation results from a number of primary studies.

SUBJECTS AND METHOD

1. Study Design
This study uses a meta-analysis research design. This research article was obtained from the electronic databases of PubMed, Springer Link, Elsevier and Google Scholar. Some of the keywords used are: "health belief model" OR "health belief" OR "belief" AND "breast self-examination" OR "breast cancer screening".

2. Inclusion Criteria
The inclusion criteria used in this study were full-text articles with a cross-sectional design. The article was published in English from 2015 to 2022. The analysis of perceived benefit to study outcomes is reported using the adjusted odds ratio (aOR).

3. Exclusion Criteria
The exclusion criteria in this study were articles that had been meta-analyzed, duplicate articles, and a sample of <100 participants and articles that did not use English.

4. Operational Definition of Variables
The articles included in this study were PICO-adjusted. The search for articles was carried out by considering the eligibility criteria using the following PICO model: Population= Women aged >18 years. Intervention= Perception of benefit is good or strong or agree. Comparison= Bad or weak or disagree perception of benefits. Outcome = Breast Self-Examination (BSE).,

BSE is an activity to carry out breast self-examination by women who are demonstrated using their hands and a mirror.

Perception of benefit is a woman's belief that doing BSE is an early detection of breast cancer, which is beneficial.

5. Instrumen Study
This research is guided by the PRISMA flow diagram and the assessment of the quality of research articles. The 12 questions used are as follows:
1. Does the objective clearly address the research focus/problem?

2. Is the research method (research design) suitable for answering research questions?
3. Is the research subject selection method clearly written?
4. Does the sampling method give rise to selection bias?
5. Is the sample representative of the research target population?
6. Was the sample size based on pre-study considerations?
7. Was a satisfactory response achieved?
8. Is the measurement (questionnaire) valid and reliable?
9. Has statistical significance been tested?
10. Did the researcher report confidence intervals?
11. Are there any confounding factors that have not been taken into account?
12. Are the results applicable in practice or community?

6. Data Analysis

Articles were analyzed using the Review Manager (RevMan) 5.3 application to calculate effect size and heterogeneity, and form the final results of the meta-analysis. The results of data processing are presented in the form of forest plots and funnel plots.

RESULTS

Process of searching article wascarried out by searching several journal databases including Google Scholar, Pubmed, and Science Direct. it can be seen using the PRISMA FLOW flowchart shown in Figure 1.
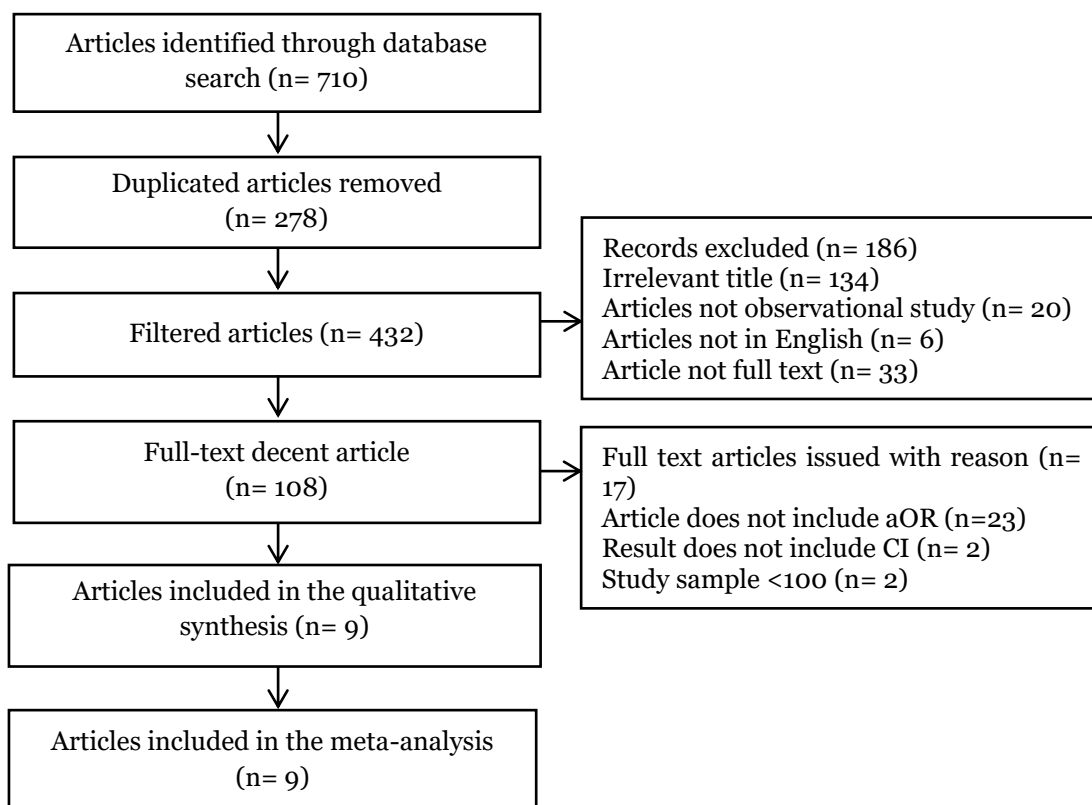

