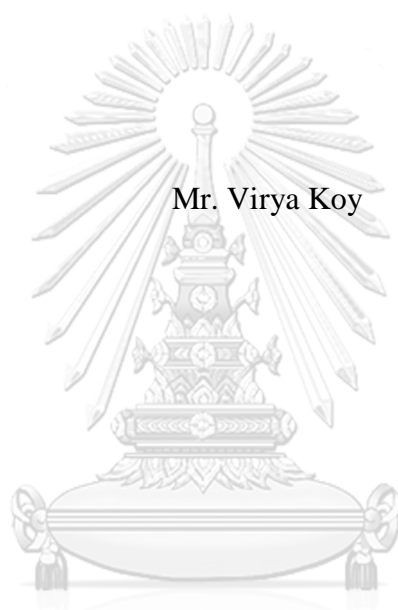


FACTORS INFLUENCING ON NURSING CARE QUALITY PERCEIVED BY  
PROFESSIONAL NURSES IN GOVERNMENT HOSPITALS,  
KINGDOM OF CAMBODIA



Mr. Virya Koy

จุฬาลงกรณ์มหาวิทยาลัย

บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)  
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ปัจจัยที่ส่งผลต่อคุณภาพการพยาบาลตามการรับรู้ของพยาบาลวิชาชีพ  
ในโรงพยาบาลรัฐ ราชอาณาจักรกัมพูชา



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต  
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งานวิจัยภาคตัดขวางเชิงพรรณนาเพื่อศึกษาแบบจำลองเชิงสาเหตุนี้ มีวัตถุประสงค์เพื่อศึกษา  
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ของโคเปนเฮเก้น แบบประเมินดัชนีชี้วัดความพึงพอใจในการปฏิบัติงานของพยาบาล และแบบประเมิน  
คุณภาพการพยาบาลตามการรับรู้ของพยาบาลราชอาณาจักรกัมพูชา

ผลการศึกษาพบว่า โมเดลสมมติฐานมีความสอดคล้องกับข้อมูลเชิงประจักษ์ สามารถอธิบาย  
ความผันแปรของคุณภาพการพยาบาลตามการรับรู้ของพยาบาลได้ร้อยละ 12 ( $\chi^2 = 266.78$ ,  $df = 187$ ,  
 $\chi^2/df = 1.42$ ,  $p\text{-value} = .001$ ,  $GFI = .94$ ,  $RMSEA = .034$ ,  $SRMR = .042$ , and  $CFI = .99$ ,  $AGFI = .92$ ,  $NFI = .96$ )

ผลของโมเดลสมการโครงสร้างพบว่า ความพึงพอใจในการปฏิบัติงานมีอิทธิพลทางตรงด้าน  
ลบ ต่อคุณภาพการพยาบาล ส่วนอัตรากำลังทางการพยาบาลมีอิทธิพลทางตรงด้านบวกต่อความพึงพอใจ  
ในการปฏิบัติงาน ( $r = -.26$ ,  $.22$ ,  $p < .05$  ตามลำดับ) อย่างไรก็ตาม สภาพแวดล้อมในการทำงาน  
พยาบาล ไม่มีอิทธิพลทางตรงต่อคุณภาพการพยาบาล ความเหนื่อยหน่ายในการทำงาน และความพึง  
พอใจในการปฏิบัติงาน ส่วนอัตรากำลังทางการพยาบาลไม่มีอิทธิพลต่อคุณภาพการพยาบาลและความ  
เหนื่อยหน่ายในการทำงาน

ผลการศึกษาชี้ให้เห็นว่า ความพึงพอใจในการปฏิบัติงานเป็นปัจจัยที่ส่งผลกระทบต่อ  
ลบต่อคุณภาพการพยาบาล และอัตรากำลังทางการพยาบาลเป็นปัจจัยที่ส่งผลกระทบต่อความพึง  
พอใจในการปฏิบัติงาน

สาขาวิชา พยาบาลศาสตร์

ปีการศึกษา 2560

ลายมือชื่อนิสิต .....

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KEYWORDS: NURSE WORK ENVIRONMENT / NURSE STAFFING / NURSE WORK SATISFACTION / NURSE BURNOUT / NURSING CARE QUALITY

VIRYA KOY: FACTORS INFLUENCING ON NURSING CARE QUALITY PERCEIVED BY PROFESSIONAL NURSES IN GOVERNMENT HOSPITALS, KINGDOM OF CAMBODIA. ADVISOR: ASSOC. PROF. JINTANA YUNIBHAND, Ph.D., CO-ADVISOR: ASSOC. PROF. POL. CAPT. YUPIN AUNGSUROCH, Ph.D., 243 pp.

This descriptive cross-sectional research design for causal modeling aimed to examine factors influencing on nursing care quality in government hospitals, Cambodia. The conceptual framework were modified from the Nurse Work Environment, Nurse Staffing, and Outcome Model and empirical studies. A multi-stage sampling was used for data collection, which conducted from October 2016 to April 2017. Three hundred and seventy five RNs represented twelve tertiary general hospitals were invited for the study. All of participants completed five questionnaires, including demographic data and nurse staffing, nurse practice environment, nursing work index, Copenhagen burnout inventory, Index work satisfaction, and Cambodian nursing care quality scale.

The results specified that the hypothesis model fit the empirical data and explained 12% of the variance about nursing care quality ( $\chi^2 = 266.78$ ,  $df = 187$ ,  $\chi^2/df = 1.42$ ,  $p\text{-value} = .001$ ,  $GFI = .94$ ,  $RMSEA = .034$ ,  $SRMR = .042$ , and  $CFI = .99$ ,  $AGFI = .92$ ,  $NFI = .96$ ).

The structural equation modeling resulted nurse work satisfaction had negative directly affected nursing care quality, nurse staffing had positive directly affected on nurse work satisfaction ( $r = -.26$  and  $.22$ ,  $p < .05$  respectively). However, nurse practice environment had no affected nursing care quality, burnout, and nurse work satisfaction. In addition, nurse staffing had no affected on nursing care quality and burnout.

The results indicated that the nurse work satisfaction was negatively impacted on nursing care quality, and nurse staffing was positively impacted on nurse work satisfaction.

Field of Study: Nursing Science

Academic Year: 2017

Student's Signature .....

Advisor's Signature .....

Co-Advisor's Signature .....

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## CONTENTS

	Page
THAI ABSTRACT .....	iv
ENGLISH ABSTRACT.....	v
ACKNOWLEDGEMENTS .....	vi
CONTENTS.....	vii
LIST OF TABLES .....	ix
LIST OF FIGURES .....	xii
CHAPTER I INTRODUCTION.....	1
1. Background and significance of the study.....	1
2. Research questions.....	6
3. Objectives of the study .....	7
4. Research Hypothesizes with rationale .....	7
5. Scope of the study:.....	10
6. Operational definition of concepts.....	11
7. Expected benefits .....	14
CHAPTER II LITERATURE REVIEW .....	15
1. Nursing care quality in globe.....	15
2. Cambodian healthcare system and professional nurses.....	17
3. Current nursing care quality in Cambodia.....	17
4. Nursing care quality perceived by professional nurses .....	19
5. Factors related to nursing care quality .....	36
6. Policy to promote nursing care quality .....	59
7. Structure equation modeling for analysis .....	61
CHAPTER III METHODOLOGY .....	66
1. Research design .....	66
2. Population and sample .....	66
3. Instrumentation .....	69
4. Instrument summary .....	108
5. Protection of the rights of human subjects .....	109

	Page
6. Data Collection .....	110
7. Data Analysis .....	112
CHAPTER IV RESULTS .....	114
Part I: Descriptive statistics of variables .....	114
Part II Structural Equation Modeling Analysis .....	118
Part III: Findings of Research Questions and Hypothesis Testing .....	121
CHAPTER V DISCUSSION .....	142
1. Summary .....	142
2. Discussion .....	144
2. Limitation .....	160
3. Implication for Nursing .....	161
4. Conclusion .....	165
5. Recommendations for Future Research .....	166
REFERENCES .....	168
APPENDICES .....	184
Appendix A Approval Dissertation Proposal .....	185
Appendix B Approval of Ethical Review Committee .....	187
Appendix C List of Experts .....	189
Appendix D Participant Consent Form.....	191
Appendix E Research Instruments.....	195
Appendix F Permission from previous authors to use instruments .....	205
Appendix G Assumptions of path analysis.....	208
Appendix H Measurement model of the study variables.....	211
Appendix I Measurement Model of Study's Variables .....	216
Appendix J LISREL printout for model testing of the structural equation model	223
VITA .....	243



## LIST OF TABLES

	Page
Table 1 Measure and threshold .....	65
Table 2 demographic data of tryout (n = 29) .....	77
Table 3 Statistical summary of Tryout (Mean, SD, Item-total correlation, and Chronbatch's Alpha (n = 29)).....	78
Table 4 Levels of Interpretation of NCQ.....	78
Table 5 KMO and Bartlett's test results .....	82
Table 6 Description 34-item of CNCQS After EFA (n=225).....	83
Table 7 Goodness of Fit Statistics of Cambodia Nursing Care Quality Scale (CNCQS) Measurement Model (n = 375).....	85
Table 8 Factor Loading of Cambodian Nursing Care Quality Scale (CNCQS) (n=375) .....	86
Table 9 Goodness of Fit Statistics of Index of Work Satisfaction-Cambodian version Measurement Model (n = 375) .....	92
Table 10 Standardized Factor Loading of Index Work Satisfaction-Cambodian Version (n=457) .....	93
Table 11 Number of Items, S-CVI, I-CVI, and Reliability of Index Work Satisfaction (n=457) .....	96
Table 12 Goodness of Fit Statistics of Practice Environment Scale of Nursing Work Index-Cambodian version Measurement Model (n = 475) .....	97
Table 13 Factor loading and construct validity of Practice Environment Scale of the Nursing Work Index – Cambodian version (n = 457).....	98
Table 14 Number of Items, S-CVI, I-CVI, and Reliability of PES-NWI-Cambodian Version (n=457).....	102

	Page
Table 15 Goodness of Fit Statistics of Copenhagen Inventory Index-Cambodian version Measurement Model (n = 475) .....	104
Table 16 Factor loading and construct validity of Copenhagen Inventory Burnout – Cambodian version (n = 457).....	105
Table 17 Number of Items, S-CVI, I-CVI, and Reliability of CBI-Cambodian Version (n=457) .....	107
Table 18 Summary of Instruments' Reliability and Validity .....	110
Table 19 Demographic Characteristics of Participants (375) .....	115
Table 20 Description of Study Variables and Observed Variables (n=375) .....	117
Table 21 Assessment for Multicollinearity among the Study Variables (n=375) .....	120
Table 22 Description the frequency, percentages, Mean, and SD of Nurse-Patients Ratio (n=375) .....	121
Table 23 Dimensions' Description of CNCQS (n=375) .....	122
Table 24 Dimensions' Description of PES-NWI (n=375) .....	124
Table 25 Dimensions' Description of IWS (n=375) .....	124
Table 26 Dimensions' Description of Nurse Burnout (n=375) .....	125
Table 27 Observable Variables Pearson Correlation, Mean, SD (n=375).....	126
Table 28 Statistical Overall Fitted Index values of measurement models (n = 375).	127
Table 29 Loading and reliability of indicators.....	128
Table 30 Goodness of Fit Measures for Overall Model (n=375) .....	130
Table 31 Factor Loading of All Observable Variables (n=375).....	134
Table 32 Standard Path Coefficients, Standard error (SE), and T-Values (n=375)..	136
Table 33 Summary Total Direct, Indirect Effects of Causal Variables on Affected Variables (n=375).....	137
Table 34 Summary of Hypotheses Testing Results .....	140

	Page
Table 35 Minimum Nurse Staffing Levels RNs .....	163
Table 36 Test of Univariate Normality and Multivariate Normality of the observed variables (N = 375).....	210



## LIST OF FIGURES

	Page
Figure 1 Theoretical Substruction Diagram.....	23
Figure 2 Nurse Work Environment, Nurse Staffing, and Outcomes Model: A Conceptual Model Permitted by Aiken (2002) .....	35
Figure 3 Multi-stage random sampling procedure for main study: sample size = 396 .....	70
Figure 4 Measurement Model of Cambodian Nursing Care Quality Scale (CNCQS) Cambodian Version .....	88
Figure 5 Measurement Model of Index Work Satisfaction-Cambodian Version .....	95
Figure 6 Measurement Model of PES-NWI-Cambodian Version .....	101
Figure 7 Measurement Model of CBI-Cambodian Version .....	106
Figure 8 The proposed model of NCQ among registered nurses in governmental hospitals.....	131
Figure 9 The modified model of NCQ among registered nurses in governmental hospitals.....	132
Figure 10 the measurement model of CNCQS as initial output .....	217
Figure 11 the measurement model of CNCQS, revised model.....	218
Figure 12 the measurement model of IWS-Cambodian Version: revised model .....	219
Figure 13 the measurement model of PES-NWI-Cambodian version: revised model .....	220
Figure 14 the measurement model of CBI: initial model .....	221
Figure 15 the measurement model of CBI: revised model .....	222

# CHAPTER I

## INTRODUCTION

### 1. Background and significance of the study

Healthcare institutions across the globe are confronted to achieve nurse workforce stability, safety, and nursing care quality (NCQ). Assessing NCQ should not carry out without consideration of registered nurses (RNs) are the major healthcare suppliers who are accountable for the delivery of nursing care and responsible for the NCQ during patients' hospitalization (Kos, Dziewa, Ksykiewicz-Dorota, Drop, & Kos, 2016). Because RNs spend 24 hours over 24 hours with patients, which may have a major impact on patient outcomes (Kieft, de Brouwer, Francke, & Delnoij, 2014).

In clinical sites, although some NCQ indicators were used to report the patient falls, and/or nosocomial infection (Chitpakdee, Kunaviktikul, Srisuphan, & Akkadechanunt, 2008), which was not able to reflect the completed constructs of NCQ. These indicators were also considered as the consequences of NCQ (Lucero, Lake, & Aiken, 2009; MacDavitt, 2008; Sochalski, 2001).

Specifically, there are many perspectives that concerned NCQ such patients, nurse administrators, and registered nurses (RN). Based on patients' perceptions of NCQ has limitation of consciousness their outcomes and they do not perceive on nursing background (Bassett, 2015; Istomina, Razbadauskas, & Martinkėnas, 2014). Meanwhile, nursing administrators were often favoring a focus on the organizational efficiency and cost-effectiveness. Contrary, the perceptions of RNs were essential to guide quality improvement because they were with patients all days. RNs make the significant influence by assessing, planning, and evaluating patient needs, providing treatments, advocating patients, and guaranteeing patients comfort (Burhans & Alligood, 2010; Cline, Rosenberg, Kovner, & Brewer, 2011).

Another study defined NCQ as the degree of which nurses have concerned the care provided to patients included physical environment, staff characteristics, and requirement for care, task-oriented activities, human-oriented activities, and progress of nursing process. In particular, the assessment of NCQ perceives by RNs critically

are significant in order to recuperate patient outcomes and safety (Leinonen, Leino-Kilpi, Ståhlberg, & Lertola, 2003). When RNs reported high NCQ it meant that the negative patient outcomes were reduced. For examples, adverse event was significant negative predictor of NCQ (Mallidou, Cummings, Estabrooks, & Giovannetti, 2011). Another indicator negatively influencing NCQ was surgical patients' failure to rescue. Lastly, mortality and shorten the length of stay were negatively impacted on NCQ (Lucero et al., 2009; McHugh & Stimpfel, 2012).

However, there were numerous problems happened in Cambodia related to NCQ among Cambodian government RNs. Cambodian Council of Nurses (CCN) (2015) found that 1250 RNs who were given direct nursing care at provincial hospitals reported that 35% were poor NCQ. This figure was higher than other developing and developed countries, for examples China was discovered only as poor or fair 29% of NCQ (L.-m. You et al., 2013). Thailand was informed only 19% as poor or fair NCQ. Furthermore, some developed countries had lower, for examples, Germany, USA, UK, and New Zealand as poor or fair. These nations described that RNs accounted for 20%, 13.1%, 14%, and 12%, respectively (Aiken, Clarke, Sloane, Lake, & Cheney, 2008).

RNs have scope of practice nursing practice, which indicated as followings the (1) care as cares which are provided by own decision, (2) cares which are provided physician's prescription, (3) cares which are provided as assistance, (4) specialist care, and (5) emergency care (MoH, 2003). The other researchers have informed the actual problems, which was associated to NCQ in Cambodia, for examples, Cambodian Council of Nurses (CCN) (2015) showed that nurses had poor clean environment, which was concerned on the comfort and safe to patients. Bureau of Nursing and Midwifery (BNM) (2016) performed two focused groups of 25 nursing directors around Cambodia showed that currently RNs concern about patient satisfaction. In addition, they delivered less compassionate care to patients, respect or empathetic, which meet patients' demands. A survey reported that 52% of RNs did explain least clear information to patients, which nursing care provided. In addition, they followed medical doctors' direction rather to have own decision on implement nursing process, it was also reported that 95% of RNs have been employed in different settings such primary, secondary, and tertiary general hospitals would not

apply nursing process or inappropriate apply in their workplaces, which the total care was much worried by patients (BNM, 2016). Furthermore, the physical environment was poor around patients' units and nursing station. Moreover, the moral commitment to patient was concerned by society and reported via many medias. Furthermore, there were lack of in-service trainings as profession commitment, which led to upgrade their new knowledge and skills to meet patients' demands (BNM, 2016). As apart of these issues, there have been concerned on emotional and information supportive care, which many patients made complaints while they have admitted with lack of the patients' information as they expected.

As far as NCQ is warning sign to nurse administrators. While low NCQ would lead to loss confidence and credibility and reputation of healthcare facilities, loss of interest and job gratification among the nurse staff, and increased health expenses and lawsuit demands (WHO, 2006). It can turn harmfully affect on people health in terms of morbidity, mortality, and hospital length of stay, which could be resulted financially losses for hospitals, families, and impact on country economic, for example, cost of care for treating pneumonia raised totally by \$22,390- \$28,505, length of stay increased 5.1-5.4 days, probability of death rose 4.67-5.5 percent, pressure ulcers, and another category of adverse event are about \$8.5 billion per year (Bailey, Davis, Levy, Molinari, & Johnson, 2016).

There were many studies in other nations to focus on NCQ. For examples (Aiken et al., 2001) conducted about hospital nurse staffing and mortality of patient, nursing burnout, and work satisfaction (Leinonen et al., 2003), which was measured by Good Perioperative; a study looked at NCQ perceived by nurses and patients in China (S. H. Zhao, Akkadechanunt, & Xue, 2009), another group (Aiken et al., 2008) focused on effects of environmental hospital care on mortality and nursing outcomes (Aiken et al., 2014) investigated on nurse staffing, NCQ, and nursing outcomes in intensive care units (Burhans & Alligood, 2010) indicated about NCQ in the words of nurses. A group of Thai researchers (Apiradee Nantsupawat et al., 2011) shown about NCQ in Thailand; (C. Duffield et al., 2011) presented nurse staffing, nurse workload, work environment and patients outcomes; and worked on perceptions of nurses on patient adverse events depend on nursing workload (Kang, Kim, & Lee, 2014). However, in Cambodia till today, there are no articles or researches, which deal with

the factors influencing on NCQ whether there is any differences from the earlier researches. There is not unknown about NCQ and influencing factors on NCQ yet. This present study is a first challenge to understand NCQ and assess the factors influencing on NCQ as perceived by RNs at government hospitals. From the casual model, if the most significant predictors and factors relationships can be confirmed by exploiting a structural equation model (SEM) whether any factors would mostly influence directly or indirectly in negative or positive way on NCQ at government hospitals. Hence, to fulfill this gap of knowledge, this study is aimed at conducting a causal model to explain the associations among influencing factors on NCQ, which RNs perceived their activities of nursing care provided to patients.

The literature review found that commonly used Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM) (Aiken, Clarke, & Sloane, 2002). NWE-NS-OM (Aiken, 2002) was very well known around the world. Over a couple of dozen years, this model was well tested. As we have known interesting variables such nurse staffing, nurse practice environment, nurse work satisfaction, and nurse burnout have been reported because those variables looked most likely the same situation. However, Cambodian context has particular situation, where international nursing community does not have the same issues, for example, nurse staffing refers to 24-hour shift, which was about 60 hours per week, and high nurse-to-patient ratio was varied from 15 to 25 patients. Furthermore, nurse practice environment was lack of resource adequacy because 97% were associate degrees that were given directly nursing care. In management level was lack of nurse leaders both nursing education and nursing services because of there have been occupied by medical doctors at almost all administrative levels. Similar to previous study reported that nurses had more better work environment and littler concerns with care quality, and patients had significantly lower risks of death and failure to rescue in hospitals (S. E. Lee & Scott, 2016).

