

CAUSAL RELATIONSHIP BETWEEN HEALTH PROMOTING BEHAVIOR AND QUALITY OF LIFE IN CERVICAL CANCER PATIENTS UNDERGOING RADIOTHERAPY

Pimsurang Taechaboonsersak¹, Jaranit Kaewkungwal², Pratap Singhasivanon²,
Wijitr Fungladda¹ and Sarigapan Wilailak³

¹Department of Social and Environmental Medicine, ²Department of Tropical Hygiene, Faculty of Tropical Medicine, Mahidol University; ³Department of Obstetric and Gynecology, Faculty of Medicine at Ramathibodi Hospital, Mahidol University, Bangkok, Thailand

Abstract. The purpose of this cross-sectional study was to examine the causal relationships among age, education, family income, and stage of carcinoma, perceived benefits, perceived barriers, perceived self-efficacy, health promoting behavior and quality of life in patients with cervical cancer. Pender's Health Promotion Model (1996) provided a guide for the conceptual framework of this study. Purposive sampling was employed to recruit 488 cervical cancer patients who were undergoing radiotherapy at seven public hospitals in five areas of Thailand. The instruments used in this study included a Personal Data Form, Cognitive perception Form, Health promoting behavior scale, the social support questionnaire and The Functional Assessment of Cancer Therapy General (FACT-G) form. The proposed model was tested and modified by the LISREL Program. The modified model adequately fitted with the data. The results demonstrate that health promoting behavior had a significant direct positive effect on quality of life ($\beta=0.71$, $p<0.01$). Cognitive perceptual factors had a significant direct effect on health promoting behaviors ($\beta=0.69$, $p<0.01$). Social support had a significant direct effect on the cognitive perceptual factors ($\beta=0.64$, $p<0.01$), health promoting behavior ($\beta=0.70$, $p<0.01$), and the quality of life ($\beta=0.48$, $p<0.01$). Age and education did not have a significant total effect on the quality of life. Family income had a significant direct effect on cognitive perceptual factors ($\beta=0.10$, $p<0.05$). The stage of cancer had a significant direct negative effect on cognitive perceptual factors ($\beta=-0.11$, $p<0.05$) and the quality of life ($\beta=-0.12$, $p<0.01$). The direct effect of the predictors on the quality of life indicated that cervical cancer patients with higher practice of health promoting behavior tended to have a higher quality of life. The findings indicate that Pender's Health Promotion Model is a useful guide for explaining and predicting the health promoting behavior and the quality of life of Thai cervical cancer patients who were undergoing radiotherapy. The significance of cognitive perceptual factors and social support confirm health promoting behavior as a goal directed towards the level of well being. This has implications for health care systems in planning interventions to promote health promoting behavior in a health promotion setting in cervical cancer patients for a better quality of life and healthy. A longitudinal study and experimental study are recommended for further study.

INTRODUCTION

Cancer is a major health problem. More than 6 million people worldwide will die of the disease each year, and 9 million new cases are diagnosed every year. The problem is increas-

ing. It is estimated that by the year 2020, cancer will kill over 11 million people annually worldwide; more than 7 million of these in the developing world (IARC/WHO, 1997).

In Thailand, cancer is the second cause of mortality in women, following cardiovascular disease (Chooprapawan, 2000). Cervical cancer is the second most common cancer in women. The incidence is highest in the northern and central parts of Thailand, with incidence ratios of 18.82 and 19.44 per 100,000 population for the year 2002, respectively (NCI, 2002). Invasive cervical

Correspondence: Pimsurang Taechaboonsersak, Department of Social and Environmental Medicine, Faculty of Tropical Medicine, 420/6 Rajvithi Road, Bangkok 10400, Thailand.
Tel: 66 (0) 2354 8536
E-mail: phtpb@mahidol.ac.th

cancer occurs most commonly among women between the ages of 45 and 55 years old. Recent trends indicate an increasing incidence of cervical cancer in younger women who have a low socioeconomic status (Srisomboon, 1997).