Figure 1. Results of PRISMA Flow Diagrams

Figure 2. Research Distribution Map

The total articles obtained were 9 articles spread across 2 continents, namely Asia and North America. The 8 main studies were from Asia, three from Turkey, two from Iraq, one from Yemen, one from Iran, and one from Indonesia. 1 major study from North America is from Mexico.

Table 1. Research Quality Assesment using the Critical Appraisal Checklist for Cross-sectional Study.

Primary Study	Criteria												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Selcuk *et al.* (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Jaurez *et al.* (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Basaran *et al.* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Dagnaw *et al.* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Kirag dan Kizilkaya. (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Nikpour *et al.* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Shakor *et al.* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Dewi *et al.* (2019)	2	2	2	2	2	2	2	2	2	2	2	2	24
Al-Sakkaf dan Basaleem. (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24

Note: Answer 2= Yes; Answer 1= Can't tell; Answer 0= No

a. Forest plot

The forest plot in Figure 2 shows that there is high heterogeneity (I2= 79%; p<0.0001), so the data analysis in the forest plot uses a random effects model. Based on the results of the forest plot, it can be concluded that there is a strong benefit for improving the practice of breast self-examination (BSE) by 1.03 times compared to the perception of a weak benefit and statistically not significant (aOR=1.03; 95%CI=0.96-1.11; p= 0.440).

b. Funnel plot

The funnel plot presented in Figure 3 shows that there is publication bias. This is indicated by the asymmetry of the right and left plots where there are 6 plots on the right, 3 plots on the left and 2 plots touching the vertical line.

Table 2. Description of Primary Research included in the Meta-Analysis

No	Author (Year)	Country	Study Design	Sample	Population (P)	Intervention (I)	Comparison (C)	Outcome (O)	aOR (CI 95%)
1	Selçuk et al. (2020)	Turkey	Cross Sectional	416	Woman visiting at family health center	Good perceived benefit, good self-efficacy	Poor perceived benefits poor self-efficacy	Perceived benefits have a significant relationship with BSE.	aOR= 2.43 (1.37 to 4.29)
2	Juárez-García and Téllez (2020)	Mexico	Cross Sectional	738	Women in Mexico over 20 years old	Good perceived benefit	Low benefit perception	Perceived benefits related to BSE	aOR= 1.05 (1.03 to 1.07)
3	Basaran et al. (2019)	Turkey	Cross Sectional	877	College student	Good perceived benefit, good self-efficacy, low perceived barrier	Poor perceived benefit, poor self-efficacy, poor perceived barrier	Perceived benefit did not have a significant relationship with BSE.	aOR= 0.9 (0.9 to 1.0)
4	Kirag dan Klzllkaya (2019)	Turkey	Cross Sectional	200	Woman working at Aydin Adnan Menderes University	Good perceived benefit, bad perceived barrier, good self-efficacy	Poor perceived benefit, good perceived barrier, poor self-efficacy	Perceived benefit did not have a significant relationship with BSE.	aOR= 0.90 (0.82 to 0.99)
5	Dagnaw (2019)	Iraq	Cross Sectional	803	Women who visit the health center and hospital of Babol University	Good perceived benefit, positive self-efficacy	Negative perceived benefit, negative self-efficacy	Perceived benefits are not related to monthly breast self-examination	aOR= 1.254 (0.901 to 1.746)
6	Shakor et al. (2019)	Iraq	Cross Sectional	750	Women aged 20-60 years	Good perceived benefit, high self-efficacy, low perceived barrier	Low perceived benefit, low self-efficacy, high perceived barrier	Perceived significant benefit of breast self-examination (BSE)	aOR= 1.332 (1.02 to 1.73)
7	Nikpour et al. (2019)	Iran	Cross Sectional	800	Women who visit the Aden health center	The perception of many benefits, a lot of self-efficacy	Low perceived benefits, low self-efficacy	Perceived benefit is a predictor of BSE	aOR= 1.72 (1.42 to 2.07)
8	Dewi et al. (2019)	Indonesia	Cross Sectional	1,967	Woman visiting at family health center	More benefit perception, good self-efficacy	Less perception of benefits, poor self-efficacy	Perceived benefits have a significant relationship with BSE	aOR= 1.09 (1.04 to 1.13)
9	Al-Sakkaf and Basaleem (2016)	Yaman	Cross Sectional	400	Women in Mexico over 20 years old	High benefit perception	Low benefit perception	Perceived benefits related to breast self-examination (BSE)	aOR= 0.89 (0.77 to 1.05)