As apart from these issues, nurse work satisfaction was unfavorably by RNs, nursing autonomy was control by other health professions, which RNs practice as followers or follow medical suggestions. The last issue was nurse burnout, which was much different from other countries because Cambodian nurses work for 24 hours



longer shift, which was driven RNs to leave some nursing care activities left undone during the shift.

NWE-NS-OM's was the best fitted for this study, as the reason it explained mainly that nurse staffing and nurse practice environment can significantly affect outcomes, which could be answered all hypotheses underpinning of this model. Furthermore, NCQ as patient outcomes was aligned well with this theoretical framework. The main concepts were hospitals: policies/priorities, Registered Nurse to patient ratio, nurse work environment, nursing outcomes, and patient outcomes, which is the concept of interest of this study. The author stated that the hospitals, registered nurse, nurse practice environment influenced on nursing outcome, which led to affect patient outcomes. Nursing outcomes can be recognized as nurses' reactions to their work (Hinno, Partanen, & Vehviläinen-Julkunen, 2012). A study stated that hospital factors include nurse staffing and work environment (Aiken, 2002). Outcomes for nurses are burnout and nurse work satisfaction. For factors like patient to nurse ratios to impact nurse or patient outcomes, they must change some aspects of care, which is called process of care that is what nurses actually do. Therefore, this theoretical framework guide this study are followings (1) RN (patient ratio), (2) nurse practice environment (nurse practice environment), (3) nurse outcomes (burnout & nurse and work satisfaction), and (4) patient outcome (NCQ). However, the hospital factor (hospital types) was not fitted to this study because, researcher could not find any studies focused on the relationship between hospital types and other variables. The hypotheses of causal model should be established based on the original theory, which were popular amount researchers who were interest in nursing care quality to explain how predicating factors influencing NCQ in Cambodia. This causal technique would have more powerful opportunities to advance scientific knowledge of NCQ at government hospital.

First, nurse staffing was affecting on NCQ was the nurse-to-patient ratio because each patient to nurses may have work-loaded, which was related with an increase of 1.04 times in the odds of nurses recording that the NCQ on their unit was only fair or poor. It was an indicator to evaluate nurse staffing (Apiradee Nantsupawat, 2010). The literature review supported that the nurses staffing was significantly negatively influenced by the NCQ (Cho et al., 2015; L.-m. You et al.,

2013). Because there is a mounting research literature linking nurse-to-patient ratios with variation in outcomes of patients (Aiken, 2002).

Second, nurse practice environment is positive significantly predictor of NCQ (Virya Koy, Yunibhand, Angsuroch, & Fisher, 2017). Nurse practice environment has also been discovered positively influenced nurse work satisfaction (Ioannou et al., 2015; Liu et al., 2012); and negatively influenced nursing burnout (Liu et al., 2012; Rochefort & Clarke, 2010).

Third, nurses' work satisfaction was the positive predictor of NCQ (MacDavitt, 2008; Stalpers, Van Der Linden, Kaljouw, & Schuurmans, 2017). Moreover, nurse work satisfaction has been found to negatively impact nurse burnout (Khamisa, Oldenburg, Peltzer, & Ilic, 2015; Rosales, Labrague, & Rosales, 2013).

Fourth, nurse burnout, which were feelings of emotional fatigue, depersonalization, and reduced personal accomplishment, can happen among individuals who do people work (Maslachi, Jackson, & Leiter, 1996). It was importantly negative predictors of NCQ (Van Bogaert et al., 2017).

Thus, it is significant to establish a causal model about factors that influence on NCQ in order to provide better understanding of both direct and indirect influencing factors based on the Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM) framework in government hospitals in Cambodia. While the reasons of selecting government hospitals were the problems occurred than privates sectors.

## **2. Research questions**

(1) What are the levels of nurse practice environment, nurse work satisfaction, nurse burnout, and NCQ at government hospitals as perceived by RNs?

(2) What are the relationships among nurse practice environment, nurse work satisfaction, nurse staffing, and nurse burnout on nursing care quality as perceived by professional nurses in government hospital?

### 3. Objectives of the study

1. To explore the levels of nurse work environment, nurse work satisfaction, nurse burnout, and NCQ at government hospitals as perceived by RNs.

2. To examine how nurse practice environment, nurse work satisfaction, nurse staffing, and nurse burnout influence on NCQ as perceived by professional nurses at government hospitals in Cambodia, the research hypotheses are as followings:

### 4. Research Hypothesizes with rationale

The study is intended to advance the understanding of the reasons what are the factors influence on nursing care quality perceived by individual professional nurses in government hospitals, Cambodia.

In previous studies found support for a model where nurse practice environment dimensions predicted work satisfaction, and nurse-assessed quality of care (in the unit, the previous shift, and in the hospital) through burnout dimensions (Van Bogaert, Kowalski, Weeks, & Clarke, 2013).

1. When RNs work in good environment, they feel cheerier and with fewer burnout (Zhang et al., 2014). RNs would also accomplish higher score of their perceptions of NCQ, therefore, they work at the place that inspires to deliver good nursing care (J. You et al., 2013). The model of NWE-NS-OM also supports that good nurse practice environment can increase nurse work satisfaction and perceptions of NCQ and decrease nurse burnout.

Moreover, when nurses have those positive thoughts will further influence on their performance. Thus, they measure higher score for their nursing care service (MacDavitt, 2008); (Aiken, 2002). Therefore, these ideas were answered by hypothesis 1.

**Hypothesis 1:** Nursing practice environment has positive directly relationship on nurse work satisfaction and NCQ, it has negative direct effect on nurse burnout; and it has negative indirectly relationship on NCQ through burnout. Nurse practice environment has positively indirect on NCQ through nurse work satisfaction.

2. There was empirical evidence from previous studies found that nurse staffing were negatively correlated with nursing care quality (Aiken et al., 2008; J. E. Ball et al., 2016; Olds & Clarke, 2010; Patrician, Shang, & Lake, 2010; Penoyer,

2010; Van Bogaert, Clarke, Vermeyen, Meulemans, & Van de Heyning, 2009). In addition, nurse staffing was negatively related with NCQ through nursing burnout (Aiken et al., 2008); (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002) and nurses in hospitals with lower nursing staff were higher in reporting nursing care quality as fair or poor (Aiken et al., 2008; Sochalski, 2004; Spilsbury, Hewitt, Stirk, & Bowman, 2011); nurse staffing is associated with better quality or outcomes (Spilsbury et al., 2011).

When the amount of patients admitted to a hospital increased, and there were not enough RNs, therefore, one RN should assume more workload. Therefore, the higher numbers of patient to nurse ratio can make RNs feel more fatigue, and least satisfied with their work (Aiken et al., 2012); (Hyer et al., 2011). In addition, the higher numbers of patient to nurse ratio can also make RNs provide lower quality of nursing services to the patients, because RNs would not have enough time to accomplish their services (Bae & Fabry, 2014). These explanations were also supported by (Aiken, 2002) NWE-NS-OM that lower numbers of patients to nurse ratio can be significantly increased nurse work satisfaction, and reduced nurse burnout. In addition, when RNs have the negative psychological response from higher workload, those negative emotions would further effect their performance, so they would be lower score for their nursing service (MacDavitt, 2008). There higher patient-nurse ratios was significantly associated with an increased risk of burnout amongst nurses (Hanrahan, Aiken, McClaine, & Hanlon, 2010). In European countries conducted a cross sectional survey found that burnout were highly associated with an increased patient-nurse ratio (Lu, Ruan, Xing, & Hu, 2015). When numbers of assigned patients were decreased, it was significantly related with a low level of nursing burnout (Akman, Ozturk, Bektas, Ayar, & Armstrong, 2016). This descriptive explanation was answered by hypothesis 2.

**Hypothesis 2:** Nurse staffing has negative direct relationship on nurse work satisfaction, positive direct effect on nurse burnout, and negative direct effect on NCQ, and it has negative indirect relationship on NCQ through burnout.

**3.** When RNs described satisfaction as how she or he feels about one's job (Cowin, Johnson, Craven, & Marsh, 2008; Virya Koy, Yunibhand, & Angsuroch, 2015). Nurse work satisfaction was viewed as a pleasant or positive emotion, which

was stated as resulting from the appraisal of job or job experience (Coomber & Barriball, 2007). Therefore, it could be presumed that when nurse feel displeas in their job, it could be related to nurses' rating high NCQ.

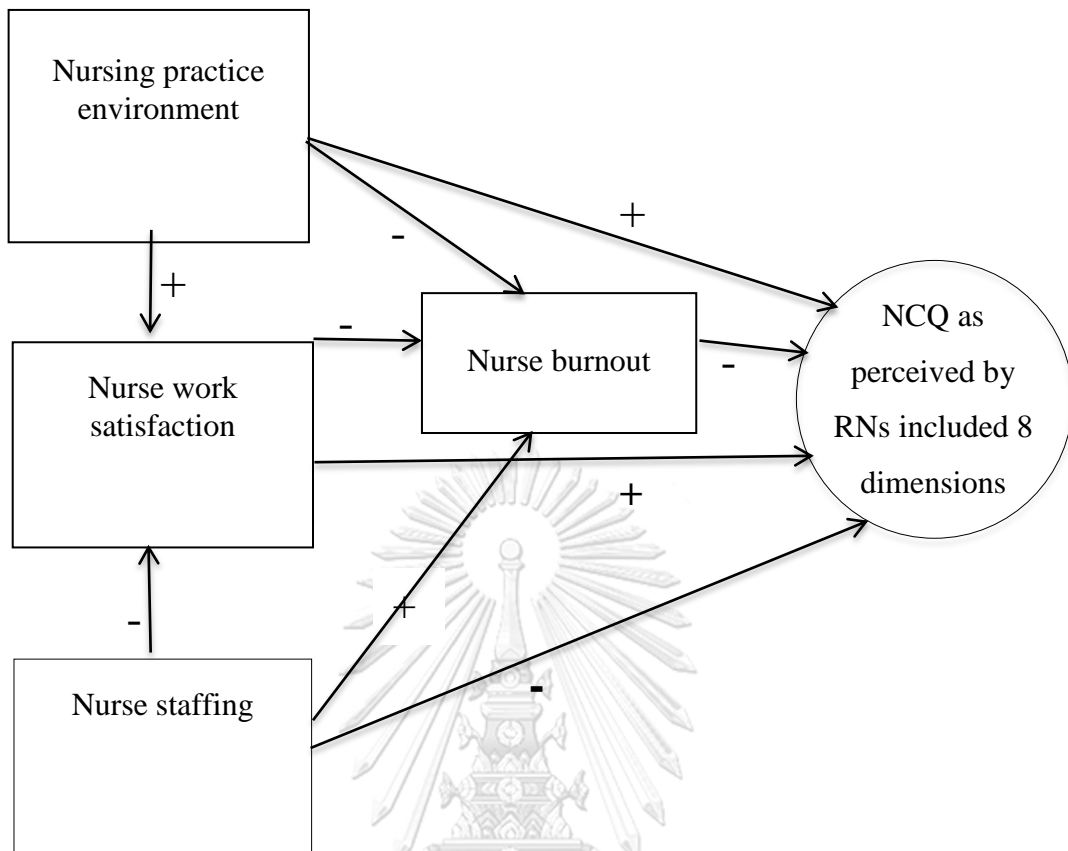
Furthermore, the high level of nurse work satisfaction, and a decreased number of assigned patients were significantly associated with a low level of burnout (Akman et al., 2016; Myhren, Ekeberg, & Stokland, 2013). In addition, when RNs were more pleased with their work, they would provide good care to the patient. Thus the NCQ would be increased as well (Aiken et al., 2012). Moreover, it was logical to assume that when RNs were satisfied with their jobs, the decrease of nurse burnout would further impact their performance, which they provide nursing services.

**Hypothesis 3:** Nurse work satisfaction has positive direct relationship on NCQ, and it has negative indirect relationship on NCQ through burnout.

4. When nurses experienced higher level of burnout in their workplace, they would increasingly think frustrated work (Zhang et al., 2014). In addition, when nurses experienced more burnout, it would influence their performance, which led to low quality. So they would further assess lower score for their nursing service (Estryn-Béhar et al., 2007; Apiradee Nantsupawat, Nantsupawat, Kunaviktikul, Turale, & Poghosyan, 2016). Previous studies demonstrate that nurse burnout has negative consequences not only for patient care and safety (Teng, Shyu, Chiou, Fan, & Lam, 2010; J. You et al., 2013), but can also be reduced quality of services (Borritz et al., 2006). On the other hand, reducing nurse burnout has been found to have a positive impact on patient care, such as reducing patient infections by 30% (Cimiotti, Aiken, Sloane, & Wu, 2012).

Although RNs, who have experience high level of burnout may show less ability or willingness to deliver high NCQ. It is also possible that work environment where NCQ was low may lead to emotional distress and disconnection. Nurse burnout has negatively effect on NCQ (Poghosyan, Clarke, Finlayson, & Aiken, 2010; Van Bogaert et al., 2017). This could be considered as hypothesis 4.

**Hypothesis 4:** Burnout has negative direct relationship on NCQ (*Figure 1*).



**Figure 1** Hypothesized Model of Factors Influencing on Nursing Care Quality

### 5. Scope of the study:

The populations of this study will carry out among professional nurses both diploma and bachelor of science in nursing who work in primary, secondary, and tertiary in all areas of Cambodia (Kampoung Cham, Battambang, Stung Treng, Kampot, and Phnom Penh regions). Those samples use selected based on the criteria and Multi-stage random sampling procedure. The purpose of this study is to investigate a model of predicting factors influencing on the dependent variable of NCQ at government hospitals in Cambodia. The potential factors are nurse work environment, nurse work satisfaction, nurse staffing, and burnout, which are independent variables.

## 6. Operational definition of concepts

1. **Nursing care quality** refers to the degree to which an activity fulfills moral commitment, professional commitment, total care, environment management, quality-safety conscious care, emotional supportive care, information supportive care, and patient satisfaction as perceived by Cambodian RNs based on the nursing standards of practice they provide with their expectation to meet patients' needs.

**1.1 Moral commitment** refers to the concern about politeness, kindness, protects patient's right, participating in solving moral issues as perceived by professional nurses about the degree of excellence on providing a clean ward environment to meet patients' needs.

**1.2 Professional commitment** refers to appropriate to the professional competence as perceived by professional nurses about the degree to which professional development, individual nurses concern and to provide nursing services to meet patients' needs.

**1.3 Environmental management** refers to the concern about room cleanliness, good ventilation, and quiet as perceived by professional nurses on providing a clean ward environment to meet patients' needs.

**1.4 Quality-safety conscious care** refers to the concern about patient safety, patient comfort, good basic nursing care, appropriate treatment, protect physical injury, and practice with caring behaviors, which provided to meet patients' needs.

**1.5 Total care** refers to the concern of physical, mental, social, and spiritual as perceived by professional nurses about the degree, which they provided good basic nursing care, holistic, reduce patient anxiety, and release patient' worry about illness to meet patients' needs.

**1.6 Emotional supportive care** refers to the helping process by doing patient happy with teaching, information given, and provides enough time for patients as needed to meet patients' needs.

**1.7 Information supportive care** refers to the knowledge and information explained clearly to patients as perceived by professional nurses in provision nursing care to meet patients' needs.

**1.8 Patient satisfaction** refers to patient happiness with nursing services provided as perceived by professional nurses in provision of nursing to meet patients' needs.

**2. Nursing practice environment** refers to organizational characteristics at the work settings to control over the provision of nursing care that perceived by individual RNs. The domains under this concept is following definition:

**2.1 Nurse participation in hospital affairs** refers to an organizational characteristic that inspires professional nurses to contribute in policy-making, contribution of hospital governance, and participating to nursing committees in the hospitals.

**2.2 Nursing foundations for the quality of care** refers to an organizational characteristic that inspires the nursing principles for a high level of standard of patient care, including a persistent nursing philosophy, a nursing model rather than a medical model of care, and RNs have clinical competence standard of nursing care in the nursing work settings.

**2.3 Nurse manager ability, leadership, and support of nurses** refers to an organizational characteristic that concentrate on the critical role of the nurse administrators, key qualities of the nurse administrators, and the ways that the Cambodian nurse administrators supported Cambodian professional nurses' nursing services in their work settings.

**2.4 Adequacy of staffing and resources adequacy** refers to an organizational characteristic that has enough Cambodian nurses and supported resources to deliver NCQ in their work settings.

**2.5 Collegial nurse-physician relations** refer to an organizational characteristic that is categorized by the equality of working relationship between Cambodian nurses and medical doctors in the work settings.

It would be assess by the Practice Environment Scale of the Nursing Work Index PES-NWI scale, which was developed by Lake (Lake, 2002).

**3. Nurse staffing** refers to individual nurses report numbers of patients per nurse in last shift. The individual RNs report the number of patients assigned to individual nurse. The level of nurse staffing would analyze with a continuous



measurement. The predictive validity of using nurse reports assessed staffing levels, which was shown previously (Aiken, Clarke, & Sloane, 2002).

**4. Nurse work Satisfaction** refers to appraisal of the degree to which the work fulfills their own work values on certain dimensions of the career as perceived by individual professional nurses, which was included of autonomy, pay, task requirements, organizational policies, interaction, and professional status. This can be assessed by the Index of Work Satisfaction (IWS), which developed by Stamps & Piedmonte (1986).

**4.1 Autonomy** refers the feeling to amount of independent work, inventiveness, and freedom either allowed or required in daily activities.

**4.2 Pay** refers to feeling as money compensation and benefits received for the work done.

**4.3 Task requirement** refers to those things that have to be done as a regular part of work.

**4.4 Organization policies** refer to the restrictions or limits upon work activities by organization's management.

**4.5 Interaction** refers to opportunities and requirement presented for formal and informal social and professional interaction during working hours.

**4.6 Professional status** refers to the feeling about the work at personal level as well as included the organization and community.

**5. Nurse burnout** refers to the state of physical and psychological fatigue with experienced perceived by individual professional nurses that included of three certain domains person burnout, work-related burnout, and client-related burnout as perceived by individual RNs.

**5.1 Personal burnout** refers a state of prolonged physical and psychological exhaustion.

**5.2 Work-related burnout** refers a state of prolonged physical and psychological exhaustion, which is perceived as related to the person's work.

**5.3 Client-related burnout** refers a state of prolonged physical and psychological exhaustion, which is perceived as related to the person's work with clients.

This can be assessed by Copenhagen Burnout Inventory (CBI) (Borritz, 2006).

## **7. Expected benefits**

The result of this study can develop new knowledge, factors influence on NCQ among RNs that generate the influence on patient outcome specifically in governmental hospital in which the situation exists. The finding will be useful for nurse administrator, and policy maker to find an effective strategies and intervention for improving nursing care quality. Furthermore, the result of this investigation would be able to solve in any these related factors included nurse burnout, nurse practice environment, nurse staffing, and nurse work satisfaction to be better improvement. Moreover, the findings of this study may provide the strong evidence that problems related to NCQ in governmental hospitals is specific to patient outcomes. Thus, RNs can pay attention to these problems when they deliver nursing services to their clients. In addition, the result can be possibly to provide valuable information for health policy-makers to set nurse-staffing plan and adjust hospital policies to back nursing practice.

This study would provide of best practice of RNs, who keep best of interest of patients'/clients. It also importance to promote and maintain the highest standards of NCQ in the nursing services should be foremost.

## **CHAPTER II**

### **LITERATURE REVIEW**

The study has aimed to examine the factors influencing on nursing care quality perceived by professional nurses in governmental hospitals in Cambodia. A critical review of the existing literature includes theories and empirical studies. The review was divided into seven parts:

1. Nursing care quality in globe
2. Cambodian healthcare system and professional nurses
3. Current nursing care quality in Cambodia
4. Nursing care quality perceived by professional nurses
5. Factors related to nursing care quality:
  - Nurse staffing
  - Nurse work satisfaction
  - Nurse practice environment
  - Nurse burnout
6. Policy implication to promote nursing care quality
7. Structural equation modeling for analysis

#### **1. Nursing care quality in globe**

Nursing care quality is alarming sign for nurse administrators around the globe and this phenomenon has its impact in terms of the patient safety care nurses provide, as well as the nurses themselves. Globally, as nurses conform with different law and regulatory mandates related to quality and improved patient outcomes (Ryan et al., 2017).