Cervical cancer is a life-threatening disease. Patients have to struggle with the side effects of treatment, be they surgical, radio-therapeutic or chemotherapeutic. Although effective treatment may produce a better survival rate nowadays, psychological, sexual and physical dysfunction can produce a deleterious effect on the quality of the woman's life. The diagnosis of cancer not only changes a person's life at the time of diagnosis, but also affects their lives forever (Mahol and Casperson, 1997). Some cancer survivors reported negative effects that decreased their quality of life because of long-term post-treatment effects, and the continuing physical, psychological and social problems caused by the cancer.

The goals of cancer treatment and prevention are not only to extend life expectancy but also to improve the quality of life in the years prior to death (Torrance, 1987). The term "quality of life" can have several meanings. It may be used to refer to outward material circumstances, such that good physical health, material security, and a supportive family and friends represent having a good quality of life. Alternatively it can refer to a subjective feeling of well being; an individual's sense of happiness or satisfaction, typically reflecting a global assessment of all aspects of their life. McCauley and Bremer (1991) made a similar distinction between outward circumstances and personal assessment in their proposal of "objective well-being" versus "subjective well-being". Quality of life typically involves the assessment of several dimensions: physical well-being, emotional well-being, social well-being, and functional well-being.

A healthy lifestyle is the way to have good quality of life. Pender's Health Promotion Model (1981, 1996) has been widely used as a framework for research aimed at predicting overall health promoting lifestyles in various populations. Pender (1996) categorizes health-promoting behavior into six aspects: nutrition, physical activity, stress management, health responsibility,

interpersonal relations and spiritual growth. The Health Promotion Model also guides a framework for research to explain and predict specific health responsibility, which is incorporated as a part in initiating and maintaining health promotion behavior in individuals. Ardell (1977), who extensively studied health and wellness, states that self-responsibility for health is the keystone to a life with a high level wellness or healthy lifestyle. It is believed that the inappropriate health behaviors of cervical cancer patients may lead to poor health and a poor quality of life.

This study attempts to determine the role of health promoting lifestyle in cervical cancer patients through using the Pender's Health Promotion Model (1987, 1996). The main purpose was to examine a multi-dimensional indicator for the healthy lifestyle of cervical cancer patients towards the quality of life. It is expected to reveal associations and the impact of various factors on the quality of life of cervical cancer patients undergoing radiotherapy which could be used for developing better guidelines for more successful interventions in cervical cancer patients. A structural model is summarized in Fig 1

MATERIALS AND METHODS

Study population and data collection technique

The population of this study was cervical cancer patients who underwent radiotherapy at the radiotherapy out-patient clinic of Ramathibodi Hospital, Rajavithi Hospital, Lumpang Cancer Center, Ubon Ratchathani Cancer Center, Lop Buri Cancer Center, Chon Buri Cancer Center and Surat Thani Cancer Center.

The investigator and seven research assistants were in charge of the data collection. The research assistants were seven graduate nurses. The investigator trained all the research assistants prior to data collection. The training covered the objectives of the study, data collection procedures and the role of research assistants. Data collection took place from November 2004 to April 2005. The processes for data collection were as follows:

Permission from the Faculty of Tropical Medicine, the Human Research Board of Mahidol University and seven sample hospitals were

sought prior to data collection. After that, the investigator informed the head of each section to select patients from the radiotherapy unit in each of the hospitals and inform them of the objectives and the process of the study. On the data collection date, the investigator or research assistants obtained permission from the head of the OPD unit before obtaining patients' medical records and selecting those meeting the inclusion and exclusion criteria. The patients who met the inclusion criteria were individually approached and informed of the purpose of the study and the time required for participation. The participating rights were also guaranteed, both confidentiality and the freedom to withdraw from the study at any time during the interview period. Those who were willing to participate in the study were asked to sign a consent form. The personal data from the patient's medical records was retrieved and used to fill in the relevant parts of the personal data form. Each participant completed the remaining personal data on the form and answered a questionnaire.