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Al-Sakkaf and Basalen 2019	-0.1165	0.0739	11.4%	0.89 [0.77, 1.03]
Basaran et al 2019	-0.1054	0.0538	14.6%	0.90 [0.81, 1.00]
Dagnam 2019	0.2263	0.1687	3.9%	1.25 [0.90, 1.75]
Dewi et al 2019	0.0862	0.024	19.5%	1.09 [1.04, 1.14]
Jaurez et al 2020	0.0488	0.0098	21.0%	1.05 [1.03, 1.07]
Kirag and kizilaya 2019	-0.1054	0.0475	15.7%	0.90 [0.82, 0.99]
Nikpour et al 2019	0.131	0.115	6.9%	1.14 [0.91, 1.43]
Selcuk et al 2020	0.8879	0.2924	1.5%	2.43 [1.37, 4.31]
shakor et al 2019	0.2867	0.1357	5.4%	1.33 [1.02, 1.74]
Total (95% CI)			100.0%	1.03 [0.96, 1.11]

Heterogeneity: Tau² = 0.01; Chi² = 38.91, df = 8 (P < 0.00001); I² = 79%
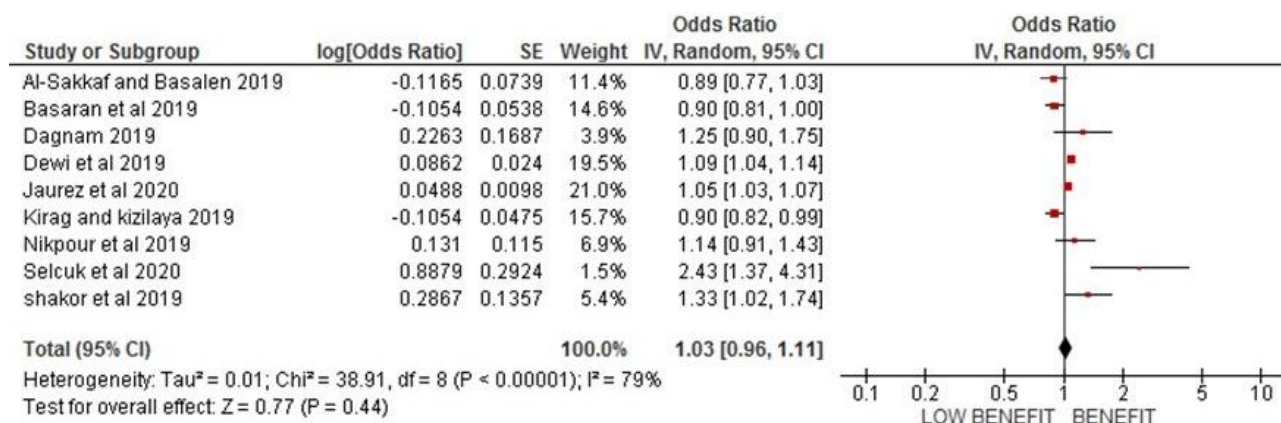Test for overall effect: Z = 0.77 (P = 0.44)