The World Health Organization accepts that one's right to stay in the best health, as well as having access to the greatest healthcare facilities were the basic rights of every human being. On the one hand, this means that everybody should gain access to medical care but on the other hand, the services should be of the best quality possible. Providing high quality care means the need for showing the differences between the desired quality and the quality that was really achieved (Kos et al., 2016).

A study Australian undergraduate and postgraduate nurses (n = 156) to define the meaning of excellence in nursing care, using a qualitative design and self-administered open-ended questionnaire. Their discoveries suggested that when delivering excellent nursing care, the patient is the central focus at all times (Kos et al., 2016). Australian nurses perceived quality nursing care around the themes of professionalism, holistic care, practice, and humanism. (Coulon, Mok, Krause, & Anderson, 1996).

British and US conducted a study together they found that the perceptions of RNs, which developed an instrument to evaluate hospital nurses' perceptions. The participants identified the following as dimensions of NCQ: staff competency, staff communication, patient-staff communication, caring, understanding patient needs, dignity, and privacy of patients, feeling valued and listened to, and basics such as cleanliness and safety (McKenna et al., 2006).

A previous eight studies as systematic review conducted in the US, Australia, United Kingdom (UK) and Canada discovered that the whole incidence of in-hospital adverse events was 9.2%, which was 43.5% of these incidents were preventable, and was 7.2% led to death (Friese, Lake, Aiken, Silber, & Sochalski, 2008; Lucero et al., 2009). Professional nurses may find it increasingly difficulty to deliver necessary nursing care because it increased complexity of healthcare delivery, and continuing efforts to cover costs by dipping hospital length of stay (Lucero et al., 2009). A total of 89 patients who had their catheter replaced after initial removal. Overall, the rate of urinary tract infection was 2.1% and the rate of urinary retention was 28%, including all patients who required intermittent catheterization after removal of indwelling catheter (Purvis et al., 2014).

As far as strong relational statements of some factors have been linked with nursing care quality over few decades. For examples, Sochalski (Sochalski, 2004) found that nurse staffing related to nursing care quality (Duffield, Roche, Blay, & Stasa, 2011; Martsof et al., 2014). A study found that nurse satisfied their job was influenced on nursing care quality (Mrayyan, 2006). Further, (Van Bogaert et al., 2013) reported that nursing practice environment is correlated with nursing care quality. They added that nurse burnout and work satisfaction were mediating of practice environment, and nurse-assessed quality of care in the hospital (Bogaert, Clarke, Willems, & Mondelaers, 2013a; Van Bogaert et al., 2009).

## **2. Cambodian healthcare system and professional nurses**

The Cambodian Health Survey 2005 indicated that Cambodia has made considerable development toward successfully achieving the Millennium Development Goals 4 (MDG) (decrease child mortality) and MDG 6 (Combat main communicable diseases of HIV/AIDS, Tuberculosis and Malaria). Based on MDG 5 (Improve maternal health), maternal mortality rests high and continues to pose a huge challenge. This requires to consider the investment in term of resources, and, by the meantime, there are needed strengthening of interventions, additional organizational development and capacity building, and also enhancing health system functioning, which is including effective coordination and multi-sectoral collaboration (WHO & MoH, 2012).

There are three different health care systems; first community health level is provided primary health care, in Phnom Penh city. Second, provincial level is provided secondary care. Third, national level is provided tertiary care, which is located (MoH, 2008).

Professional nurses are included Associate Degree who graduated from 3-year program and Bachelor of Science in Nursing graduated from 4-year program. The estimated total amounts of professional nurses are 15,500. These are working at different places such government 60% employed at government institutions, 20% working at private sectors, 7% is employed at non-profit organization, and 3% is placing at military health organization (CCN, 2015).

In 2015, government issued a schedule for civil servants have worked for 8 hours per day, which was not longer than 40 hours per week. In this regards, RNs must have 8-hour shift. However, since over a couple of decades, all healthcare facilities have scheduled for one-shift as 24-hour on duty. This 24-hour-shift was composed on 7 days for duty, 7 days were day off, and 16 days more were 8-hour shift.

## **3. Current nursing care quality in Cambodia**

As Cambodia, is a developing nation in Southeast Asia, there are many factors nearby co-exist and subsidize to sub-optimal patient care quality and increases the risk of healthcare associated infections (HAI): irregular resources of medical uses, limited hospital operational budgets, low salaries of health personnel (Jacobs & Price, 2004),

poor knowledge of infection control practices, irregular repartition of health services causing overload of work (Kanchanachitra et al., 2011), and co-existence of other major health problems in Cambodia.

Previously, a study conducted to explore the surgical wound infections of caesarean in a hospital reported that there was 222 patients admitted for caesarian deliveries, 176 (79.3%) were monitored for 30 days. Of these, 11 were diagnosed with superficial surgical site infections giving an incidence rate of 6.25% to 36.4% were detected after hospital discharge. In addition, the length of hospital stay was significantly longer for the superficial surgical site infections cases (Srun et al., 2013).

Recently, there are many issues on the moral commitment of RNs, which RNs once self have perceived their concerns about politeness, kindness, protects patient's right, participating in solving moral issues. RNs were professionally worried about the role of emotions in providing compassionate care to patients (Jameton, 2017).

Over a few decades, RNs have lack of qualified nurses, which 95% are associate degree nurses. Other developed countries use bachelor degree in nursing sciences to provide nursing services, for example, Thailand. Professional commitment refers to appropriate to the professional competence as perceived by professional nurses about the degree to which professional development, individual RNs are concerning on the provision of nursing services to meet patients' needs because shortage numbers of nurses, therefore Cambodian nurses have been assigned to take patient as one nurse to 18 patients, which is led RNs to low professional commitment (García-Moyano et al., 2017; Virya Koy, Yunibhand, Angsuroch, & Torale, 2017).

Over the few last few years, Bureau of Nursing and Midwifery has introduced nursing process, which integrated both nursing process and holistic care. Holistic care defined as the concern of physical, mental, social, and spiritual as perceived by RNs (Zamanzadeh, Jasemi, Valizadeh, Keogh, & Taleghani, 2015).

Furthermore, RNs have concerned about patient satisfaction, which refers to patient happiness with nursing services provided by RNs in provision of nursing to meet patients' needs. As long as a decade, Cambodian patients have sought both medical and nursing services in neighboring countries such Thailand, and Vietnam, which total numbers were 300 patients per day (RFA, 2017). Patients were satisfied

with nursing care have been found to be one of the most essential predictors of satisfaction with hospital care. Additionally, patient satisfaction was the one of the important patient outcomes, which is that patients definitely suggested the hospital to others friends or family (Tei-Tominaga & Sato, 2016).

In sum, information from this study has the potential to directly impact the nursing care delivered to patients in all health care settings. This potential information can be benefited to NCQ, which would be covered some aspects as followings patient satisfaction, holistic care, moral commitment, and professional commitment.

#### **4. Nursing care quality perceived by professional nurses**

##### **4.1 Conceptual framework:**

Regarding literature review, these are important factors have been influenced on NCQ such nurse staffing, burnout, nurse practice environment, and nurse work satisfaction (Aiken, 2002). Many researchers examined the effect of hospital organization on outcomes (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Aiken et al., 2012; Aiken, Xue, Clarke, & Sloane, 2007). Regarding to NWE-NS-OM comprised of hospital factor, nurse work environment, nurse staffing, process of care, nursing outcomes, and outcomes of patients (Aiken, 2002). The relationship of the concepts under NEW-NS-OM is explained as followings:

**4.1.1** Hospital factor, based on this conceptual model, influenced on nurse staffing and nurse practice environment(Aiken, 2002). Identifying the adverse event, RNs were within the organization influence the extent to which they can organize the resources of the hospital including physicians to assist in-patient rescue. However, this construct was not included into the model as original did because researcher could not find literature to support.

**4.1.2** Author explained nurse staffing is referred to RN to patient ratio, skill mix. Nurse staffing (the numbers of nursing staff, including RNs, Associate degree in nursing, and aides) and skill mix (the proportion of RNs and associate/nurse aids) impact the timing of patient problem identification, which is important to secure patient from the life threatening.

**4.1.3** Nurse practice environment includes nurse practice environment predicted the nursing outcomes such as burnout and nurse work satisfaction, and at the unit, the last shift, and in the hospital (Van Bogaert et al., 2013). Nurse practice

environment was positively associated with NCQ (Apiradee Nantsupawat et al., 2011).

**4.1.4** Nursing outcomes include burnout and nurse work satisfaction. Nurse work satisfaction was significantly higher among nurses had good nurse practice environment, and less burnout (McHugh & Ma, 2014). Therefore, it could be presumed that when nurse feel less satisfy in their job, it could be related to a threefold increase (odds ratio, 2.97; 95% confidence interval, 2.22-3.97) in the odds of nurses' rating high NCQ. Burnout, explained that there was widespread concern that the stresses inherent in caring for professional nurses with a fatal and potentially communicable disease would lead to high rates of nurse burnout making dedicated very difficult to staff with qualified personnel. In addition to the presumed effects of burnout on nurse resignation, burnout-physical and emotional exhaustion and a diminution of positive feelings, empathy, and respect for patients, which leads professional nurses to distance themselves from patients, to develop attitudes of protection, to dehumanize patients, and to treat patients in demeaning ways (Maslachi et al., 1996) (Figure 1).

## **4. 2 Theoretical substruction**

The fours steps outlined to theoretical substruction (Hinshaw & Atwood, 1984). These included: (1) identify and isolate major concepts, (2) specify relationships among the concepts, (3) hierarchically order concepts by level of abstractions, and (4) pictorially present the relationships among the variables.

Based on this NEW-NS-OM (Aiken, 2002) explained that this theory composed of hospital priorities/policies; RN: patients' ratio; nurse work environment, and outcomes. The conceptual levels are composed of hospital levels, nurse staffing, nurse work environment, and nursing outcomes. The goal of theoretical substruction is to identify major variables such first, second, and tertiary care; nurse-patient ratio; nurse practice environment, nurse work satisfaction, burnout, and NCQ in this study, analyze the level of abstraction among the variables, identify the hypothesized relationships between nurse staffing, nurse practice environment, burnout, nurse work satisfaction, and NCQ. The empirical indicators are type of hospital care, nurse-patient ratio, nurse practice environment, nurse work satisfaction, burnout, and NCQ



perceived by professional nurses. The last level is measurements, which include first, second, tertiary care; nurse staffing measurement form, PES-NWI, IWS, CBI, and Cambodian Nursing Care Quality Scale.

Ideally, RNs are in position to account on the nursing care quality in hospitals. In fact, they are playing as roles of surveillance system controlling the patient care. The nurses work as the practical bedside care supplier and intermediary between patients and all other healthcare clinicians involves importantly in all aspects of patient care. For examples include direct care giving, surveillance and monitoring of health status, RNs provided emotional support for patients and families, assist with activities of daily living of patients, playing important role as interprofessional team collaboration, and given patient education. Thus, nurses' perceptions of nursing care quality are built on more than an aspect of nursing care services, but they are developed over time through a series of interactions and direct observations of care (McHugh & Stimpfel, 2012).

NCQ has been at the forefront of researchers' agenda for several decades because healthcare quality measures are integral to the decision-making of regulators, consumers, and purchasers (Borger, 2012; Chassin & Loeb, 2011; Donabedian, 2002, 2005).

Previous studies have shown significantly that nurses in hospitals with supportive nurse work environment and adequate nurse staffing were more satisfied in their jobs, experience less nurse burnout (Berkowitz, 2016), and nursing care quality was better (Apiradee Nantsupawat et al., 2011).

Likewise, Buerhaus and team found that under staffing level is raising the stress level of nurses, impacting work satisfaction, and contributing adverse outcomes in hospital care (Aiken, Clarke, Sloane, Sochalski, et al., 2002) by effecting to outcomes of patient; for instance, which was increased mortality, failure to rescue, medication error, and other adverse events (Aiken et al., 2008; Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2005; Estabrooks, Midodzi, Cummings, Ricker, & Giovannetti, 2005; Tourangeau et al., 2007).

In conclusion, NEW-NS-OM is best fitted to explain the process of conducting causal modelling study in Cambodia as the first paper, which had never ever studied over many decades. In this study, the theoretical division is going to classify as followings: first, the theoretical level composed of nurse staffing, nurse practice environment, nurse outcomes, and patient outcomes. Second classification, the conceptual level is composed of nurse staffing, nurse practice environment, nurse outcomes, and nursing care quality. Third classification, variable level is composed of nurse-patient ratio, nurse practice environment, nurse work satisfaction, nurse burnout, and nursing care quality. Forth classification is empirical indicators, which is composed of nurse-patient ratio, nurse practice environment, nurse work satisfaction, nurse burnout, and nursing care quality. Last classification is measurements, which are included nurse-to-patient ratio, Practice Environment Scale of Nursing Work Index, Index of Work Satisfaction, Copenhagen Burnout Inventory, and Cambodian Nursing Care Quality Scale.

This model would help research to examine the causal relationship between nurse staffing and nurse practice environment as independent variables and nursing care quality through nurse work satisfaction, which is mediated by nurse burnout. The results of this study would be more interesting because researcher is using western theory to guide the study where the unique context of Cambodia.

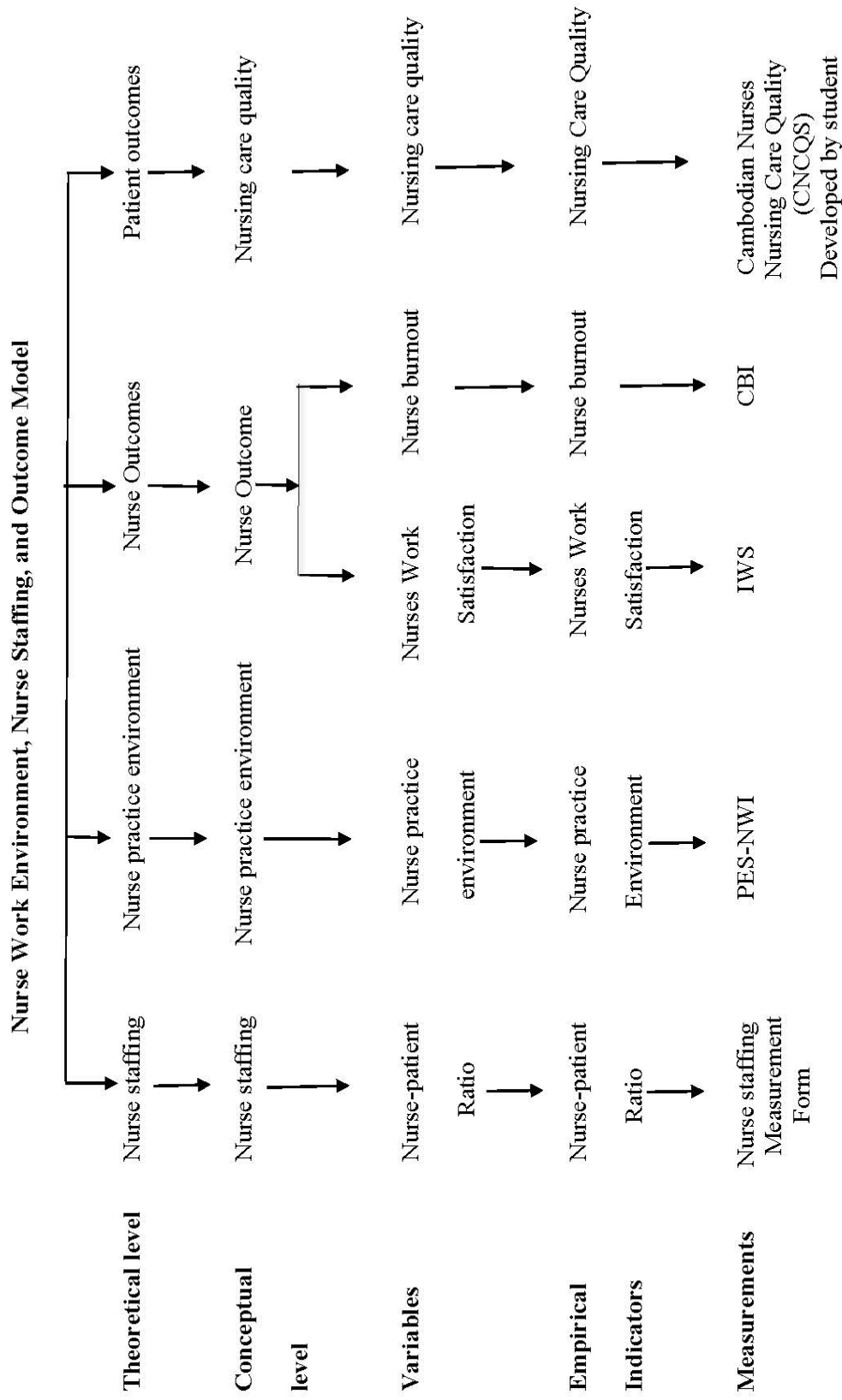


Figure 1 Theoretical Substruction Diagram

### 4.3 Definition of nursing care quality

Everyone in health care approaches the definition of quality from a different perspective: society judges utilitarian benefits, payers the economic outcomes, patients the personalized attention received, and providers the congruity with professional worldviews and standards (Virya Koy et al., 2015). Two distinct frames of reference exist within the process of evaluating the nursing care quality, which were patient outcomes and nursing profession (Gunther & Alligood, 2002).

Regarding to patient's outcomes and nursing profession, there are variety of definition about nursing care quality. For instance, (Hogston, 1995) defined NCQ as a degree of experience in nursing practice, knowledge, skills, and competence to deliver care for patient without error. Another investigator reported that NCQ has also been referred to the degree of excellence in nursing care delivered for patients that meets the patient's spiritual, mental, social, physical environmental needs (Helena Leino-Kilpi, 1990). NCQ defined as a degree of suppliers in nursing practice with skillful, establishing a trust relationship with patients, provision of comfortable, well organize, and vigilant in ensuring on receivers (Lynn & McMillen, 1999).

Furthermore, another study defined nursing care quality as a degree of excellence in nursing practice and a service, which rests on its ability to satisfy a given need (Al-Kandari & Ogundeyin, 1998). In addition, NCQ has been defined as the degree of providing care for the patient needs, treating the patients pleurably, caring for the patients, morality, and patient satisfaction of care that they received (Larrabee & Bolden, 2001). NCQ is defined as 'the degree to which an activity fulfills the requirements lay down (Lindgren & Andersson, 2011).

NCQ can also be considered as the degree of nursing services deliver safe care based on nursing standards practice, which is based on standard of practice to meet patient needs (Tafreshi, Pazargadi, & Abed Saeedi, 2007).

Another study defined NCQ by using RNs' perspectives as to the degree of excellence in provision of nursing care to patients, which included care-related activities, staff characteristics, progress of the nursing process, preconditions for care, physical environment, and cooperation with relatives (S. H. Zhao et al., 2009).

In addition, another defined the degree of which nurses concerned the care provided to patients comprised of physical environment, staff characteristics,

preconditions for care, Task oriented activities, Human oriented activities, and process of nursing process (Leinonen et al., 2003).

A study conducted as a qualitative study to develop a concept for the description of good nursing care according to the views of RNs, including practical nurses, nurse educators, nurse students, as well as on the researcher's investigations of those people (Helena Leino-Kilpi, 1990).

There was a study described NCQ could be defined as multidimensional, multifaceted therapeutic effective care, which occurs when physical, psychology, any extra needs of patients were met (Williams, 1998). Similarly to another study defined NCQ as physical, emotional, social, and spiritual needs of patients provided in a caring manner, so that the patients were cured, and healthy, be able to live normally lives, and patients gratified (Kunaviktikul et al., 2001).

In other words, a study stated that NCQ is defined the degree to which nursing services provided to meet human needs through caring, having empathetic, having respectful interactions within which responsibility, providing intentionality and advocacy form an essential, integral foundation (Burhans & Alligood, 2010).

Another study has attempted to define quality of health care in terms of standards. For example, the IOM defined NCQ as the degree to which nursing services for individuals and populations increase the likelihood of desired outcomes of patients and are consistent with current professional knowledge. This was led to a definition of NCQ that appeared to be listings of nursing care quality indicators, which were expressions of the standards of nursing practice. These standards are not necessarily in terms of the possibilities or conceptual clusters but use them as nursing care quality indicators. Further, most clusters of quality indicators were comprised of the 5Ds: death, disease, disability, discomfort, and dissatisfaction, which was considered than more positive components of quality (Lohr, 1988).