Questionnaire

The structured questionnaire used in this study was divided into five parts: 1) personal data form, 2) cognitive perceptual scale, 3) health promoting behavior scale, 4) social support scale, and 5) quality of life scale (FACT-G).

The researcher developed the personal data form to collect data on the patient's age, marital status, education, family income, type of family, diagnosis and treatment.

The cognitive perceptual scale used a modified version of the Perceived Benefit of Health Promoting Scale. The Perceived Barriers to Health Promoting Scale, and the Self-efficacy Scale developed by Pender (1996). This scale was translated for use by Thai cervical cancer patients. It consists of 45 items and a five-point Likert Scale: strongly agrees, agrees, undecided, disagree, and strongly disagree. Five experts evaluated the content validity of the instrument. After their recommendations, the researcher modified and used the test in five cervical cancer patients to clarify the instructions and wording of the items. Testing was done on 30 cervical cancer patients to evaluate item clarity and

estimate the reliability. The Cronbach's alpha of the total score was 0.86.

Item generation in the Health Promoting Behavior Scale were based on Pender's concepts, which consist of six dimensions and 24 items. The four-point Likert scale was used: not applicable, sometimes, often, or regular. Five experts evaluated the content validity of the instrument. After their recommendations, the researcher modified and used the test in five cervical cancer patients to clarify the instructions and wording of the items. Testing was done on 30 cervical cancer patients to evaluate item clarity and estimate the reliability. The Cronbach's alpha of the score was 0.80.

The social support scale was developed based on House's theory. It assessed support in four areas: emotional support, information support, appraisal support, and material support. It included 16 items and a five-point scale evaluating support as very supportive, sort of supportive, in between, not very supportive and not at all supportive. The social support scale has been widely used in several studies that examined the relationship between social support and health promotion behavior. After modification, as suggest by the five experts, the instrument was tested on five cervical cancer patients to clarify the instructions and wording of the items. Then testing was done on 30 cervical cancer patients to evaluate the clarity and to estimate the reliability. The Cronbach's alpha of the social support scale was 0.87.

The Functional Assessment of Cancer Therapy-General (FACT-G) was developed by Cella (1993). In the Thai version by Ratanatharathorn and co-workers (2001), the FACT-G is composed of four dimensions of quality of life: physical, mental adjustment, social relationships, and activities. It used the five-point Likert scale ranging from not at all to very high confidence. From this study the Cronbach's alpha of this scale was 0.92.

Statistical analysis

Steps in data analysis were: 1) descriptive statistics including frequency, means, percentages, standard deviations, and ranges for the scores for each variable, to describe the characteristic of the sample, and examine the distri-

bution of the demographic and other major variables; 2) a Causal Model was tested for the normal distribution of data by using PRELIS, then computed to estimate the parameters of the hypothesized causal model for the variables and tested procedures in the LISREL program (Joreskog and Sorbom, 1993).

RESULTS

Demographic characteristics of the sample

The ages of the majority of the subjects were 41-50 years (40.0%) and 51-60 years (27.5%). The mean age was 51.19 year (SD =10.36). The majority of the marital statuses were couples (73.1%) and the major religion was Buddhism (96.3%). More than half the subjects (59.6%) had a primary education, while 12.3% had a secondary school education. In terms of occupation, the majority of the subjects were employees (29.5%) or housekeepers (25.6%). In terms of families' incomes the majority had lower than 5,000 baht per month (35.6%). Next were those having insufficient income and having loan (37.7%), while 34.6% had sufficient incomes but did not have any savings. Nearly half of the subjects (49.8%) had second stage cervical cancer, and 28.3% had third stage cervical cancer (Table 1).

Model testing and modification

The hypothesized causal model was tested with a structural equation modeling (SEM) using the LISREL 8.52 program. It had normal distribution considering skewness, the kurtosis and the chi-square test. From the multicollinearity assessment the tolerance of the predictor variables ranged from 0.16775 to 0.89453 indicating the low multicollinearity problem (Norusis, 1995) and VIF ranged from 1.0876 to 5.9564, indicating low evidence of multicollinearity (Steven, 1996). In Table 2, the correlation was calculated and used to analyze the linear relationships among the study variables. The results show that the correlation coefficients among the predictors ranged from -0.32 to 0.43, indicating low multicollinearity.