Figure 4. Forest Plot Application of the Health Belief Model to Breast Self-Examination (BSE)
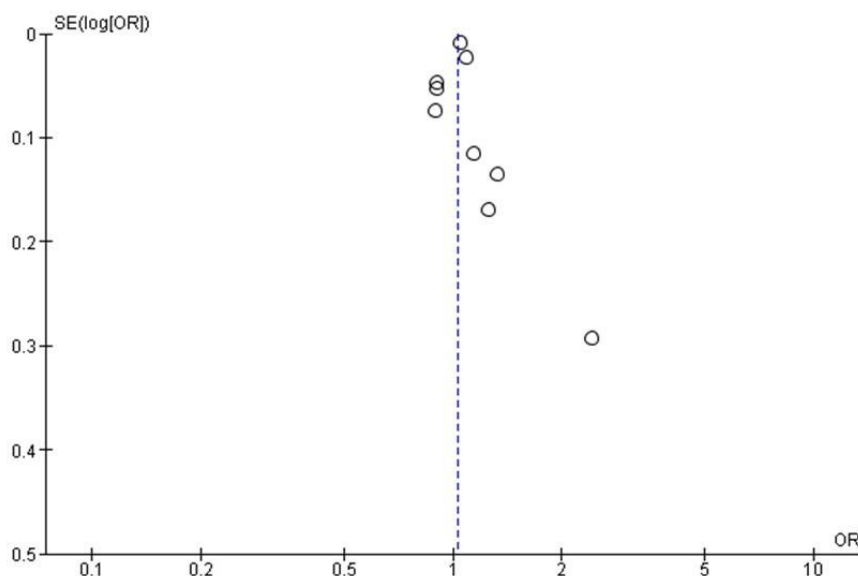

Figure 4. Funnel Plot Application of the Health Belief Model to Breast Self-Examination (BSE)

DISCUSSION

This meta-analysis research raised the theme of applying the health belief model to the practice of breast self-examination (BSE). The independent variable in this study is the perceived benefit perception. The dependent variable in this study was the practice of breast self-examination (BSE).

This study was conducted using the results of the aOR statistic from multivariate analysis, which aims to control for confounding factors. Confounding factors can cause research results to be invalid because confounding factors also affect the relationship or affect the population being studied (Anulus et al., 2019).

Application of perceived benefits in BSE practice showed strong perceived benefits were slightly more likely to perform BSE than weak perceived benefits, but were not statistically significant. The results of this study are in line with research conducted by Tahmasebi and Noroozi (2016),

which states that the perceived benefits can affect the practice of BSE, but it is not statistically significant. Ozkan et al. (2011) also stated that perceived benefits were not statistically significant in predicting BSE behavior.

Perceived benefit is the degree to which a person perceives a change in behavior as beneficial and the extent to which they believe that the behavior can prevent the risk of disease when a person makes the necessary change in behavior. High perceived benefit is closely related to earlier disease diagnosis and better disease treatment, decreased cancer-related mortality, longer survival and improved quality of life (Selçuk et al., 2020).

Perceived benefits based on this study can increase the likelihood of doing BSE because perceived benefits are one of the predictors of BSE (Darvishpour et al., 2018). The perceived benefits that can influence women to do BSE include the perceived benefits of doing BSE, reducing the risk of breast cancer, the benefits of which the BSE method is an easy and free method of early detection of breast cancer, reducing death from breast cancer, early detection, and chances for recovery and maintain longer health status (Ergin et al., 2012).

AUTHOR CONTRIBUTION

Desi Syahbaniar and Dian Asih Ning Utami are the main researchers who choose the topic, find and collect research data.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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REFERENCES

Al-Sakkaf KA, Basaleem HO (2016). Breast cancer knowledge, perception and breast self- examination practices among yemeni women: An application of the Health Belief Model. Asian Pac J of Cancer Prev, 17(3): 1463–1467. 10.7314/APJCP.2016.17.3.1463.

Anulus A, Murti B, Prasetya H (2019). Risk Factors of HIV among Male Military Personnels: A Meta Analysis. J of Health Promot and Behav, 4(3): 178–188. 10.26911/thejhpb.2019.04.03.03.

Basaran O, Uskun E, Erturk C, Savas P (2019). Health beliefs, behaviour and determining factors in breast self – examination among a group of university students. Marmara Med J, 32(3): 130–136. 10.5472/marumj.638115.