Cambodian standard of nursing practice defined that RNs must fulfill the activities, which are included professional commitment, quality and safety, patient information is given clearly, and holistic care must be given to meet the patients needs (MoH, 2015).

In conclusion, in the literature, there are two groups of researchers to provide definition of NCQ as followings: group one defined NCQ as the degree of excellence

in nursing care delivery for patients (Larrabee et al., 2003; Helena Leino-Kilpi, 1990; H Leino-Kilpi, 1996; Tafreshi et al., 2007; S. H. Zhao et al., 2009). Another group of researchers defined NCQ as the treatment effective care which occurs when physical, psychology, any extra needs' patients are met (Burhans & Alligood, 2010; Kunaviktikul et al., 2001; Williams, 1998). The last definition was included morality, professionalism, holistic care, and quality and safety. The term of NCQ has been used differently such nurses' perceptions of NCQ (Andersson & Lindgren, 2013; MacDavitt, 2008), nurse reported quality of care (Aiken, Clarke, & Sloane, 2002), or quality of nursing care (El-Jardali et al., 2011; Apiradee Nantsupawat, 2010; Apiradee Nantsupawat et al., 2011; Sochalski, 2001) have been used interchangeable. In this study, the term "NCQ perceived by professional nurses" has been used. From the literature, it was found that the definitions NCQ from nurse perspectives were synthesized the attributes of NCQ perceived by professional nurses as excellence of nursing care (Aiken, Clarke, & Sloane, 2002; S. H. Zhao et al., 2009), standard of nursing services (Hogston, 1995; Helena Leino-Kilpi, 1990; Apiradee Nantsupawat, 2010; Tafreshi et al., 2007; Williams, 1998), the capacity to meet the needs of the patients (Burhans & Alligood, 2010; Hogston, 1995; Kunaviktikul et al., 2001; Williams, 1998) and the activity to fulfill patient satisfaction; and morality, professionalism, total care, and quality and safety (MoH, 2015).

Therefore, the NCQ of this study refers to the degree to which an activity fulfills moral commitment, professional commitment, total care, environment management, quality-safety conscious care, emotional supportive care, information supportive care, and patient satisfaction as perceived by Cambodian RNs based on the nursing standards of practice they provide with their expectation to meet patients' needs.

#### **4.4 Dimensions of NCQ**

NCQ is a multidimensional concept. These dimensions are related to the NCQ perceived by individual professional nurses as the following,

A study conducted a concept analysis found that there were nurse competency & performance, good experiences of care, met nursing care needs, good leadership, staff characteristics, preconditions for care, environmental management, progress of nursing process, and cooperation with relatives (Virya Koy et al., 2015).

Another study compared the perceptions of nurses and patients on perioperative quality care using the Good Nursing Care Model had different five classifications including staff characteristics, nursing activities, preconditions, the progress of nursing process, and environment (Leinonen et al., 2003). Another study concluded five main categories of good nursing care, which were characterized as good nurse, the activities of a good nurse, the nature of activities, the preconditions for good nursing care, and the aims of good nursing care (Helena Leino-Kilpi, 1990).

Two researchers categorized nursing care quality as two dimensions: first dimension was prerequisites included routines, staffing, and attitudes and elements of performance. Second dimension was the elements of performance, which was included detecting, acting on behalf of the patients, and acting on signs and symptoms (Idvall & Rooke, 1998).

A study explored healthcare staff perceptions of the quality of hospital care provided, these were related particularly to competency, communication, confidentiality, dignity of patients, cleanliness and hygiene, expertise and judgment, safety, discharge procedures, information and education, staff morale, and continuity of care (McKenna et al., 2006).

In previous study conducted a qualitative study, they categorized in three themes (1) perceptions of nurses on caring behaviors (trying one's best in meeting clients' needs, establishing effective communication, interpersonal skills, and providing a supportive environment), (2) barriers to caring (human barriers, cultural nursing barriers, administrative and resource barriers), and (3) ways to overcome the barriers (promoting personal and professional self, certifying colleague support, and increasing a healthy working environment) (Yam & Rossiter, 2000).

Another study reported six essential themes of NCQ were including advocacy, caring, empathy, respect, intentional and responsibility (Burhans & Alligood, 2010). In Chinese, a study developed Nurse-Assessed Quality of Nursing Care Scale, which was categorized seven dimensions such physical environment, staff characteristic, precondition, timeless activities, task orientated activities, professional commitment, and patient satisfaction (Lui, 2014).

In conclusion from previous studies provided different dimensions as followings: staff characteristics, nursing activities, preconditions, the progress of

nursing process, environment, prerequisites, elements of performance, competency, communication, confidentiality, dignity of patients, cleanliness and hygiene, expertise and judgment, safety, discharge procedures, information and education, staff morale, and continuity of care, nurses' perceptions of caring behaviors, barriers to caring, ways to overcome the barriers, advocacy, caring, empathy, respect, intentional and responsibility, psychosocial relations, commitment, work satisfaction, openness/closeness, competence development, security/insecurity, timeless activities, and patient outcomes.

In this study researcher selects only the practical and fitted to Cambodian context, which is mainly focused on patient satisfaction, safety, quality, professionalism, information, provided total care, environment, and ethical consideration of professional nurses. Furthermore, researcher has grouped some dimensions into appropriate key dimension to which that key dimensions can be represent to concept of nursing care quality. The followings dimensional framework included (1) moral commitment, (2) professional commitment, (3) environmental management, (4) quality-safety conscious care, (5) total care, (6) emotional supportive care, (7) information supportive care, and (8) patient satisfaction. The eight dimensions were defined as followings:

**4.4.1 Moral commitment** refers to as concern about politeness, kindness, protects patient's right, participating in solving moral issues as perceived by professional nurses about the degree of excellence on providing a clean ward environment to meet patients' needs.

**4.4.2 Professional commitment** refers to as appropriate to the professional competence as perceived by professional nurses about the degree to which professional development, individual nurses concern and to provide nursing services to meet patients' needs.

**4.4.3 Environmental management** refers to as the concern about room cleanliness, good ventilation, and quiet as perceived by professional nurses on providing a clean ward environment to meet patients' needs.

**4.4.4 Quality-safety conscious care** is defined as the concern about patient safety, patient comfort, good basic nursing care, appropriate treatment, protect



physical injury, and practice with caring behaviors, which provided to meet patients' needs.

**4.4.5 Total care** is defined as the concern of physical, mental, social, and spiritual as perceived by professional nurses about the degree, which they provided good basic nursing care, holistic, reduce patient anxiety, and release patient' worry about illness to meet patients' needs.

**4.4.6 Emotional supportive care** is defined as the helping process by doing patient happy with teaching, information given, and provides enough time for patients as needed to meet patients' needs.

**4.4.7 Information supportive care** is defined as knowledge and information explained clearly to patients as perceived by professional nurses in provision nursing care to meet patients' needs.

**4.4.8 Patient satisfaction** is defined as patient content with nursing services provided as perceived by professional nurses in provision of nursing to meet patients' needs.

#### **4.5 Measurement of nursing care quality**

A study found that instruments could be categorized from three different measuring perspectives (1) nurses, (2) patients and (3) both nurses and patients (V Koy, Yunibhand, & Angsuroch, 2016).

Nurse Reports of Quality of Hospital Care Questionnaire (NRQHCQ) was developed by Aiken et al. (Aiken, Clarke, & Sloane, 2002) to assess nurses reports of NCQ in the units of the hospitals, which was the care provided. NRQHCQ categorized in a four-point Likert Scale, which ranged the scores as 1= excellent, 2 = good, 3 = fair, 4 = poor. The items related to NCQ were through the question "How would you describe the quality of nursing care delivered on your last shift?" However, this single item may not reflect the construct of NCQ (DeVellis, 2016).

Based on Sochalski (Sochalski, 2004) the NCQ were rated significantly relationship with the number of patients who RNs were cared for, rated of unfinished care for those and the of patients, frequency patient safety problems happened. These single items for total assessment of NCQ has been used in a number of studies assessing the quality of medical and nursing care and have been found to be strongly related with process of care criteria as well as outcomes of patient (Ayanian,

Weissman, Chasan-Taber, & Epstein, 1998; Pearson, 2000; Reschovsky & Imazeki, 2001). The reporting on a single shift rather than some multiple period of time was less troublesome, and the average across all nurses offers a reasonable appraisal of overall NCQ. They were a single item couldn't suggest the reliability and validity of NCQ scale.

The Good Perioperative Nursing Care Scale (GPNCS) was used by Leinonen et al. (Leinonen et al., 2003) to compare the perceptions of patients and nurses on perioperative nursing care quality in five the hospitals in Finland. It was a five-point Likert Scale, which was categorized with five subcategories were classified as followings staff characteristics, activities, preconditions, progress of nursing process, and physical environment. The Cronbach alpha coefficients ranged from .50 to .84 for nurses. This instrument was tested internal consistency reliability, which could be acceptable for use. However, the construct validity of GPNCS was not reported. In addition, GPNCS was used in surgical operating departments, which may not be appropriate to be used in other inpatient departments.

Perception of Quality Nursing Care Scale (PQNCS) (S. H. Zhao et al., 2009) was used to explore and compare NCQ as perceived by RNs and patients in medical and surgical departments in a Chinese, it was tertiary general hospital. The total of 63-item was divided into six categories as staff characteristics (10-item), care-related activities (25-item), preconditions for care (8-item), physical environment (7-item), progress of nursing process (5-item), and cooperation with relatives (8-item). The content validity index (CVI) of PQNCS was ranged from 0.91 and 0.93 for patients. The Cronbach's alpha coefficient for PQNCS of nurses and patients were ranged from 0.81, and 0.84, respectively. However, the construct validity was not tested by the (S. H. Zhao et al., 2009) Perceptions of Quality Nursing Care Scale.

Good Perioperative Nursing Care Scale (GPNCS) (Leinonen et al., 2003), literature review, and experts interview. The total of 37 items was divided into six categories as physical environment (6 items); staff characteristics (8 items), preconditions for care (7 items), Task oriented activities (6 items), Human oriented activities (5 items), and process of nursing process (5 items). The Cronbach's alpha coefficient of GPNCS was 0.71.

In addition, a study conducted a psychometric property test the Assessment of Quality Scale-Acute Care Version (AQS-ACV), which invited 1227 RNs to answer the questionnaire. This was an exploratory factor analysis, which grouped into 77 items were taken with eight factors were included interaction (19-item), vigilance (10-item), individualization (6-item), and advocate (10-item), including work environment (12-item), unit collaboration (9-item), personal characteristics (7-item), and mood (4-item). However, this instrument was not reported the construct validity result (Lynn, McMillen, & Sidani, 2007).

Thailand administered a single item, which was asked the perceptions of RNs about the NCQ delivered on the last shift. The measurement was designed a ranged 4-Liker-scale from 1 (excellent) to 4 (poor), if it was higher scores, which was indicating poorer levels of NCQ. The Cronbach's coefficients for previous nursing care quality were in the range of 0.92 to 0.94 (Apiradee Nantsupawat et al., 2011).

In sum, there are several troubles related to the existing instruments, which was concerning on the perceptions of RNs on NCQ. For example, some instruments were designed as single item, which they cannot reflect the reliability and validity of nursing care quality, some of other instruments lacked construct validity, and the rest were used for personal reason rather focusing on nurses' phenomena. Therefore, it is necessary to develop a new Cambodian Nursing Care Quality Scale from the nurses' perspective that can be used in Cambodia's inpatient departments' context, and another reason was reflected on Cambodian cultural context rather than western contexts of western nurse perspectives.

#### **4.6 Theory of nursing care quality**

Highlighting on the assessment of nursing care quality has shifted over time from structures to processes to outcomes. The decade of the 1990s was dedicated to outcomes research, which was the as comparison between interventions, systems, and technologies on the basis of patient outcomes and to outcomes, it was as results by changing processes (Jones, Jennings, Moritz, & Moss, 1997). Only recently has there been an stimulus to incorporate more optimistic outcomes such as improved health status and functional ability (Mitchell, Ferketich, & Jennings, 1998). Over many decades, scientists have used many theories to improve health quality included NCQ as the one of most concerns among nurse researchers. Those theories have advantages

and disadvantages, therefore, each study where someone picks up appropriate theory to guide own study, which was needed to analyze the applicableness of each theory. The followings are the theories of nursing care quality, which are related to this study. The theoretical analysis was conducted as the followings:

#### **4.6.1 Donabedian's Structure, Process, and Outcomes:**

Donabedian developed the framework of structure, process, and outcome, it has guided three decades of study in the elements needed to evaluate and compare medical care quality. The highlighting on assessing NCQ has switched from structures (having the right things) to processes (doing things right) to outcomes (having the right things happen) (Donabedian, 2005). The total of variables have been examined to alter each of the components has increased markedly. Structures were usually thought to impact on processes, which in turn make desirable or undesirable outcomes. However, Donabedian's viewpoint was critically linear, supposing that structures influence processes, which in turn affect outcomes. Characteristics of patients were sometimes considered as mediating outcomes and clinical interventions were considered to be processes.

#### **4.6.2 Quality Health and Outcomes Model**

In other words, the Quality Health and Outcome Model (QHOM) indicated that interventions were affected by both system and patients' characteristics in producing desired outcomes. Furthermore, the relationship between system and client indicated that the hypothesis that no single interference acts directly through either system or patient alone. The effect of an implementation was mediated by client and system characteristics, but was thought to have no independent direct effect. The QHOM suggested two direction relationships among components, with interventions always operating through characteristics of the system and of the client (Mitchell et al., 1998).

#### **4.6.3 Process of Care and Outcomes Model**

The conceptual model, is Process of Care and Outcomes Model because it incorporates elements of the structure, process, and outcome and QHOM (Lucero et al., 2009). Furthermore, all dimensions of this model have relationship among each others, for example, the care environment, patient factors, and the process of care have a direct influenced on patient outcomes (Lucero et al., 2009). Moreover, the

traditional framework characteristics of the nursing and hospital organization were built into the care environment. Since nurses were continually adapting to changes in the care environment and patients' health status' issues, the relationship between the process of care and outcomes may be affected by both the care environment and patient factors. Finally, If the care environment was characteristically an 'organized agency, such as a hospital or provider network' (Mitchell et al., 1998), then the nursing practice environment, nurse staffing, nurse work satisfaction , nurse burnout, and hospital characteristics would be structural types that impact on the process of care, patients and outcomes (Lucero et al., 2009).

#### **4.6.4 Nurse Work Environment, Nurse Staffing, and Outcome Model (NEW-NS-OM):**

The NWE-NS-OM was developed by Aiken (Aiken, 2002) through conducting numerous studies to examine the effect of hospital organization on outcomes (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Aiken et al., 2012; Aiken et al., 2007). NWE-NS-OM acts that hospital priorities/policies effect on nurse staffing and nurse work environment. Nurse staffing can effect on nurse work environment. Both nurse practice environment and nurse staffing can be influenced the process of care, which further influenced together nursing outcomes and patients' outcomes. In addition, it was presumed that nursing outcomes further influenced on outcomes of patient.

In addition, Aiken (2002) theoretical model was also explained that people who worked in the hospital practice environment that was magnet-designated often brought about good outcomes, which included higher level of nurse work satisfaction, lower level of nurse burnout (Aiken et al., 2001) (Aiken et al., 2012), and higher perceptions of NCQ (Aiken et al., 2008; Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010; Van Bogaert et al., 2009; Van Bogaert et al., 2013). The concept of nurse practice environment was clarified into three categories: resource adequacy, nurse-physician relations, and administrative support. After clearly studying the magnetic hospital nurse practice environment (Lake, 2002), which was used the term "nursing practice environment" to explain 'organizational characteristics of a work setting that facilitated or constrained the RNs practice'. It was ground into five key domains by using factor analysis, which were (1)

participation in hospital affairs, (2) nursing foundations for quality of care, (3) nurse manager ability, leadership and support of nurses, (4) staffing and resource adequacy, and (5) collegial nurse-physician relations (*Figure 2*).

The strength of NWE-NS-OM was developed based on the phenomena that nurse resources and practice environment could be significantly influenced on outcomes. Additionally, interactions among concepts were also described in this model. However, definitions associated to concepts were not provided in the model. Moreover, regarding nursing outcomes and patient outcomes, researchers could define them based on their own studies' purposes. Likewise, only some of the relationships among the concepts that draw on the NWE-NS-OM could be supported by empirical studies.

The model selected for this research

This study was followed by modified model of NWE-NS-OM (Aiken, 2002). Because the NWE-NS-OM included similarly variables such nurse staffing and nurse work environment, which were believed to have an impact on nursing outcomes (nurse work satisfaction, nurse burnout, and NCQ). Additionally, Aiken's research group has presented particularly interest in contributing to understand the link between organization and outcomes (Aiken, Clarke, & Sloane, 2002).

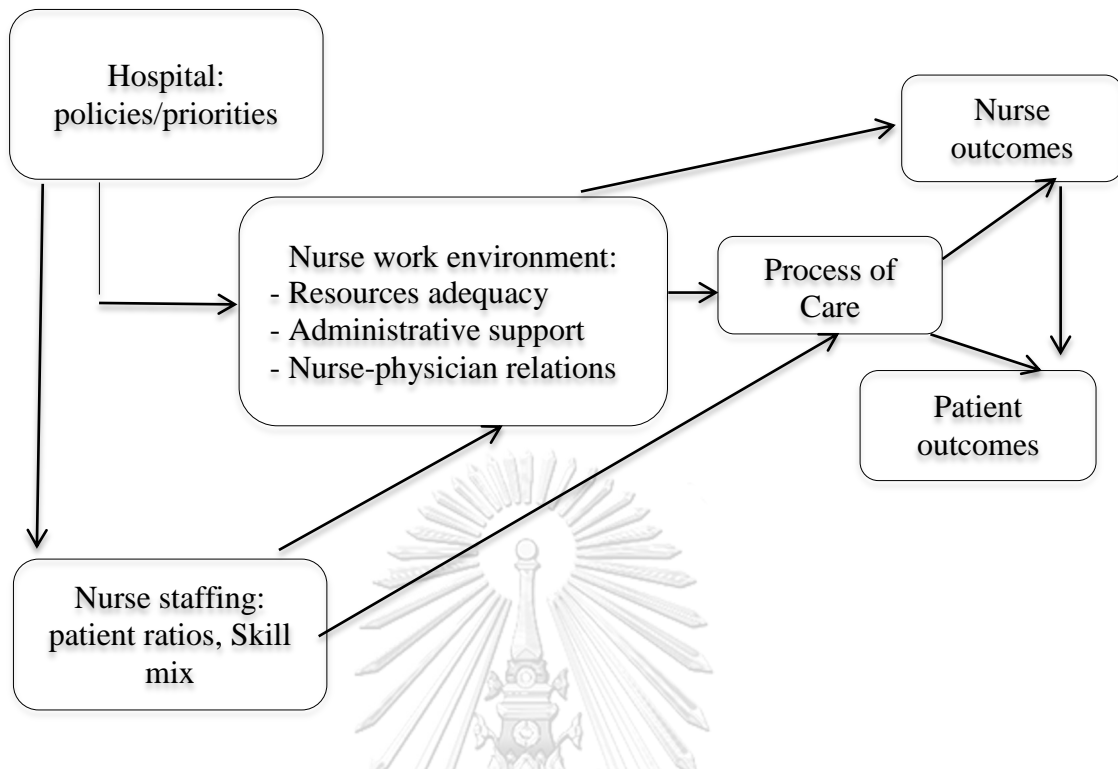


Figure 2 Nurse Work Environment, Nurse Staffing, and Outcomes Model: A Conceptual Model Permitted by Aiken (2002)

Moreover, many previous studies focused on how nurse staffing and nurse work environment have a direct influenced on outcomes (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2012). Even though, this model also comprised other two concepts such hospital policies and process of care, however, there were not empirical evidence has been found to support in one model. In the same way, the aim of this study was to examine the factors related to NCQ, which was defined as the patient outcomes (Aiken, 2002). Thus, nursing outcomes was not the current stage to be built for the current study.

As we have known interesting variables such nurse staffing, nurse practice environment, nurse work satisfaction, and nurse burnout have been reported because those variables looked most likely the same situation. Even though, Cambodian context has particular situation, where international nursing community does not have the same issues, but it was the best fitted for this study, as the reason it explained mainly that nurse staffing and nurse practice environment can significantly affect NCQ, which could be answered all hypotheses underpinning of this model.