Effects of predictor variables on endogenous variables

The modified model was performed to fit

Table 1
Demographic characteristics of the sample
(n= 488).

Variable	Number	Percentage
Age (years)		
< 30	3	0.6
31-40	61	12.5
41-50	195	40.0
51-60	134	27.5
> 60	95	19.5
Family status		
Single	11	2.2
Couples	357	73.1
Widowed/Divorced/Separated	120	24.6
Region		
Buddhist	470	96.3
Christian	8	1.6
Muslim	10	2.0
Education		
No formal education	46	9.4
Primary school (grade 1-6)	291	59.6
Secondary school (grade 7-12)	60	12.3
Vocational school	39	8.0
Bachelor degree	43	8.8
Higher than bachelor degree	9	1.8
Occupation		
Housekeeper	125	25.6
Employee	144	29.5
Farmer	102	20.9
Government official	48	9.8
Entrepreneur	61	12.5
Other	8	1.6
Family income (baht/month)		
< 5,000	174	35.6
5,001-10,000	131	26.8
10,000-15,000	55	11.3
15,000-20,000	33	6.8
> 20,000	95	19.5
Family income status		
Sufficient with savings	69	14.1
Sufficient but no savings	169	34.6
Insufficient but no loans	66	13.5
Insufficient and had loans	184	37.7
Stage of CA		
First stage	85	17.4
Second stage	243	49.8
Third stage	138	28.3
Fourth stage	22	4.5

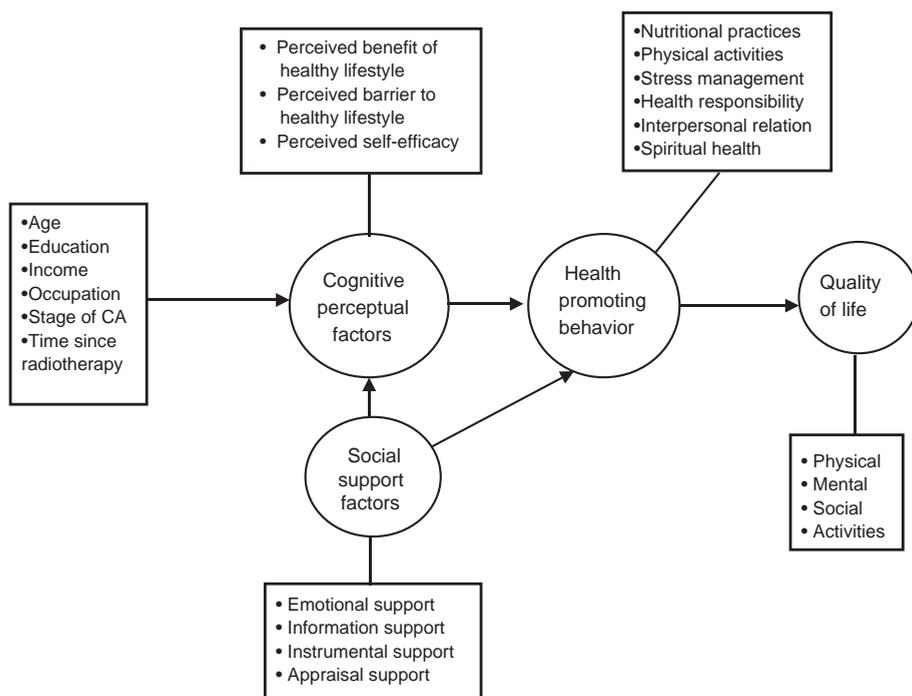


Fig 1–A structural equation model of health promoting behavior of cervical cancer patients.

Table 2
Correlation matrix of the variable in the model (n = 488).