Dagnaw M (2019). Breast self-examination practice and its associated factors among undergraduate female students at University of Gondar, Northwest Ethiopia. Jair, 8(3): 62–67.

Darvishpour A, Vajari SM, Noroozi S (2018). Can health belief model predict breast cancer screening behaviors? Maced J of Medi Sci, 6(5): 949–953. 10.3889/oamjms.2018.183.

Dewi TK, Massar K, Ruiter RAC, Leonardi T (2019). Determinants of breast self-examination practice among women in Surabaya, Indonesia: An application of the health belief model. BMC Public Health, 19(1): 1–8. 10.1186/-s12889-019-7951-2.

Ergin AB, Sahin NH, Sahin FM, Yaban ZS, Acar Z, Bektas H (2012). Meta analysis of studies about breast self examination between 2000-2009 in Turkey. Asian Pac J of Cancer Prev, 13(7): 3389–3397. DOI: 10.7314/APJCP.-2012.13.7.3389.

Fajriah AS, Respati SH, Murti B (2019).

Application of Health Belief Model and Theory of Planned Behavior on Factors Affecting Breast Self Examination among University Students. J of Health Promot and Behav, 4(4): 246–257. 10.26911/the7thicph.02.42.

Fuller MS, Lee CI, Elmore JG (2016). Breast Cancer Screening : An Evidence-Based Update. Med Clin North Am, 99(3): 451–468. DOI: 10.1016/j.mcna.2015.01.002.Breast.

Gonzales A, Alzaatreh M, Mari M, Saleh AA, Alloubani A (2018). Beliefs and behavior of Saudi women in the University of Tabuk toward Breast Self Examination practice. Asian Pac J of Cancer Prev, 19(1): 121–126. DOI: 10.22034/APJCP.2018.19.1.121.

Infodatin (2018). Beban Kanker di Indonesia (Cancer Burden in Indonesia). Jakarta: Kementerian Kesehatan Republik Indonesia.

Juárez-García DM, Téllez A (2020). Adaptation and Validation of the Health Belief Model Scale for Breast Self-Examination in Mexican Women. Value in Health Regional Issues, 23(2): 30–36. DOI: 10.1016/j.vhri.2019.11.006.

Kirag N, Klzllkaya M (2019). Application of the Champion Health Belief Model to determine beliefs and behaviors of Turkish women academicians regarding breast cancer screening: A cross sectional descriptive study. BMC Women's Health, 19(1): 1–10. DOI: 10.1186/s12905-019-0828-9.

Nikpour M, Hajian-Tilaki K, Bakhtiari A (2019). Risk assessment for breast cancer development and its clinical impact on screening performance in Iranian women. Cancer Manag and Research, 11: 10073–10082. DOI: 10.2147/CMAR.S229585.

Nugrahani RR, Budihastuti UR, Pamungkasari EP (2017). Health Belief Model on the Factors Associated With the Use of Hpv Vaccine for the Prevention of Cervical Cancer Among Women in Kediri, East Java. J Epidemiol Public Health, 2(1): 90. DOI: 10.26911/theicph.2017.009.

Ozkan A, Malak AT, Gurkan A, Turgay AS (2011). Do Turkish nursing and midwifery students teach breast self-examination to their relatives? Asian Pac J of Cancer Prev, 12(1): 111–115.

Selçuk KT, Avci D, Dundar GY, Merca Y (2020). Breast cancer screening behaviors in women aged 40 years and over in a semi-urban region in turkey: Relationships with health beliefs. Healthcare (Switzerland), 8(2): 1-10. DOI: 10.3390/healthcare8020171.

Shakor JK, Mohammed AK, Karotia D (2019). Determinants of Breast Self-Examination Practice amongst Iraqi/ Sulaimani Women using Champion Health Belief Model and Breast CAM. Int J of Med Res Health Sci, 8(9): 51–59.

Tahmasebi R, Noroozi A (2016). Is health locus of control a modifying factor in the health belief model for prediction of breast self-examination?. Asian Pac J of Cancer Prev, 17(4): 2229–2233. DOI: 10.7314/APJCP.2016.17.4.2229.

WHO (2018). Indonesia Source GLOBOCAN 2018. http://gco.iarc.fr/

WHO (2020). Breast Cancer. Retrieved fromhttps://www.who.int/cancer/prevention/diagnosis-screening/breast-cancer/en/.