## **5. Factors related to nursing care quality**

An understanding of the factors related to NCQ is critically importance whether this study will be found out and the poor factors that can be solved out. The databases CINAHL Complete, Google, Nursing & Allied Health Source, SCOPUS, HINARI, and PubMed searched from January 2014 to July 2016. A study found that there were relationships amounts of nurse staffing, nurse work satisfaction, nurse practice environment, burnout, and nursing care quality (Virya Koy, Yunibhand, Angsuroch, & Fisher, 2017).

### **5.1 Nurse staffing**

#### **5.1.1 Definition of nurse staffing**

Regarding to American Nurses Association (ANA) defined nurse staffing as enough staffing as “a match of RNs’ expertise to meet the needs of the patients, where nursing care services provided in the context of the practice setting and situations. The delivery of appropriate nurse staffing was necessary to reach safe, quality outcomes; it was accomplished by dynamic, multidimensional decision making processes that require to take into account a wide range of variables (Mensik, 2017).”

Staffing normally was a day-of-operations function in which entitled persons assessed and determined the shift-to-shift ratio of RNs to patients to ensure adequate staffing on each shift in the unit. Usually, staffing processes did not look more than 24 hours in advance of the shift, or 48 hours for a weekend or holiday.

Staffing may be centralized or decentralized as followings (1) with centralized staffing, there was one department to take responsible for staffing all units if any units required additional nurses to fulfill the tasks, which included as call-in staff, call-off staff, or float staff; (2) the decentralized staffing meant head nurse, charge nurses, or managers identified the level of staffing needed before and during the shift (Mensik, 2017).

An swollen patient-nurse ratio in the evening was related with a 90 percent was increased in relative risk of death in ICUs (Donaldson et al., 2005). In addition, there were more than 22 000 registered nurses’ reported about the low nurse-to-patient ratios were related with higher informed poor nursing care quality and safety (McHugh & Stimpfel, 2012; Stimpfel & Aiken, 2013); relationship between the



nursing staffing and nursing care quality (Spilsbury et al., 2011).

Usually the Nurse-Patient Ratios in government hospitals in Cambodia was ranged between 1-15 and 1-25 (one nurse is taking care of patients from 15 to 25 patients per shift).

### **5.1.2 Research related to nurse staffing**

There was a large and growing literature on the relationship between nurse staffing. For examples, a study investigated whether the size of the workforce (nurses, doctors and other health personnel) has an influence on the survival chances of critically sick patients together in the intensive care unit (ICU) and in the hospital (West et al., 2014).

Another study found that a higher number of patients per RN was significantly related with higher odds of reporting poor/failing patient safety (OR = 1.02, 95% CI = 1.004–1.03) and poor or fair NCQ (OR = 1.02, 95% CI = 1.01–1.04), and having care left undone due to lack of time (OR = 1.03, 95% CI = 1.01–1.05) (Cho et al., 2016). In addition, these researchers described that RNs who did not work overtime, RNs working overtime informed an 88% increase in failing or poor patient safety, a 45% increase in fair or poor NCQ, and an 86% increase in care left undone.

Another study focused on a higher level of RNs per bed appears to increase overall patient satisfaction, and hospitals with a higher proportion of nursing hours provided by contract nurses have significantly lower levels of patient satisfaction on scores associated to overall patient satisfaction and nurses' communication with the patients (Hockenberry & Becker, 2016).

Based on a study, which was concerned on the nurse staff level and patient outcomes found that RN staffing levels were associated with a lower risk of mortality for medical patients, in regression models controlling for both medical and support worker staffing for the in England (J. Ball, 2017). Similarly, a study was reported that increased patient-nurse ratio shift was associated with increased relative risk of mortality by 6-7 percent in surgical patients (Aiken et al., 2014). Another study found that nurse staffing was inversely associated with all outcomes; total hours per patient day was inversely associated (higher staffing related to lower event rate) with all outcomes; while RN skill-mix was positively associated with fall rate and pressure ulcer rate (He, Staggs, Bergquist-Beringer, & Dunton, 2016). Furthermore, a study

reported that the study was analyzed the evidence-based research, which was concerning nosocomial infections and the nursing shortage indicated that the lack of adequate nursing staff influenced to increase the rate of infection (Cronin, Leo, & McCleary, 2011).

Another study focused on nurse staffing and nursing outcomes, this was found out that 76% RNs group who were given direct nursing care made fewer medication errors than the 100% RNs group; the 76% and 92% RNs groups had a higher level of urinary tract infections; the 92% RNs group had a lower level of bloodstream infections; the 76% RNs group had a lower level of ventilator weaning; and the 76% and 92% RNs groups encountered higher nursing costs (P. H. Yang, Hung, & Chen, 2015).

### **5.1.3 Measurement of nurse staffing**

Nurse staffing is originated from the nurse surveys. Nurses were asked to deliver the details on the last shift, which could be day, evening, or night shift that they had worked, this included the number of patients they were assigned. Since staffing is scientifically different from one nursing units to other specialty units such as labor and delivery, and varies systematically at different times of day, which was derived a similar staffing assessed within and across sites by computing the average total of patients assigned to medical-surgical nursing personnel in each hospital who last worked a day duty. What is expanded in accurateness by limiting attention to staffing in a certain specialty on a exact shift versus considering staffing across all specialties and shifts would be observed in future analytical work (Aiken, Clarke, Sloane, & Consortium, 2002).

A nurse staffing measurement was calculated as the mean patient load across all registered nurses who was taken responsibility at least 2 patients on the last shift they worked, regardless of specialty or day, evening, night shift worked (Aiken, Clarke, Sloane, Sochalski, et al., 2002).

Another study used Nurse Survey as single item to ask RNs there were adequate RNs to deliver high-quality care, there were sufficient staff nurses to get work done, and there were enough supporting services (Aiken et al., 2001).

Another study measured the permanent nurse staffing, and patient days of care monthly, which was came from payroll and human resources databases. First,

nurse staffing was calculated as the hours of care per patient per day from all nursing staff, which was All Hours = Hours of direct patient care by RNs, LPNs, and nursing assistants each month split by the patient days of care on the unit for the month. Second, the calculation was hours of care provided by RNs were analyzed using only the hours of direct patient care from RNs divided by patient days. The variable RN proportion was then calculated as RN Hours per patient day divided by All Hours per patient day (Blegen, Goode, & Reed, 1998).

Another used nurse-staffing measurement was the total hours of nursing care, and the proportion of those hours of care delivered by registered nurses (J. M. McCloskey, 1998). Another paper assessed nurse staffing according to ratio tool, hours per unit (HPU) method using billed cares for technical procedures and finally a simple 1:6 ratio according to the patient volume (Rodgers, 2016).

## **5.2 Nurses work satisfaction**

Nurse work satisfaction is less than satisfactory despite well-known factors such as recognition, autonomy, and organizational commitment. Nurse work satisfaction is defined as ‘the degree to which nurses like or enjoy their jobs’ (J. C. McCloskey & McCain, 1987). Likewise, a study reported that more than 40% of nurses working in United States (US) hospitals were low work satisfaction with their jobs. In addition, low work satisfaction has been found to result in nurses becoming burned out (Aiken, Clarke, & Sloane, 2002). Job dissatisfaction related to adverse outcome (Aiken, Clarke, & Sloane, 2002; Hayes et al., 2006; Needleman, 2015). Earlier studies have implied that nurses in hospitals with supportive nursing practice environments and had sufficient nurse staffing were more satisfied in their jobs (Aiken et al., 2008; Laschinger, Almost, & Tuer-Hodes, 2003), experienced less nurse burnout (Vahey, Aiken, Sloane, Clarke, & Vargas, 2004), and reported better nursing care quality (Aiken, Clarke, & Sloane, 2002).

Other studies informed that nursing practice environment was positively correlated with nurse assessed nursing care quality; and negatively associated with burnout and lesser nursing staff was greater nursing care quality as fair or poor (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Sochalski, 2004; Van Bogaert et al., 2009).

### 5.2.1 Definition of nurse work satisfaction

Nurse work satisfaction could be defined as how one feels about one's job (Cowin et al., 2008; P. L. Stamps & Piedmonte, 1986). Furthermore, work satisfaction was described as the degree of positive affect towards a job or its components or employment (C. W. Mueller & McCloskey, 1990). A study was described work satisfaction as an individual's appraisal of the degree to which the work accomplished one's own work values could cause a positive emotional state of happiness or contrasting negative feeling of displeasure. These definitions seem to be just one feather of job attitude, which explained as an overall feeling about the job that could be measured by the approach assessment (Coomber & Barriball, 2007).

Furthermore, work satisfaction could view as a set of attitude about various characteristics of the work that could be used facet approach to identify certain aspects of work which produce satisfaction or dissatisfaction individually (Coomber & Barriball, 2007). Facets of work satisfaction could include any viewpoints of the work. A study (Prothero, Marshall, & Fosbinder, 1999) identified work satisfaction in terms of values of intrinsic and extrinsic. Extrinsic values comprise touchable aspects such as pays, job benefits, networks and bonuses. Intrinsic values comprise of status, a sense of accomplishment, the capacity interacts with others, self-worth, self-esteem, buildup of knowledge or skills, and the capacity to use and express creativity (Herzberg, 1965; Prothero et al., 1999; Spector, 1985). These could be measured with these facets of work satisfaction. Together with these definitions, work satisfaction could be referred to affective elements such a feeling of satisfaction, and a perceptual element which was an evaluation of whether one's work meets one's needs (Tovey & Adams, 1999). Additionally, these accessed multifaceted of work satisfaction contained pays, co-workers, supervisors, work environment, and workplace factors (P. Stamps, 1998; P. L. Stamps & Piedmonte, 1986).

Considering previous literature, work satisfaction in the present study is referred to nurses' consideration of the degree to which the work fills their own work values on certain dimensions of the job which comprised of autonomy, pay, task requirements, organizational policies, interaction, and professional status (Coomber & Barriball, 2007; P. Stamps, 1998).

### **5.2.2 Research related to nurse work satisfaction**

Because nursing remains in the midst of its most significant shortage, the satisfaction or dissatisfaction of nurses is of great concern to nursing and hospital administrators (Lynn, Morgan, & Moore, 2009). The RNs who were not satisfied, which may be distracted from their sick persons, failure to deliver holistic care, and in general, deliver a lesser nursing care quality (Mrayyan, 2006). According to another study, which reported that work satisfaction of nursing staff was associated to patients' perceptions of NCQ as well (Kvist, Voutilainen, Mäntynen, & Vehviläinen-Julkunen, 2014).

Considering the literature, work satisfaction was an important concept as levels of work satisfaction may impact upon the universal nursing workforce. This could be hypothesized that work satisfaction has direct positive relationship with NCQ, and has direct negative association to burnout.

### **5.2.3 Measurement of nurse work satisfaction**

Considering literature review, there were various measuring used to assess work satisfaction. There were four instruments that would present as the followings:

The Work Satisfaction Survey (JSS) had been developed for using in human service to measure manners about the job and characteristics of the job. The scale was established constructed on the samples from community health centers, state psychiatric clinics, state social service specialties, nursing homes (Spector, 1985). The scale contained having 36-item, and nine aspect scales. The nine aspects were pay, promotion, supervision, fringe benefits, contingent rewards, operating procedures, coworkers, nature of work, and communication. There are four questions for each subscale, and a total score is computed from all items. A summated rating scale format was applied, with five choices per item ranging from " 1 = strongly disagree very much" to "5 = strongly agree." The items were written in both directions, so about half must be reverse scored. Based on the internal consistency reliabilities (coefficient alpha) of total scale reported 0.91 (Spector, 1997).

Later, The Index of Work Satisfaction (IWS) developed originally in 1972. This instrument was based on a combination of need theory and social orientation group theory (P. L. Stamps & Piedmonte, 1986) and has been through two

revision processes (P. Stamps, 1998). The IWS has been examined in multiple nursing populations (Newcomb, Smith, & Webb, 2009). For instance; this instrument had been used by the American Nurses Association since 2003 for its National Database of Nursing Quality Indicators (NDNQI), which was part of the Association's safety and quality initiative (Taunton et al., 2004). The IWS is a two-part multidimensional instrument. Part A assesses the importance of six components of work satisfaction: pay, autonomy, task requirements, organizational policies, interaction and professional status. The elements were defined at the beginning of the instrument before respondents are presented with 15 forced-choice, which was compared the six components. Pay is the monetary recompense and extreme benefits as received for the work done. Autonomy was the quantity of job-associated independence, creativity and freedom, either permitted or required in daily work activities. Task requirements were tasks or activities that must be done as a routine work. Organizational policies were the managing policies and procedures put forward by the hospital and nursing administration of the healthcare facilities. Interaction was the chance presented for both official and unofficial social and professional contact during working hours. Professional status was the whole importance or significance felt about the work, both in own opinion and in the opinion of others. Part B is contained of 44-statement that allowed respondents to rate their existing feelings of work satisfaction on a Likert scale ranging from 1 (strongly agree) to 7 (strongly disagree). Half of the items were positively while the other half was negatively worded. Higher work satisfaction was indicated by high on positively worded items, low scores on negatively worded items or both. On the other hand, little work satisfaction was indicated by little scores on positively worded items, high scores on the negatively worded items or both. Possibly scores ranged from 44 to 308. If scoring were lesser 50% of possible scores, it would be indicated as a low quantity of satisfaction. Previous research has identified the instrument was reliable and valid, which was coefficient alpha ranged from 0.82 to 0.91 for the total scale (Stamps, 1997). The six subscales proved adequate reliability coefficient ranges of pay (0.83 - 0.89), Autonomy (0.69 - 0.76), Task Requirements (0.69 - 0.78), Organizational Policies (0.73 - 0.83), Professional Status (0.45 - 0.76), and Interaction (0.72- 0.84). The IWS has been used several times for clinical and managerial purposes and was found to be a valid and reliable tool of nurse work

satisfaction (Best & Thurston, 2004; Manojlovich, 2005).

In 1990, another instrument was developed, which named as Mueller and McCloskey Satisfaction Scale (MMSS). The MMSS was designed to assess nurse work satisfaction midst nurses working in hospitals and consists of 31-item assessing nurses' work satisfaction in eight domains as follows: (1) satisfaction with extrinsic rewards, (2) scheduling, (3) family/work balance, (4) co-workers, (5) interaction, (6) professional opportunities, (7) praise/recognition, and (8) control/responsibility. Each item was graded along a 5-point Likert scale (5=very satisfied, 3=neither satisfied nor dissatisfied, 1=very dissatisfied). The reliability of the scale was presented by internal consistency ( $\alpha$ ) = 0.89., and test-retest reliability = 0.64 (six month interval). Criterion-related validity had been presented association with Brayfield-Rothe general satisfaction scale, Hackman and Oldham's job diagnostic survey that ranged from 0.53 to 0.75. Construct validity has been indicated the associated with characteristics from job characteristics inventory that discovered in the parts of autonomy, friendship opportunities, feedback, variety and task identity, and association with NCQ (C. W. Mueller & McCloskey, 1990).

The Satisfaction in Nursing Scales (SINS) was developed traditionally to measure on work satisfaction, which highlighted on the interface of people with their work environment and condition of occupation (Lynn & Redman, 2005). This scale has been administered with 787 RNs to assess the association between organizational commitment, work satisfaction, and NCQ. This scale contained of 54-item rating on 4 Likert-type scales, which was with ranging from 1 = strongly disagree to 4 = strongly agree. It was used to assess in 4 domains, which are workload, intrinsic satisfiers, collegiality, and administrative support. The scale reliability was ranged from 0.87 to 0.92. The SIN was tested for content validity using panelists of 20 RNs; all items were measured as content valid by at least 80% of the panel experts.

Prior literature was shown different kinds of measurement to assess work satisfaction in various aspects. However, the Index of Work Satisfaction (IWS) was developed by (P. Stamps, 1998) presented the aim to respond the feelings of work satisfaction on six dimensions, which could be assessed the attitude of nurses toward overall their work. Furthermore, the IWS has been assessed several times for clinical

and administrative aims and was found to be a valid and reliable assess of nurse work satisfaction (Best & Thurston, 2004; Manojlovich, 2005).

In conclusion, this study work satisfaction refers to nurses' appraisal of the level to which the work meets their own work values on specific domains of the career, which comprised of autonomy, pay, task requirements, organizational policies, interaction, and professional status. The details of adaptation process and psychometric properties testing of the instrument are presented in Chapter III.

### **5.3 Nursing practice environment**

Nursing practice environment is where RNs practice, can also effect on nursing care quality. This unit practice environment was central to the delivery of high nursing care quality and advised that nurses working in more positive practice environments were better placed to provide better care (Warshawsky & Havens, 2011). This was assessed by the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002; Warshawsky & Havens, 2011), the most commonly reported assesse used to evaluation the nursing care quality.

As illustrated in most theoretical models of NCQ, the structural characteristics of the work environment was high interest in the theoretical emphasized in current study. The characteristics of "Magnet hospital" was acknowledged as a accomplishment in attracting and maintaining nurses (Gu & Zhang, 2014) that was well known in the key factors of the work environment impacted hospital success. Nurse practice environment was acknowledged as an essential issue in attracting and maintaining professional nurses in hospital care (Heinen et al., 2013).

In previous studies found that nursing practice environment predicted nursing care quality through burnout (Bogaert et al., 2013a). They added that the relation between nursing practice environment and burnout (Bogaert, Clarke, Willems, & Mondelaers, 2013b) as an postponement of our earlier findings involving nurse-assessed NCQ in a example of psychiatric care RNs.

A previously study reported that the large of 617 and 488 hospitals from the US and 12 European countries confirmed the influence of nursing practice environment on nursing care quality (Aiken et al., 2012). In each country shortfalls in nursing care quality were identified as well as better-perceived nursing practice environments. There was growing consensus amongst leaders and researchers that



certain hospital characteristics were supporting sound nursing practice environments and nursing care quality can be replicated (Kirwan, Matthews, & Scott, 2013; Li et al., 2013).

### **5.3.1 Definition of nurse practice environment**

Nurse practice environment can be defined in numerous ways. Hoffart & Woods (1996) had defined nursing practice environment as “a system that supports registered nurses controlled over the provision of nursing care and the environment in which care was delivered”. Likewise, another study described the meanings of practice environment as “a set of concrete or abstract psychological features, such as job characteristics, autonomy, and advancement opportunities perceived by necessary job who compared these opinions against a set of standards, values, or needs” (Ganz & Toren, 2014). Nurse practice environment can be referred to the organizational characteristics of a work setting that assist or restrain professional nursing practice (Lake, 2002). In other words, the organization characteristic has identified on five dimensions, each once of the PES-NWI was named and defined.

Participation in Hospital Affairs subscale was stated “nurses were involved in hospital and nursing division affairs (internal governance, policy decision-making, and other committees), had chances for advancement, communicated openly with a responsive nursing management, and recognize a powerful, visible, and available nurse executive”. The Nursing Foundations for Quality of Care subscale, she described that, “a high standard of patient care included a persistent nursing philosophy, a nursing (rather than a medical) model of care, and nurses’ clinical competence. Quality was assured by a formal quality assurance program, as well as by cultivation of new staff and continuing professional education for all staff. Numerous nursing model indicators of care comprised continuousness of nursing care and the use of nursing diagnoses and nursing care plans”. The Nurse Manager Ability, Leadership, and Support of Nurses subscale, Lake described key qualities of a nurse manager as “being a good administrator and leader, the nurse administrator would support the nurse when there was a struggle with a physician, when nurses made errors, and by praising and acknowledging a job well done”. The Staffing and Resource Adequacy subscale, she defined as “to having enough nurses to provide quality patient care were being able to use time with patients and being able to discuss

patient care problems with other nurses”.

Another study was defined nursing practice environment as “a set of workplace structures that, when present, enable nurses to display professional practice characterized by decision-making autonomy, clarity of mission, and organizational responsiveness” (Estabrooks et al., 2005).

In summarized, the purpose of this study is to investigate nurses’ perspective nursing practice environment that could be presented the characteristic of magnet hospital, which was significantly in nursing care quality, thus, this study would use the theoretical definition proposed by Lake (2002). In addition, this construct was demonstrated on the scope of nurses in magnet hospital that acknowledged as successful in attracting and maintaining nurses. The current study, a nursing practice environment is referred to the organizational characteristics of a work setting that support nurses in providing nursing care and assist or restrain in professional nursing practice. These traits or indicators of a work setting include nurse participation in hospital affairs; nursing foundations for the quality of care; nurse manager ability, leadership, and support of nurses; adequacy of staffing and resources; and collegial nurse-physician relations.