Variable	1	2	3	4	5	6	7	8	9	10
1. Age	1.00									
2. Education	0.04	1.00								
3. Family income	-0.03	0.11	1.00							
4. Stage of CA	0.01	0.15	0.10	1.00						
5. Perceived benefit	-0.07	-0.02	0.38	-0.02 ^a	1.00					
6. Perceived barriers	0.03	0.19	0.02	-0.13 ^b	0.33 ^b	1.00				
7. Self-efficacy	-0.12	0.07 ^a	0.01 ^b	-0.22 ^c	0.38 ^b	-0.18 ^b	1.00			
8. Social support	-0.05	0.24 ^a	0.17 ^b	0.08 ^c	0.04 ^b	-0.27 ^c	0.34 ^b	1.00		
9. Health promotion	-0.02	0.08 ^a	0.21 ^a	-0.23 ^c	0.38 ^b	-0.20 ^c	0.43 ^b	0.57 ^c	1.00	
10. QOL	-0.01	0.14 ^a	0.25 ^b	-0.29 ^c	0.33 ^b	-0.32 ^c	0.56 ^b	0.24 ^c	0.19 ^c	1.00

^ap<0.05; ^bp<0.01; ^cp<0.001

the empirical data at $\chi^2=34.11$ (df=23), $p=0.64$, Goodness-of-Fit Index (GFI) =0.99, Adjusted Goodness-of-Fit Index (AGFI)=0.97, Root Mean Square Error of Approximation (RMSEA)=0.02. These results show that this model fits the data well. Sixty-three percent ($R^2=0.63$) of the total variance in the quality of life was explained by

age, education, family income, stage of cervical cancer, cognitive perceptual factors, social support and health promoting behavior. The results demonstrate that health promoting behavior had a significant direct positive effect on the quality of life ($\beta=0.71$, $p<0.01$). Cognitive perceptual factors had a significant direct effect on health

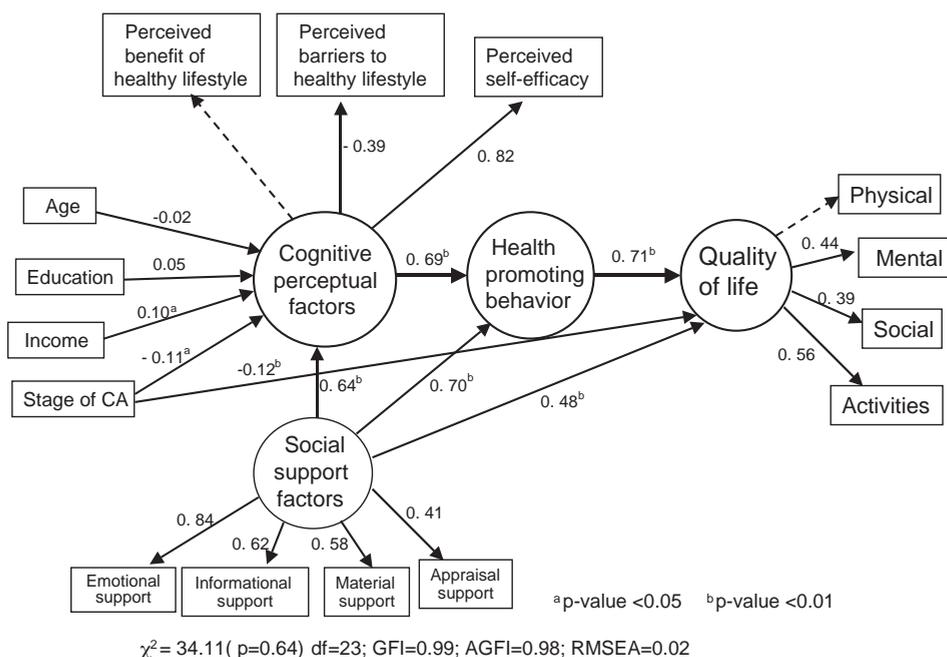


Fig 2—Model of health promotion and quality of life of cervical cancer patients.