### **5.3.2 Research related to nurse work environment**

A study conducted a different countries, different settings, which was cross-sectional survey design to administer among 23,159 RNs who were employed on surgical and medical units in ten European states that joined in the RN4Cast study (Heinen et al., 2013). The findings had many factors, which related with level of nurse-physician relationship (OR 0.86; 95% CI 0.79-0.93), leadership (OR 0.78; 95% CI 0.70-0.86), participation in hospital affairs (0.68; 95% CI 0.61-0.76), older age (OR 1.13; 95% CI 1.07-1.20), female gender (OR 0.67; 95% CI 0.55-0.80), working fulltime (OR 0.76; 95% CI 0.66-0.86) and burnout (OR 2.02; 95% CI 1.91- 2.14).

A study examined the direct and indirect relationships among the practice environment, nurse-physician communication, and nurse work satisfaction among 500 hospital nurses throughout Michigan (Manojlovich, 2005). The findings revealed the practice environment were highly associated with work satisfaction ( $r = 0.68$ ,  $p < 0.01$ ). The regression analysis presented the work practice environment was a significant predictor of work satisfaction ( $\beta = 0.39$ ,  $t\text{-value} = 7.67$ ,  $R^2 = 0.61$ ).

Another study examined nurse practice environments and outcomes of nurses who were working in oncology units or magnet hospitals. That study was invited 1,956 RNs, of whom 305 worked in oncology units, which were sample in the study. The findings revealed emotional exhaustion was significantly lower among oncology nurses working in magnet hospitals. The scores on the Collegial Nurse-Physician Relations subscale were highest among oncology nurses. Outcomes were related with Practice Environment Scale of the Nursing Work Index scores and Magnet status (Shang, Friese, Wu, & Aiken, 2013). The results of the logistic regression model illustrated that nurses who responded favorably on the Nurse Manager Ability, Leadership and Support of Nurses ( $\beta = -.24, p < .01$ ; OR .79; 95% CI -.38, -.11); Staffing and Resource Adequacy ( $\beta = -1.17, p < 0.01$ ; OR 0.31; 95% CI -1.37, -0.98); and Collegial Nurse-Physician Relations ( $\beta = -.21, p < .01$ ; OR .81; 95% CI -.37, -.06) subscales were far less likely to have high emotional exhaustion. Additionally, nurses who were responded favorably on the Nurse Manager Ability, Leadership and Support of Nurses ( $\beta = -0.81, p < 0.01$ ; OR 0.44; 95% CI -1.01, -0.61); Staffing and Resource Adequacy ( $\beta = -1.55, p < 0.01$ ; OR 0.21; 95% CI -1.74, -1.36); and Collegial Nurse-Physician Relations ( $\beta = -0.25, p < 0.01$ ; OR 0.78; 95% CI -0.42, -0.07) subscales were far less likely to have high job dissatisfaction. The higher scores on the Staffing and Resource Adequacy subscale were a strong and significant predictor for all three outcomes. Oncology nurses with adequate staffing and resources were 80% less likely to report emotional exhaustion, 84% less likely to have job dissatisfaction, and seven times more likely to report high-quality care ( $p < 0.01$ ). Nurse manager ability was only a significant predictor for job dissatisfaction ( $p < 0.01$ ).

Nurses work environments have been associated with several nurse job outcomes, including higher work satisfaction. Additionally, it was also lower turnover rated (Aiken, Clarke, & Sloane, 2002). Likewise, a study observed that work environment characteristics, such as leadership, supervisory relations, and participation, were associated to nurse work satisfaction (Irvine & Evans, 1995). Moreover, nurse work satisfaction was negatively associated to NCQ. Another study has not been supported nurse work environment, which was resulting in lower occupational commitment and work satisfaction, and predicted NCQ (Samuel, 2015).

A study has been examined the impacts of nurse work environment on Belgian nurses' job outcomes and found that hospital management and organizational support were significant predictors of nurse work satisfaction (Van Bogaert et al., 2010).

These literatures can be hypothesized that nurse work environment, which is supportive environment has direct positive relationship with work satisfaction.

### **5.3.3 Measurement of nurse practice environment**

The instruments used to measure nursing practice environment were variety developed for evaluating their practice environment. There were four existing instruments have been used to measure nursing practice environment, these are presented as the followings:

The Nursing Work Index (NWI) was established by a group of researchers (Kramer & Schmalenberg, 2003). This was the primary instrument to measure the attributes of an excellent staff nurse work environment. This used for the work environment characteristics reported by nursing representatives from 41 magnet hospitals to develop this index. This index contained of 65 items and categorize the attribute as nurses autonomy, control over practice, presence of collaborative nurse-physician relation that had established in the purpose to study and used to identify work values related to nursing work satisfaction, perceived productivity, and perceptions of an environment conducive to quality nursing care (Kramer & Schmalenberg, 2004). For each item, nurses responded on a 4-point Likert scale. The criterion validity was addressed by a sample of nurses from magnet and non-magnet hospitals that present positive correlations between hospital level work satisfaction and the past year's turnover rate ( $r = 0.95$ ), and between individual level perceived productivity and performance evaluation ( $r = 0.17$ ). Internal alpha reliability coefficients (Cronbach's) for each subscale ranged from 0.89 to 0.93 (Kramer & Hafner, 1989). However, as a time passing, this tool was doubtful on its cutting edge and changing in the context. Additionally, many items on the NWI demonstrate a lack on commonly shared and understood definition, and also presence inconsistency regarding to the validity of the subscales (Kramer & Schmalenberg, 2004). Moreover, as quite long instrument-65 items is consuming time for respondents (Lake, 2002).

Later, the NWI was redesigned to revise Nursing Work Index (NWI-R) in order to measure the Medicare mortality rates for 39 original magnet hospitals and 195 matched control hospitals (Aiken, Smith, & Lake, 1994). In that study, the result publicized that the magnet hospital was presented significantly lower mortality rate and higher score on nurse autonomy, control over clinical setting, and associations with physicians. The NWI-R was a 57-item, which comprised of 55 original NWI items and two additional items. This tool was consisted of four subscales include autonomy, control over work environment, relationship with physicians, and organizational support of care givers. In 2000, a study reported on the development and usefulness of the NWI-R in assessing of professional nursing practice environments. This study nurses reported on the existence of their current job, which used to describe traits of a hospital or nursing unit (Aiken & Patrician, 2000). The findings shown Cronbach's alpha was 0.96 for the entire NWI-R, for individual level ranged from 0.75 to 0.79, and 0.84 to 0.91 for nursing setting level. The instrument was tested validity and its ability to differentiate between hospitals or nursing units with known administrative forms, which were correlated with better nurse and patient outcomes. Later, they compared both NWI and NWI-R, which could distinct on its focus, NWI-R determined the focusing on the existence of particular organizational traits, however, NWI focused on nurse satisfaction and supposed productivity correlated with these traits (Lake, 2007).

Lake had revised the NWI by conducting a secondary data examination from (Kramer & Hafner, 1989) and (Aiken et al., 2001) to assess the hospital nursing practice environment, which has been renamed to the Practice Environment Scale of the Nursing Work Index (PES-NWI), which comprised of 31 items scales and defined in five subscales: nurse participation in hospital affairs (9-item), nursing foundation for quality of care (10-item), nurse manager ability, leadership, and support of nurses (5-item), staffing and resource adequacy (4-item), and collegial nurse-physician relations (3-item). In the scale was developed that Lake had done conceptual examination in the first stage, in the second stage she explored the factor analysis was used to identify subscales, in the third stage the individual- and hospital-level reliabilities of the subscales and the composite were examined (Lake, 2002). A factor analysis indicated that the Cronbach's alpha values for these five subscales and the

entire scale were 0.71 to 0.84 and 0.82, respectively. In addition, the intra-class associations of the five subscales and the entire scale were 0.86 to 0.97 and 0.96, respectively. In the fourth stage the construct validity of the subscales were assessed by comparing the scores of nurses in magnet and non-magnet hospital samples. The significant differences were found between these two groups; magnet hospitals informed higher scores on each subscale. This scale was used a four-point scale, which was responded ranging from 1 (strongly disagree) – 4 (strongly agree). The higher the total score was the more agreement with the magnet nursing practice environment. Previous studies indicated that there have been associated poorer scores on PES-NWI subscales to increases in nurse: bed ratio and decreases in safety and patients' outcome (Lake & Friese, 2006; Laschinger & Leiter, 2006). It was a reliable assess at nurse and hospital levels to examine nursing practice environment associated to magnet hospital characteristics. Its psychometric properties were analyzed through homogeneity (e.g. internal consistency, intra-class correlation) and construct validity (e.g. factor analysis, known-group approach: higher mean scores in magnet hospitals compare to non-magnet hospitals). The five factors in the instrument were explained 48% of the variance in the PES-NWI.

Formerly, a study used factor analysis to endorse the Professional Practice Environment (PPE) (Hasselhorn, Tackenberg, Müller, & Group, 2003), which was administered with 849 nurses working in the acute care setting (Erickson et al., 2004). This instrument was established foundation the concept of magnet hospitals. The PPE comprised of 38 items that used to assess the level of positive regard nurses on their practice environment and categorize the conflict resolution and inter-professional practice. Scores ranged from 1 (strongly disagree) to 4 (strongly agree). These findings demonstrated that there were eight dimensions in in the acute nursing setting that were: handling disagreement and conflict, internal work control over practice, leadership and autonomy in clinical practice, staff relationship with physicians, teamwork, cultural sensitivity, and communication about patients. Though the PPE was explained grounded theoretically measurement, there was no theory specifically defined to support the assessment. The Cronbach's alpha for the whole instrument was indicated as 0.93, which the subscale alpha ranged of 0.78 - 0.88. It explained the benefit of PPE as regarding the practice environment beyond the

original magnet characteristics to also make conclusion in the areas such as disagreement work motivation and culture sensitivity.

When developer compared between PES-NWI and NWI instruments, it was more parsimonious and psychometrically sound with empirical subscales (Lake, 2002). In the scale development study, Lake used a theoretical framework based on sociology of organizations, occupations, and work to guide the analysis. Additionally, this instrument demonstrated its construct validity of the subscales by comparing the scores of nurses in magnet and non-magnet hospital samples. In term of magnet hospitals are recognized as those productively proving in fascinating and maintaining nurses in which nurse practice environment was characterized by professional autonomy, control over nursing practice, adequacy of staffing, support management, and effective interdisciplinary associations (Goode et al., 2005). The nursing practice environments of magnet hospitals positively subsidized to hospital outcomes in both patients and nurses such as lesser mortality, greater work satisfaction and lesser turnover rate (Upenieks, 2003). It was noticeably beneficial for hospitals to adopt a magnet work environment for the practice of nursing because nurse practice environment was significantly associated with NCQ (Y. Wang, Chang, Fu, & Wang, 2012), thus, the investigation of the nursing practice environments based on magnet hospital traits could provide insights into the development of an optimal nursing practice environment in Cambodia context in recruiting and preserving qualified RNs. Therefore, the PES-NWI is an appropriate instrument for measuring nurse practice environment with its demonstrating high psychometric properties' values.

In summary, this study nurse practice environment defines the organizational characteristics of a work setting that support nurses in providing nursing care and facilitate or restrain in professional nursing practice. These indicators of a work setting comprise of nurse contribution in hospital affairs; nursing foundations for the quality of care; nurse manager ability, leadership, and support of nurses; adequacy of staffing and resources; and collegial nurse-physician relations. To examine this concept, the Practice Environment Scale of the Nursing Work Index (PES-NWI) – Cambodian version modified from the PES-NWI' was used in the study. The details of adjustment process and psychometric properties testing of the instrument are presented in Chapter III.

#### **5.4 Nurse burnout**

Nurse burnout has been theorized as a psychological syndrome containing emotional exhaustion, a tendency to depersonalize client encounters, and a reduced sense of personal accomplishment (Maslach, Jackson, & Leiter, 1986). Nurse burnout was assessed using the Maslach Burnout Inventory–Human Services Survey (MBI-HSS), a standardized instrument with published norms for medical personnel that has been applied formerly in international research (Aiken et al., 2008; Aiken et al., 2001; Poghosyan, Aiken, & Sloane, 2009; Poghosyan et al., 2010). There were some studies informed that enough nurse staffing and satisfied in their work, familiarity less nurse burnout, and report better quality of nursing care (Aiken, Clarke, & Sloane, 2002; Needleman, 2015; Rahman & Shamsudin, 2015; Vahey et al., 2004).

As the results, it was robust evidence to support nurse staffing, nurse work satisfaction, nursing practice environment, and burnout on nursing care quality. Similar to many studies reported that low nursing care quality has been associated with nursing outcomes such as falls (Sochalski, 2004), medication errors (Blegen & Vaughn, 1998), decubiti, nosocomial infections, upper gastrointestinal bleeding (Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002), ‘failure to rescue’ incidents, pulmonary complications, increased hospital costs and mortality (Simpson, Lyndon, & Ruhl, 2016).

##### **5.4.1 Definition of nurse burnout**

Nurse burnout developed into the literature in the 1970s, a study defined burnout as a state of fatigue or frustration that resulted from professional relationships that failed to increase the expected rewards (Aiken, Havens, & Sloane, 2009; Freudemberger, 1974). Moreover, burnout was explained as a syndrome of physical and emotional exhaustion caused by long-term involvement in situations that were psychologically demanding (Pines & Aronson, 1988; Pines & Maslach, 1978). Additionally, another study defined burnout as “a syndrome of emotional exhaustion and cynicism that occurs frequently among individuals who do ‘people-work’ of some kind”(Maslach & Jackson, 1981).

These researchers later has been explained more on the definition of burnout by referring burnout as a physical, emotional and intellectual exhaustion syndrome revealed by adverse attitude to professional life and other people with the



progress of a adverse self-esteem in the individual experiencing chronic fatigue, and mindsets of helplessness and hopelessness (Maslach & Jackson, 1981). Formerly, they had been defined burnout as “a syndrome of emotional exhaustion, depersonalization, and reduced personal achievement that can arise among individuals who employment with people in some capability” (Maslachi et al., 1996). This concept can be divided into three categories, namely: 1) emotional exhaustion is defined as feeling of being emotionally drained and exhausted either physically or cognitively by one’s work; 2) depersonalization refers to an insensitive response toward people who are recipients of one’s services; and 3) personal accomplishment refers to feelings of competence and successful achievement in one’s work with people (Jourdain & Chênevert, 2007). In supplement, burnout can be referred as a state of physical, emotional and mental exhaustion that results from long-term participation in work situations that are psychologically demanding (Schaufeli & Greenglass, 2001).

Later, researchers had been mentioned on specific aspects in the person’s life, in order to understand this particular concept, there were many studies have been conducted to focus on the attribute of fatigue and exhaustion (Kristensen, Borritz, Villadsen, & Christensen, 2005). Burnout refered to as “a certain type of prolonged professional stress that seemed to happen most significantly among human being, who provided services professionals, with emotional exhaustion as its core symptom”. This could be separated into 3 domains that are 1) personal burnout was referred to the degree of physical and psychological exhaustion experienced by the person; 2) work-related burnout was referred to the degree of physical and psychological exhaustion that is perceived by the person as associated to his/her work; and 3) client-related burnout was defined as the degree of physical and psychological exhaustion that was perceived by the person as linked to his/her work with clients.

Burnout has been explained to highlight more on a commonly affects employees in service employments, especially those with prolonged experience to stressors (Borritz, 2006; Poghosyan et al., 2009). Burnout was referred as degree a existent dysfunctional state that results from prolonged experience to chronic stress, which was a situation where a person senses encountered incessantly with a high level of burdens and inadequate resources associated to the work itself and to degree in

which the work takes place (Jourdain & Chênevert, 2010).

From literature review confirmed that most scientific research uses the three domains included emotional exhaustion, depersonalization, and personal accomplishment (Schaufeli, Leiter, & Maslach, 2009). However, there are some arguments regarding these three domains. Some author argued that the depersonalization domain has been regarded because it correlated coping strategy rather than an critical part of the syndrome, and lack of personal achievement appeared to be in the process of being relegated to the status of a possibly correlated coping strategy, therefore, it may not be integrated into a single score (Borritz, 2006; Kristensen et al., 2005; Schaufeli & Taris, 2005). Many authors agreed that emotional exhaustion was a core element of burnout. Thus, numerous studies have been referred the concept of burnout based on one-dimensional of burnout syndrome, which was the feelings of emotional exhaustion because there were strong literature supported the emotional exhaustion domain was most strongly linked to causes and consequences of burnout (R. T. Lee & Ashforth, 1996). In other words, various authors referred burnout in two domains, which were emotional exhaustion and depersonalization (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). A study had been shown that the domains of personal accomplishment was problematic because it was found to have a weak connection with the emotional exhaustion and depersonalization domains in the examination on the causes and consequence of burnout (R. T. Lee & Ashforth, 1996).

The concept of burnout referred as emphasized on prolonged professional stress among human being, which provided service employees, where former engaged employees steadily get overwhelmed of emotional exhaustion, loss of energy, and withdrawal from work, which was encompassed personal burnout, work-related burnout, and client-related burnout (Borritz, 2006). Thus, this study's operational definition of burnout defined personal burnout, work-related burnout, and client-related burnout.

#### **5.4.2 Research related nurse burnout**

A study was conducted to examine the relationship of burnout on NCQ; they reported that 22% of nurses informed high emotional exhaustion, 18% high depersonalization, and 35% low personal accomplishment. Furthermore, 16% of

nurses rated quality of care on their work unit as fair or poor, 5% informed patient falls, 11% informed medication errors, and 14% informed infections. All three subscales of the MBI were correlated with boosted reporting of fair or poor quality of care, patient falls, medication errors, and infections. Every unit of growing emotional exhaustion score was correlated with a 2.63 times escalation in reporting fair or poor quality of care, a 30% escalation in patient falls, a 47% escalation in medication errors, and a 32% escalation in infection (Nantsupawat et al., 2016).

Another study examined the association between nurse burnout and ratings of quality of care, which was administered the questionnaire with 53,846 nurses from six nations differently. That study was used the secondary data to analyze the International Hospital Outcomes Study; these data were collected from 1998 to 2005. The MBI of Lake was applied, which was modified as the single-item to reflect nurse-assessed NCQ were used in multiple logistic regression method to examine the relationship between nurse burnout and nurse-assessed NCQ. Transversely countries, higher levels of burnout were correlated with lower ratings of the NCQ independent of nurses-assessed practice environments. Their findings advised that reducing nurse burnout might be an effective strategy for improving nurse-assessed NCQ in hospitals (Poghosyan, Clarke, Finlayson, & Aiken, 2010).

A study was conducted by using non-probability as convenience sample technique, which administered the questionnaire with 107 patients, and 25 nurses were selected from medical and surgical unites at AL-Sadder Medical City. The study findings illustrated that majority of the nurses (80%) were working at a fair practice area, majority of the nurses (84%) were occasionally intense due to their work place, and (70.1%) of the patients were satisfying with the interpersonal support domain. In addition, they added that 62.6 patients % rated partially dissatisfied with the nursing care. Furthermore, 91.6% of patients again were partially satisfied with NCQ as a total satisfaction (Abed-Ali, Athbi, & Nawam, 2016).

Moreover, burnout is found to be correlated with work satisfaction, which was reported by previous study (Van Bogaert et al., 2010). This study conducted to assess the effect of unit-level nurse practice environment, workload and burnout on and quality of care variables. The results disclosed display significant relations between work satisfaction and nurse burnout.

Another study investigated the perception of the nursing team on work practice environment in critical care wards and its association with the safety attitude, perceived burnout and NCQ level. This study used cross-sectional to invite 114 RNs from the intensive care unit of a teaching hospital. The Maslach Burnout Inventory was applied. The findings demonstrated that the RNs who perceived greater autonomy, good associations with the health personal team and better control over the work practice environment indicated lesser levels of burnout, assessed the NCQ as good and reported a positive perception on the safety attitude for the dimensions of job satisfaction (Guirardello, 2017).

#### **5.4.3 Measurement of nurse burnout**

These instruments have developed by many people, which measured different aspects of nursing practice. The existing instrument used to assess burnout; there are four instruments that would present as the followings:

The Maslach Burnout Inventory (MBI) was developed firstly by Maslach and Jackson in 1981, was a referenced norm scale most generally used for evaluating burnout that comprised of three subscales: emotional exhaustion, depersonalization, and personal accomplishment (Maslachi et al., 1996). The measure was designed to assess hypothesized aspects of the burnout syndrome that administered to wide range of human being, which provided services, for instance, doctors, nurses, psychiatrists, counselors, and social workers, etc. This scale included of 9-item in the emotional exhaustion subscale, which defined to the feelings of being emotionally overextended and exhausted by one's work. The depersonalization subscale contains 5-item, which defined to an unfeeling and impersonal response for receivers of one's care or service. For these dual subscales, it could be explained that the higher mean scores correspond to higher degrees of experienced burnout. The 8 items in personal accomplishment that describe feelings of competence and successful achievement in one's work with people, in contrast, to identify higher degrees of experienced burnout, this subscale will correspond in lower mean scores. The scale has been rated on a 7-point Likert-type scale which asking how often they experience certain feelings. The instrument's item response options are anchored by never = 0 and every day = 6. For each subscale, the items are summed and means and standard deviations calculated. Each subscale stands alone, but together, they have been

defined the score (cut-off points) for three levels of burnout to categorize a group or individual into low, medium, or high levels of burnout (Maslachi et al., 1996). The original MBI is a reliable and valid instrument with internal consistency, Cronbach's  $\alpha$  results for the subscale ranging from .74 to .89. Test-retest reliability coefficients for the subscale were obtained by an interval of 2-4 weeks, results ranging from .69 to .82. Validity of the scale provided discriminant and convergent validity in several ways; MBI scores were correlated with behavioral rating, job characteristics that expected contribute to burnout, and various outcomes (Van Bogaert et al., 2010).

A study has been established the Maslach Burnout Inventory-General Scale (MBI-GS) from the original MBI (Maslach & Jackson, 1981). The MBI-GS was used to assess the three domains of the burnout, which contains of three subscales included emotional exhaustion, and reduced professional efficacy. This scale is a 16 items was rated on a 7-point frequency scale that ranged from 0 (never) to 6 (everyday). The emotional exhaustion domain contains of 5-item, which meant to fatigue in generic exclusive of mentioning to individuals as the source of those mindsets. Cynicism has been explained as distancing oneself from work itself and to the establishment of negative attitudes toward work in common, and not to personal associations at work. This domain comprises of 5 items. Lastly, professional efficacy was described in broader focus on encompassing of social and non-social achievement at work that comprises of 6 items. Burnout is suggested in higher scores on exhaustion and cynicism, and lower scores on effectiveness, whereas the opposite pattern reflects greater engagement. This measurement was developed for the purpose to calculate burnout among populaces in all professions. A study had indicated that the internal consistency of each of scale was satisfactory (Leiter & Schaufeli, 1996). They found Cronbach alpha coefficients was ranged from 0.84 to 0.90 for exhaustion, 0.74 to 0.84 for cynicism, and from 0.70 to 0.78 for professional efficacy. Validity of the instrument was established by using confirmatory factor analysis.

Later, in 2006, Borritz and colleague has been established new instrument to evaluate burnout named Copenhagen Burnout Inventory (CBI). This tool was developed in Denmark, which was conducted at the Danish National Institute of Occupational Health about burnout, motivation and work satisfaction. The study is designed as a three trends' prospective study over 6 years (1999-2005) in seven

organizations in the human service sector including: 1) a social security service in an urban area; 2) a state psychiatric prison; 3) institutions for severely disabled adults in a county; 4) a somatic hospital; 5) a psychiatric hospital; 6) a homecare service in a rural area, 7) a homecare service in an urban area. The CBI was developed in focusing on exhaustion and encompassed of three particular dimensions in the person's life, which was general exhaustion, exhaustion attributed to work in general, and exhaustion attributed to work with clients (Borritz, 2006).

The CBI has three different subscales that are: 1) personal burnout scale is referred to “a state of prolonged physical and psychological exhaustion”, which was a general overtiredness corresponding to the general exhaustion concept that applied to everyone in and out of the workforce. This scale had six items, which were derived from the 21 items of the BM that indicated the best psychometric properties; 2) work-related burnout that explained as “a state of prolonged physical and psychological exhaustion”, which applied to everybody in the workforce. Six of the seven items of this scale were derived from the emotional exhaustion parts of the MBI and the MBI-GS; 3) client-related burnout was defined to “a state of prolonged physical and psychological exhaustion”, which was resembled to the MBI and applicable only to populaces who work with clients. The result of this study shown that the three-burnout scales associated with each other, but it was overlay only partially that supports the idea of three different burnout scales.

All items have five response classifications. The classifications were: “never/almost never”, “a few times a month”, “once or twice a week”, “three to five times a week” and “(almost) every day”. The participants were rescaled to a 0-100 metric (Scoring: Always=100; Often=75; Sometimes=50; Seldom=25; Never/almost never= 0). The scores of this scale were calculated by taking the average mean score of the items. Reliability of this assessment found to be high for the three CBI scales (Cronbach's alpha= 0.87 for both personal and work-related burnout; and 0.85 for client related burnout). The correlation coefficients among the scales were 0.73 for personal and work burnout, 0.46 for personal and client burnout, and 0.61 for work and client burnout. This assessment tool showed discriminate validity between the professional groups in the study: a co-occurrence of both high customer and high work burnout was found in midwives, urban home care workers, social workers in the

social security service, and social care workers in the institutions for the continually disabled. Furthermore, client-related burnout showed a strong negative association with work pleasure and for selecting the same work again, if one had the accidental.

In conclusion, this dissertation burnout defines to a state of exhaustion with experienced by nurse that contained of three particular dimensions, which was included personal burnout, work-related burnout, and client-related burnout. It could benefit to assess this concept by the Copenhagen Burnout Inventory (CBI) – Cambodian version modified from the CBI of Borritz et al. (2006). The details of adaptation process and psychometric properties testing of the measurement are accessible in Chapter III.

## **6. Policy to promote nursing care quality**

The high demands to increase positive patient outcomes within the healthcare system remain to gain momentum as a significance global health policy issue. This was due, in part, to publish the numerous reports over the past decade that have designated that approximately 5–15% of patients admitted to hospitals familiarity an adverse event. Furthermore, these reports recommend that 37–52% of adverse events are avoidable (Baker et al., 2004). The current state of outcomes of patient science remains to focus predominately on the incidence of adverse events as essential indicators of safety and quality. Focusing solely on the investigation of the occurrence of adverse events and their consequences shifts the emphasis away from the importance of investigation organizational and system situations that lead to adverse events and that are often correlated with the design and provision of patient care. Appreciative the factors related to NCQ can explain important practice and policy implications, can further patient safety research, and can ultimately improve hospitals and system conditions that uphold safe clinical practices and outcomes of patients (Tourangeau, Cranley, & Jeffs, 2006).

The American Nurses Association described appropriate nurse staffing as “a counterpart of registered nurse expertise with the requirements of the patients of nursing care services in the environment of the setting and situation” (Weston, Brewer, & Peterson, 2012), which would require much greater RN personnel than is presently the norm. The ANA developed a framework of core principles for nurse

staffing that incorporates taking into account the requirements of the patient population. This was matched applicably in clinical competencies of the nurse, the level of education and length of experience of the individual nurses, and the assessment of staffing plans, which was based on nursing outcomes, particularly nurse-sensitive indicators (ANA, 2012). These core principles were implicatively to all settings where RNs were practiced and should be the standard for nurse staffing, clearly including the requirement for 24-hours RN staffing (C. Mueller, Bowers, Burger, & Cortes, 2016).

As professionals, RNs need a work practice environment that recognizes the social and health obligation of their discipline and the scope of practice and standard of nursing care as defined by country/regulatory legislation (Rocheffort & Clarke, 2010). Organizing policy structures must acknowledge the significance of level of education and ongoing lifelong learning, highlight teamwork and collegiality, which was promoted collaboration, and encourage creativity and innovation, which produce more ideas that tailor the best fitness of nursing practice. Furthermore, the quality professional practice environments have essentially the goals of nurses, which were met patients demands or assisting individually. This was takings place within the cost and quality framework authorized by the organization in which the care was delivered (Baumann, 2007).

In conclusion, delivering safe, high nursing care quality to patients has always been emphasis of nurse administrators. Ministry of Health, healthcare providers, patients, especially, nurse administrators could reduce preventable adverse events, which is harmful to patients.

Hospital and nurse administrators contribute to improving patient safety and quality. The leadership actions suggested by administrators in policy statement characterize core building blocks for such a patient safety/quality strategy. It is obligatory upon hospitals administrators to implement and enlarge upon the strategies as they struggle to eliminate errors, continuously improve the quality of nursing services and better serve the patients trusted in their care.



## **7. Structure equation modeling for analysis**

Structural equation modeling (SEM) has been applied to explain a large number of statistical models utilized to assess the validity of substantive theories with empirical data. SEM is a great powerful statistical technique that combines measurement model or exploratory factor analysis (EFA) and structural model into a simultaneous statistical test (Hoe, 2008). SEM utilized for indicating and assessing models of linear relationships among variables that may comprise both measured variables and latent variables, which are hypothetical constructs, cannot be directly measured (MacCallum & Austin, 2000). Additionally, in disparity to traditional multivariate techniques, the SEM method explicitly takes measurement error into account when statistically analyzing data and incorporates both latent and observed variables.

SEM has understood purposively the patterns of correlation/covariance among a set of variables, and explanation as much of their variance as possible with the model indicated (R. Kline, 2011). Major presentations of SEM incorporate: path analysis, causal modeling, and covariance structure analysis. In general, SEM encompasses the assessment of two models, which were comprised of a measurement model and a structural or path model (Lei & Wu, 2007).

### **Structural Equation Modeling (SEM)**

SEM presented a general and convenience framework for statistical examination that incorporated numerous traditional multivariate procedures as factor analysis, regression analysis, discriminant analysis, and canonical correlation (Hu & Bentler, 1999). Likewise, this statistical examination was great applicable to control data errors. Structural relationships were hypothesized about directional contributions or causal relations of multiple variables (e.g., how independent variables influenced dependent variables). Henceforth, path analysis was occasionally referred to as causal modeling. Because examining interrelations among variables was a major part of SEM and these interrelations were hypothesized to generate explicit detected covariance (or correlation) patterns amongst the variables, SEM was also occasionally called covariance structure examination. In SEM, a variable can serve as independent variable (named an exogenous variable) and dependent variable (named an endogenous variable) in a chain of causal hypotheses.

### **Measurement Model**

The assessment model correlates observed responses (indicators) to latent variables and occasionally to observed covariates (Skronka & Rabe-Hesketh, 2005). The assessment of latent variables initiated from psychometric theories; it cannot be evaluated directly but were indicated by responses to the amount of observable variables (indicators). The assessment model in SEM was estimated through confirmatory factor analysis (CFA). CFA was utilized to confirm the factor structure, which was a set of observed variables by analysis the hypothesis that they have association between the observed variables and their underlying latent construct(s) exists (Hoe, 2008). Once the measurement model has been indicated, structural associations of the latent factors were then modeled principally the same way as they were in path models. The integration of CFA models with structural path models on the latent constructs symbolized the general SEM outline in examining covariance structures (Lei & Wu, 2007).

Though the assessment model and structural modeling could be alongside examined, the assessment model should be primarily examined before running the full model (Hoyle, 1995; R. Kline, 2011). Conferring to recommendation the assessment model is originally examined and only when the model has a good fit. After that, the next step with running the structural model was accompanied (R. Kline, 2011). Two or more substitute models were then compared in terms of "model fit," which evaluates the extent to which the covariance predicted by the model correspond to the observed covariance in the data. The matter of how the model was best signifies the data reveals underlying theory, known as "model fit" need to be explained to prevent making such error, therefore, a guideline for identifying model fit of prospective structural equation model were defined as the follow.

The acceptance statistical criteria applied to evaluate the hypothesize model were:

#### **Absolute fit indices**

Absolute fit indicators were specified the most essential indication of how well the anticipated theory fits the data (Hooper, Coughlan, & Mullen, 2008). These indicators were encompassed Chi-square test, RMSEA, GFI, AGFI, the RMR and the SRMR.

The chi-square test ( $\chi^2$ ) purposes as a statistical method for assessing models fit and measures magnitude of discrepancy among expected and observed covariance matrices (Hu & Bentler, 1999). It is non-significant of a level with a consistent p value  $> 0.05$ , and preferably a value close to 1.00 is suggested for the hypothesized model that fit the data. Although the Chi-Squared test maintains its acceptance as a fit statistic, there exists an inadequacy in using. The Chi-Square statistic is a tremendously perceptive statistical test to sample size specifically if the samples are greater than 200 (Hoe, 2008). It indicates that the  $\chi^2$  statistic nearly always rejects the model when large samples are applied (Bentler & Bonett, 1980; Hooper et al., 2008). Outstanding to the limited of operating Chi-Square, there have substitute indicators to measure model fit.

**The normed fit chi-square ( $\chi^2/df$ )** is suggested for lessened the influence of sample size on the model Chi-square. This indicator suggests a good fit when values less than 3 (Hu & Bentler, 1999; R. Kline, 2011).

**Root Mean Square Error of Approximation (RMSEA)** is associated to residual in the model. RMSEA values range from 0 to 1 with a smaller RMSEA value demonstrating better model fit. RMSEA values between 0.05 and 0.08 suggested an adequate fit model. Acceptable model fit is suggested by an RMSEA value of 0.06 or fewer (Hu & Bentler, 1999).

**The goodness-of-fit index (GFI)** is an assessment of the proportion of all variances and covariance accounted for by the model and compared the squared residuals from prediction with the actual data. It symbolizes the total degree of fit ranging from 0 (poor fit) to 1 (perfect fit). Habitually, the cut-off point of 0.90 has been suggested for GFI. However,  $GFI \geq 0.95$  is indicative of a good fit comparative to the baseline model. GFI index is approximately corresponding to the multiple R square in multiple regressions in that it symbolizes the total amount of the covariance among the observed variables that could be accounted for by the hypothesized model (Hair, Anderson, Babin, & Black, 2010; Hooper et al., 2008).

**The adjusted goodness of fit index (AGFI)** is a postponement of GFI that is adjusted by the degree of freedom for the suggested model to the degree of freedom for the null model. Values for the AGFI also are ranged among 0 and 1. AGFI higher

than 0.90 is indicative of a good fit relative to the baseline model or .80 may be considered as an acceptable fit (Hair et al., 2010; Hu & Bentler, 1999).

**The Root Mean Square Residual (RMR)** and Standardized Root Mean Square Residual (SRMR) is the square root of the differentiation between the residuals of the sample covariance matrix and the hypothesized covariance model (Hooper et al., 2008). The smaller RMR indicated the better the model fit. The RMR value is smaller than 0.05; indicates good fit. The SRMR is standardized version of the RMR. The SRMR indicates a good fit with values of  $< 0.09$  (Hu & Bentler, 1999).

**Incremental fit indices (comparative fit indices)**, Incremental fit indicators assess the proportionate improvement in fit by comparing the chi-square value to a baseline model. A null model is a model tested that specifies that all assessed variables are unassociated (there are no latent variables) (McDonald & Ho, 2002).

**Normed-fit index (NFI)**: the standards for this indicator were ranged between 0 and 1. NFI standards were between 0.90 and 0.95, which were acceptable, and below 0.90 indicate a need to re-specify the model.  $NFI \geq 0.95$  was indicated a good fit (Hu & Bentler, 1999).

**Comparative Fit Index (CFI)**: The standard of this indicator was ranged from 0-1. The value was closer to 1 indicated a very good fit. A cut-off criterion of CFI was  $\geq 0.90$ , however, a value of  $\geq .95$  is suggested as specifying of good fit (Hu & Bentler, 1999).

**Parsimony fit indices**, These fit indices are associated fit indices that are modifications to most of the ones above. The adjustments are to penalize models that are fewer parsimonious, so that easier theoretical processes are favored over more complex ones.

**The Parsimony Goodness of Fit Index (PGFI) and the Parsimony Normed Fit Index (PNFI)** is extremely penalize for model complexity, which results in parsimony fit index values that is significantly lower than other goodness of fit indices (Hooper et al., 2008). There is no ordinarily agreed-upon cutoff value for an acceptable model. However, (Mulaik et al., 1989) does note that it is possible to attain parsimony fit indices within the 0.50 region while other goodness of fit indices achieves values over 0.90 (Mulaik et al., 1989). The Akaike's Information Criterion (AIC) or the Consistent Version of AIC (CAIC), which adjusts for sample size

(Akaike, 1974). These statistics are generally used when comparing non-nested or non-hierarchical models estimated with the same data and indicates to the researcher which of the models is the most parsimonious. Smaller values suggest a good fitting (Hooper et al., 2008).

If model fit is acceptable, the parameter estimations were assessed. The ratio of each parameter estimate to its standard error was allocated as a z statistic and was significant at the 0.05 level if its value exceeds 1.96 (Hoyle, 1995). The acceptance statistical criteria developed to evaluate the hypothesize model in this study were (Hu & Bentler, 1999):

Measure

$\chi^2/df$  p-value for the model CFI GFI AGFI SRMR RMSEA

Threshold

< 3 good; < 5 sometimes permissible > 0.05  $\geq 0.95$  great;  $\geq 0.90$  traditional acceptable  $\geq 0.95$  great;  $\geq 0.90$  traditional acceptable > 0.80 < 0.09 < 0.05 good; 0.05 to 0.10 moderate; > 0.10 bad

Table 1 Measure and threshold

Measurement	Threshold
$\chi^2/df$	< 3 good; < 5 sometimes permissible
p-value for the model	> 0.05
CFI	$\geq 0.95$ great; $\geq 0.90$ traditional acceptable
GFI	$\geq 0.95$ great; $\geq 0.90$ traditional acceptable
AGFI	> 0.80
SRMR	< 0.09
RMSEA	< 0.05 good; 0.05 to 0.10 moderate; > 0.10 bad

In addition, confirmatory factor analysis could be applied to evaluate the reliability ( $R^2$ ) and standardized validity coefficient ( $\lambda_s$ ) of the instrument. And  $R^2$  for an item was set at  $\geq 0.30$  offered evidence of acceptable reliability and a coefficient above 0.50 was considered acceptable validity (Bollen, 1989; J. C. Nunnally & I. Bernstein, 1994).

## **CHAPTER III**

### **METHODOLOGY**

This chapter describes a way systematically to solve research problem. It is understood as a science of this studying how it is done significantly. It is structured as followings: research design, population and sample, sample size calculation, sampling technique, sample selection, instrumentation, ethical consideration, data collection, and data analysis.

#### **1. Research design**

This study was used a descriptive causal modeling design to examine influencing factors on NCQ perceived by RNs including nurse staffing, nurse work environment, nurse work satisfaction, nurse burnout at government hospitals in Cambodia. The conceptual framework of this study guided by Aiken (2002) Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM).

#### **2. Population and sample**

##### **2.1 Population**

The target population in this study would be 5,861 professional nurses at government hospitals. RNs are performed direct patient care in all areas of Cambodia (Kampoung Cham, Stung Treng, Battambang, Kampot, and Phnom Penh regions). RN refers to nurse who graduated from 3-year and 4-year program and give direct or indirect nursing care. This population is working only at provincial hospitals and national hospitals because of feasible and accessible reasons.

##### **2.2 Sample size**

The calculation of sample size in this study included the instrument testing phase and the main study phase. In each phase, different criteria were used with a specific purpose.

##### **2.2.1 Sample size for the main study**

To ensure adequately sample size for path analysis, the formula follows (Krejcie & Morgan, 1970). The formula is calculate as followings:

$$S = \chi^2 NP(1-P)/d^2 (N-1) + X^2 P(1-P)$$

S=sample size;  $\chi^2$  = the table value of chi-square 1 degree of freedom at confidence level 0.95% =3.841; N=5861; P=0.5;  $d^2$  = degree of accuracy as proportion 0.05.

$$S = (3.841)(5861*0.5)(1-0.5)/(0.05)^2 (5861-1) + (3.841*0.5)(1-0.5)$$

$$S = (3.841)(2,930.5)(0.5)/(0.0025)(5860) + (1.9205)(0.5) = 5,628.02/14.65 + 0.96025 = 360.$$

10% additional total sample size to prevent dropping out of sample size, so this study will select about 396 subjects (*Figure 4*).