promoting behaviors ($\beta = 0.69$, $p < 0.01$). Social support had a significant direct effect on cognitive perceptual factors ($\beta = 0.64$, $p < 0.01$), health promoting behavior ($\beta = 0.70$, $p < 0.01$), and the quality of life ($\beta = 0.48$, $p < 0.01$). Age and education did not have a significant total effect on the quality of life. Family income had a significant direct effect on cognitive perceptual factors ($\beta = 0.10$, $p < 0.05$). The stage of cancer had significant direct negative effect on cognitive perceptual factors ($\beta = -0.11$, $p < 0.05$) and the quality of life ($\beta = -0.12$, $p < 0.01$). The direct effect of the predictors on the quality of life indicated that cervical cancer patients with a higher practice of health promoting behavior tended to have a higher quality of life (Fig 2).

DISCUSSION

Health promoting is considered to be an important public health issue for the well being of people. This model was a combination of Pender's Health Promotion Model (Pender, 1996) and House's Social Support Concept (House, 1981). The findings indicated that the conceptual model of the health promotion model was

useful in explaining and predicting the quality of life of cervical cancer patients who received radiotherapy. The data in this study shows a significant path from individual characteristics to the cognitive perceptions of family income and stage of cervical cancer. Family income had a significant positive direct effect on cognitive perceptual factors ($\beta = 0.10$, $p < 0.05$), indicating cervical cancer patients who had enough income and were free of loans would have better health promoting behaviors and a better quality of life than those who had an insufficient income and a loan. One possible reason to explain this finding may be that patients who had enough income could support their health promoting behavior, while patients who had insufficient income would have neither the time nor money to spend on health promoting behavior. The stage of cervical cancer had a significant negative direct effect on cognitive perceptual factors ($\beta = -0.11$, $p < 0.05$) and the quality of life ($\beta = -0.12$, $p < 0.01$), indicating that cervical cancer patients with a lower stage of cancer would have better health promoting behavior and a better quality of life than those who had a high stage. Those with a lower stage of cervical cancer would have a better

prognosis than with a higher stage.

In this study, age and education did not directly affect cognitive perceptual factors. This is consistent with a previous study of gynecological cancer patients (Mishel and Braden, 1988), and post radiotherapy cervical cancer women (Santawaja, 2002). It may be that the majority of these subjects were in the same age group (67.5% at 41- 60 years) and level of education (59.6% with primary education).

Cognitive Perceptual Factors consisted of the perceived benefits of health promoting life-style, perceived barriers to health promoting life-styles and perceived self efficacy of health promoting life-styles. The results show that cognitive perceptual factors had a strong direct relationship with health promoting behavior. Perceived benefits act as a positive reinforcement to the behavior. When people realize the benefits, they tend to adopt new behaviors; people will learn to value the behavior through their experiences (Bandura, 1986). Perceived barriers consisted of perceptions concerning the unavailability, inconvenience, expense, difficulty or time consumption caused by the health promoting behavior (Pender, 1996). Self-efficacy described beliefs about the ability to perform certain health promoting behavior (Bandura, 1997).

Social support had a strong direct effect on cognitive perceptual factors, health promoting behavior and quality of life. The presence of social support may facilitate health promoting behavior. This result was the same as a study by Mulenkamp and Sayles (1968). They suggested that social support was a positive indicator of life-style. Those who perceived they had adequate social support maintained a more positive health practice than those with lower levels of social support. Social support has well known effects on physical health, mental well-being and health behavior.

Health promoting behavior had strong direct effect on the quality of life. Quality of life is a product of a healthy life-style. In this study, healthy life-style was selected as a health promoting behavior variable. The results reveal that cognitive perceptual factors and social support have a direct effect on health promoting behavior. Generally, as cervical cancer patients are

highly motivated to change their behavior to improve their quality of life, this is an excellent opportunity to assist cervical cancer patients in selecting healthy life-styles for themselves. If the patient has a positive change in life-style this can contribute to a good quality of life later.

Implications and recommendations

The causal model of health promoting behavior for undergoing radiotherapy in cervical cancer patients was tested and validated by this research; this model can contribute to knowledge development. This study revealed that many factors influence health promoting behavior. Thus, it should be considered in the point-wave-relation vision. Therefore, a causal relationship needs to be set up, with effects on the intervention and the system management in future policy formulation. An effective implementation of health promoting behavior may involve a number of health professionals working together as a team. Health professional teams should be responsible for caring for patients with chronic illnesses. They should coordinate with family members and other networks. Family support seems to be an important factor for helping patients improves their health behavior and construct social networks for cervical cancer patients that can enhance their health responsibility.

Health promotion is dynamic. Therefore, future studies should not be limited to static, longitudinal or prospective designs to explain behavioral patterns.

ACKNOWLEDGEMENTS

The authors are very grateful to the many people who assisted in the completion of this project. We thank the director and all of the radiotherapy clinic staff of Ramathibodi Hospital, Rajavithi Hospital, Lampang Cancer Center, Ubon Ratchathani Cancer Center, Lop Buri Cancer Center, Chon Buri Cancer Center, and Surat Thani Cancer Center for their excellent help.

REFERENCES

- Ardell DB. High Level Wellness: an alternative to doctors, drugs and disease. Ennaus, Pennsylvania:

- Rodale Press, 1977.
- Bandura A. Social foundation of thought and action: a social cognitive theory. New Jersey: Prentice-Hall, 1986.
- Bandura A. Self-efficacy the exercise of control. New York: WH Freeman and company, 1997.
- Cella DF. The Functional Assessment of Cancer Therapy (FACT) scale: development and validation of the general version. *J Clin Oncol* 1993; 11: 570-9.
- Chooprapawan C. Thai health status. Bangkok: Printed in the USA, 2000.
- House JS. Work stress and social support. Reading, MA: Addison-Wesley, 1981.
- IARC/WHO. Cancer research for cancer control. Geneva: World Health Organization, 1997.
- Joreskog KG, Sorbom D. LISREL 8: structural equation modeling with SIMPLIS command language. Chicago: Scientific Soft Ware International, 1993.
- McCauley C, Bremer BA. Subjective quality of life measures for evaluating medical intervention. *Evaluat Health Profess* 1991; 14: 371-87.
- Mahol SM, Casperson DM. Exploring the psychosocial meaning of recurrent cancer: a descriptive study. *Cancer Nurs* 1997; 20: 178-86.
- Mishel HM, Braden CJ. Uncertainty a mediator between support and adjustment. *Western Nurs Res* 1988; 9: 43-57.
- Muhelenkamp AF, Sayles JA. Self-esteem, social support, and positive health practices. *Nurs Res* 1968; 35: 334-8.
- National Cancer Institute. "Cancer of the cervix" Cancer Net. 12 Dec 2000. NIH Publication No. 95-2047. 3 Apr 2001. Available from: URL: http://cancer.net.nci.nih.gov/wyntk_pubs/cervix.htm#2.
- Norusis MJ. SPSS 6.1: Guide to data analysis. Englewood Cliffs: Prentice Hall, 1995.
- Pender NJ. Health promotion in nursing practice. 3rd ed. Norwalk: Appleton & Lenge, 1996.
- Ratanatharathorn V, Sirilertrakul S, Jirajarus M, et al. Quality of life, functional assessment of cancer therapy-general. *J Med Assoc Thai* 2001; 84: 1430-42.
- Santawaja C. A causal model of psychosocial adjustment in post radiotherapy cervical cancer women. Bangkok: Mahidol University, 2002: 130. PhD Thesis.
- Srisomboon J. Gynecologic oncology. Bangkok: P.B. Foreign Bookscenter, 1997.
- Steven J. Applied multivariate statistics for the social sciences. 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.
- Torrance GW. Utility approach to measuring health-related quality of life. *J Chron Dis* 1987; 40: 593-600.