### 2.2.2 Sample size for development of Cambodian Nursing Care Quality Scale (CNCQS)

The CNCQS was 43-item, therefore, the sample size for this instrument was  $(43 \times 5) + 10\% = 240$  participants for conducting EFA of CNCQS.

### 2.2.3 Sample size for testing CFA

The reliability of existing instruments of Copenhagen Burnout Inventory, Index of Work Satisfaction, and Practice Environment Scale of the Nursing Work Index were tested among this sample size as well. A criterion of sample size was 5 to 10 subjects per item (Crocker & Algina, 1986; DeVellis, 2016). Therefore, IWS was 44-item, it calculated as  $(44 \times 10) + 10\% = 484$  participants would invite to join for testing CFA of existing instruments. The statistician suggested that in order to run CFA properly, the subjects must be at least 10 subjects per item. Therefore, the numbers of subjects per item was different from the first testing of EFA of CNCQS was 5 subjects per item. However, sample size of CFA of CNCQS was 396, which is the same as main study calculated the sample size.

## 2.3 Sampling technique

### 2.3.1 Instrument testing sampling technique for main study

Multi-stage random sampling procedure used for a probability sample of professional nurses whom working in government hospitals. The process was following:

**First stage**, it was purposive to select all five geographic areas in Cambodia. There were 10 hospitals in Phnom Penh region. Battambang region was 6 hospitals, Kampoung Cham region was 6 hospitals, Kampot was 5 hospitals, and

Stung Treng was 5 hospitals. It was difficult to determine the actual rates of RNs population because researcher seldom reports data on the size of the potential pool of participants.

**Second stage**, simple sampling without replacement procedure was used to recruit hospitals from each region. The lucky method was used to selected 4 hospitals from Phnom Penh region (Kossamak, National Pediatric Hospital, Khmer-Soviet Friendship Hospital, Kandal); Battambang region was 2 hospitals (Battambang and Siem Reap); Kampot was 2 hospitals (Kampot and Takeo referral hospitals); Stung Treng was 2 hospitals (Stung Treng and Kratie referral hospital); and Kampoung Cham was 2 hospitals (Kg Cham hospital and Prey Veng referral hospital). In sum, there were 12 hospitals to recruit for this study.

**Third stage**, calculation of sample size for each hospital. The twelve hospitals were similarly characteristic therefore, researcher selected 33 participants from each strata. Phnom Penh region was 132 RNs, Battambang was 66 RNs, Kg Cham was 66 RNs, Kampot was 66 RNs, and Stung Treng was 66 RNs. There were totally 396 RNs. The reason why the participants were the same numbers because there were most likely the same numbers of (just around 150 RNs) in each hospital.

**Fourth stage**, the purposive sampling technique applied to select units under each hospital as follows general medicine, surgical, pediatric, ICU, and maternity wards. This selection was based on the suggestion of hospital directors and nursing directors.

**Fifth stage**, after earning formal approval of permission to collect the data from the hospital directors and nursing divisions, nurse coordinators or head nurses of each hospitals disseminated a survey packages to the participants whose gathering by using the non-probability sampling approach. Participants in a non-probability sample were based on purposive sampling as the maximum variation sampling, which was selected on the basis of their accessibility and by the purposive personal judgment of the nurse coordinators to participate in the study. The researcher sent a request the hospital a week before, then head nurse issued an invited letter officially to each RN, therefore, researcher had changed to administer those questionnaires effectively.



### **3.2 Sampling technique for development of CNCQS**

The process of selection participants was the same process to select participants for the main study. However, the sample size for the instrument development was 240 subjects. Therefore, each hospital was invited 20 participants.

### **3.3 Main study and CFA sampling technique**

The process of selection participants was the same process to select participants for the main study. The sample size was selected 396 and 484 participants for main study and CFA respectively.

### **4 Sample selections**

Inclusion criteria will be included (1) professional nurses who working as a full time in providing directly care for patients, (2) at least one-year experience, (3) Associate Degree in Nursing (ADN) and Bachelor of Science in Nursing (BSN), (4) working in government hospitals in all region of Cambodia (Kampoung Cham, Stung Treng, Battambang, Kampot, and Phnom Penh regions), (5) nurses work at national and provincial hospitals.

## **3. Instrumentation**

Structural questionnaires were used to collect data. These questionnaires consisted of (1) demographic data included nurse staffing (nurse-patient ratio), (2) Index of Work Satisfaction, (3) Copenhagen Burnout Inventory, (4) Practice Environment Scale of the Nursing Work Index, and (5) Cambodian Nursing Care Quality Scale. Original authors have permitted all instruments. However, the CNCQS was developed by researcher, which based on Cambodian context.

The majority of the questionnaires were originally developed in English such Index of Work Satisfaction, Copenhagen Burnout Inventory, Practice Environment Scale of the Nursing Work Index, and nurse staffing, which was translated into Khmer language. Psychometric properties for testing translated instrument were required to perform. There was only one instrument as Cambodian Nursing Care Quality Scale developed by researcher.

This section was addressing: 1) instrument development; 2) instrument translation procedures and modification; 3) psychometric property testing.

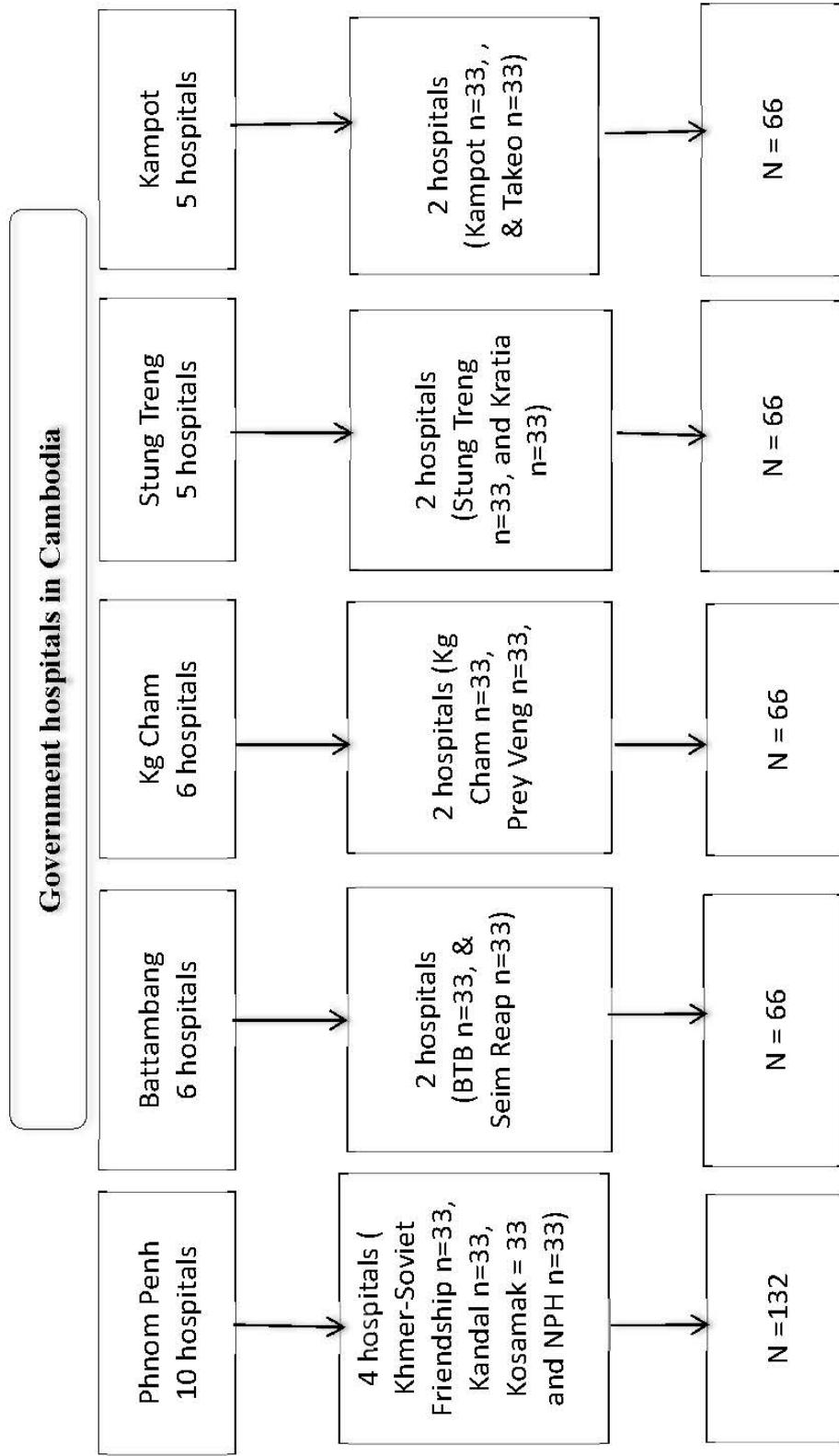


Figure 2 Multi-stage random sampling procedure for main study: sample size = 396

## **Part I: The development of instrument**

### **1. Cambodian Nursing Care Quality Scale**

The procedure of instrument development constituted of seven steps including 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryouts for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the test score (DeVellis, 2012).

#### **Step 1: Clarifying and determining the concept**

In the literature, there are two groups of researchers to provide definition of NCQ as followings: group one defined NCQ as the degree of excellence in nursing care delivery for patients (Al-Kandari & Ogundeyin, 1998; Hogston, 1995; H Leino-Kilpi, 1996; Leinonen et al., 2003; Lynn & McMillen, 1999; Tafreshi et al., 2007; S. H. Zhao et al., 2009). Another group of researchers defined NCQ as the therapeutic effective care which occurs when physical, psychology, any extra needs' patients are met (Burhans & Alligood, 2010; Kunaviktikul et al., 2001; Williams, 1998). The term of NCQ has been used differently such nurse perception quality of care (Andersson & Lindgren, 2013; MacDavitt, 2008), nurse reported quality of care (Aiken et al., 2002), or quality of nursing care (El-Jardali et al., 2011; Apiradee Nantsupawat et al., 2011; Sochalski, 2001) have been used interchangeable. In this study, the term "NCQ has been used. From the literature, it was found that the definitions NCQ from nurse perspectives were synthesized the attributes of NCQ as perceived by professional nurses as excellence of nursing care (Aiken, Clarke, Sloane, Sochalski, et al., 2002; S. Zhao, 2006), nursing standards of practice (Apiradee Nantsupawat, 2010; Tafreshi et al., 2007; Williams, 1998), the ability to meet patient needs and the activity to fulfill patient satisfaction (Burhans & Alligood, 2010; Apiradee Nantsupawat et al., 2016; Tafreshi et al., 2007).

Therefore, this study, the NCQ refers to the degree to which an activity fulfills moral commitment, professional commitment, total care, environment management, quality-safety conscious care, emotional supportive care, information supportive care, and patient satisfaction as perceived by Cambodian RNs based on the nursing standards of practice they provide with their expectation to meet patients' needs.

## Step 2: Generating an item pool

These items were integrated from existing measurements and available Cambodian nursing documentations. These items were in English. These were translated into Khmer for Cambodia experts.

First, the literature review were summarized the existing measurements was 193 statements included (Kunaviktikul et al., 2001) = 45 statements; Nurse reports of quality of hospital care questionnaire (NRQHCQ) = (8 items) (Aiken, Clarke, Sloane, Sochalski, et al., 2002); (Mrayyan, 2006) = 10 statements; (S. H. Zhao et al., 2009), Perception of Quality Nursing Care Scale (PQNCS) = (25 items); (Lucero et al., 2009) = 10 items; (Burhans & Alligood, 2010) = 10 items; (Donmez & Ozbayır, 2011) = 32 items; Lindgreen et al. (2013) = 35 items; (Donilon, 2013) = 13 items; and (Sermeus et al., 2011), Nurse ratings of quality of nursing care = (5 items) (*Appendix H2*).

Second, researcher conducted reviewing to pull 146 items included scope of nursing practice (2003) = 36 items; national nursing policy (2005) = 8 items, Code of Ethics (2014) = 16 items; and standard of nursing practice (2015) was 86 items (*Appendix H3*).

Third, the combinations both existing measurements and Cambodian nursing documentations were pulled 339 items (*Appendix H4*). This phase, there were three steps as follows: (1) removing repetition of statements was 59 items; (2) the rest of 280 items, the researcher conducted by selected items based on operational definition include as degree to which an activity fulfills task requirements perceived by Cambodian professional nurses based on the nursing standards of practice they provide with their expectation to meet patients' needs. In this step, researcher invited 2 nursing directors to the removal items. In addition, the rest items were checked the meaning.

- First, 148 items out of 280 were deleted because they were not met operational definition and another reason was long statement, which were not the same content items. Therefore, at this stage, there was 132 content items were rested.

- Second, The coding similar meaning but the content items are different. At this stage, deleted 36 content items out of 132 items, which were broad ideas, therefore, it rested 96 items.

- Last, a part of 96 items, deleted 51 content items because they were similarly meaning even there were different statement. Therefore, there was only 45 items rest. All the 45 items were edited and rephrased by Prof Richard Henker, ANA member who has currently responsible for national nursing policy and standard of nursing practice development. He had experienced to develop Cambodian Standard of Nursing Practice in 2014.

At the end of this step, researcher translated the edited version, thus all items were sent to two nursing directors again, to check the meaning.

### **Step 3: determining the format for measurement**

In this study, NCQ was designed to be assessed by five categorical ratings item format, it was summated ratings procedure called Likert scaling (Likert, 1932) to represent the attitude of people, as illustrated.

### **Step 4: the initial item pool reviewed by experts**

Logical judgment by a group of five experts who were knowledgeable in NCQ was asked to review the 45 items of the pool of the first draft. The questionnaire was used both English and Khmer versions, which was the linguistic expert translated from English to Khmer, then another professional translator was translated from Khmer to English. The scale was assigned as indication to the degree of relevant by circling the appropriate number as followings: 1= not relevant, 2= somewhat relevant 3= quite relevant 4= very relevant.

Researcher explained the group of 5 experts as followings purpose: (1) whether each item was relevant to operational definition of the construct (in step 1)? (2) What was the meaning of each item because researcher translated from original language therefore it may have different wording? This explanation was to ensure whether all experts were focused on the key points, which was the researcher wanted.

The criteria of experts are followings: (1) hold bachelor of nursing science or higher degree, (2) nursing directors, (3) at least has 5-year at clinical experiences, and (4) having experience in quality of health care improvement.

The experts suggested to combine similar items as followings: item No. “6. Patients are satisfied with the care” and “34. Patients are satisfied with the nursing care” are similar. Another couple was “36. Nursing care delivered to patients is safe” and “8. Patients receive safety care” were similar so researcher combines it.

Content validity was obtained by computing content validity index (CVI) for each item and scale. Then, the pool of the first draft were revised, or deleted following comments and suggestions of the experts. The second draft of the scale was emerged after content validity testing.

There were 43 items in the whole scale, as the result reported that the total agreement was 43, the I-CVI was 1, S-CVI/Ave was 1.00; and S-CVI/UA was 1.00. Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2014). Therefore, the 43-item of CNCQS was 1.00, which indicated that it was very good content validity.

#### **Step 5: conducting preliminary item tryouts for item review**

Beforehand the researcher has a printed item in final form for a field test. The scale was preliminary item tryout in a small group of RNs for testing readability, difficulty, and relevancy of CNCQS. At this stage, CNCQS applied back-translation technique, which translated from English to Khmer, then Khmer to English by professional translators. This process was exactly the same in Part II (instrument translation procedure and modification).

#### **Population and sample**

In this phase, the population was RNs who were worked in tertiary hospitals in Cambodia. The sample was invited from three hospitals as Khmer-Soviet Friendship hospital, Takeo referral, and Battambang referral hospitals. The samples were asked to participate in the study if they met with the inclusion criteria as follows:

- 1) RNs who were currently given direct nursing care (not head nurse)
- 2) At least has experiences more than 1 year
- 3) Be able to speak Cambodia

**Sample** The preliminary study was conducted to try out item on a small sample of examinees. It is necessary to use as few as 15 to 30 subjects for the pretest items tryouts (Crocker & Algina, 1986). In this study, 30 RNs were invited.

#### **Data collection procedure:**

- 1) After the National Ethic Committee on Health Research (NECHR Approval no. 319) approved, the researcher made appointments with nursing director of above three hospitals, then informed them about the objectives, process of the study, and asked them for cooperation.

2) The researcher made a list of the participants who met the inclusion criteria of the study.

3) Each participant was invited to participate the study. Those who agreed to participate; explained the objective of the study, process of the study, and the right to participate in this study.

4) The researcher gave consent form to each participant, explained the details of the form, and asked to sign the consent form before data collected.

5) The researcher gave the questionnaire to each participant.

6) Researcher invited three researcher assistants to help in three referral hospitals (Stung Treng, Takoe, and Khmer-Soviet Friendship Hospital. Researcher conducted the orientation session and feedback to make sure they were understood all items. Researcher asked them to explain item by item surely before the orientation session ended.

7) The participants were asked to complete the questionnaire as self-administered. Then, the researcher and/or research assistants proved that the questionnaire was completely filled in. Participants were asked to answer any missing items if any were.

The researcher used filed work as chance to observe reactions of participants during answering, nothing such behaviors as long pauses, scribbling, or answer changing, which may specify confusion about particular items. After the answering session, the participants were invited to comment and suggestion on each item. The conclusion of suggestions was considered and added in second draft of CNCQS. The final draft of the scale was the same number as 43 items. However, most of them sought for understanding, for example:

Item 15: in Cambodian meaning “Nurse explained information clearly” to “Nurse explained information to patients clearly”

Item 22, “My patient is satisfied with patient teaching” to “Patient is satisfied with nurses’ teaching”

In summary, all participants took advice to keep the 43 items and made some small changes as above (*Appendix A*).

For instrument development, the reliability is essential component in indicating the repeatable and consistency of instrument (Ferketich, 1990). The present

study is focused on internal consistency, which was a main criterion for assessing quality and adequacy. It describes the estimates of reliability based on average correlation among items within a test (Nunnally & Bernstein, 1994). The internal consistency was tested by Coefficient Alpha (Cronbach's Alpha), which is a reliability index that estimate the internal consistency or homogeneity of a measurement compose of several items or subparts (Shadish, Cook, & Campbell, 2002). The Cronbach's Alpha Coefficient must be above 0.70 for a new instrument development (J. C. Nunnally & I. Bernstein, 1994).

After conducting CVI, the pilot study was conducted to test the readability, comprehensibility, administrative feasibility and scoring of the measures, and to identify logistical management issues. Only 29 out of 30 participants returned questionnaire. The total Cronbach Alpha was 0.907. Therefore, this new instrument was acceptable. This pilot study was a small-scale test of the methods and procedures to be used on a larger scale. The purpose of this pilot study is to examine the feasibility of an approach that is intended to ultimately use in a main study.

The demographic result was indicated in table 2. The returned questionnaire was 29 out of 30 participants. The gender of these participants was almost the same numbers as male was 48% and female was 52%. There was age average 38.21 years (SD = 11.22). In addition, they were employed as RNs average years were 15.13 (SD = 11.02), and the average of year working in the currently unit was 11.69 (SD = 10.01). There was ADN = 73% and BSN 27 %. The majority of these participants were 93% as full time job. Result illustrated that 65% of participants were married followed by 31% was single. The majority of working places was ICU, which was 48.3%, followed by surgical and medicine was 17.2%, and then pediatric was 10.3%. However, there was only 6.9% from maternity unit. Shift of participants work devised as night shift was 17.2% and 24-shift was 82.8%.



Table 2 demographic data of tryout (n = 29)

Variables		Freq.	Percentages	Mean	SD
Gender	Male	14	48		
	Female	15	52		
		29	100		
Age		-	-	38.21	11.22
Year working as RN		-	-	15.13	11.02
Year working in current unit				11.69	10.01
Nursing degree	ADN	21	73		
	BSN	8	27		
		29	100		
Staff characteristics	Full time	27	93		
	Part time	2	7		
		29	100		
Family characteristics	Single	9	31		
	Married	19	65		
	Divorce	1	4		
		29	100		
Working places	ICU	14	48.3		
	Pediatric	3	10.4		
	Surgical	5	17.2		
	Maternity	2	6.9		
	Medicine	5	17.2		
		29	100		
Shift of work	Night	5	17.2		
	24-hour	24	82.8		
		29	100		

After tryout with 29 participants, which were the same characteristics of the main study. In table 3, was indicated that Mean was 4.26, which was SD = 0.69. There was item-total correlation ranged from -.30 to 0.73. Moreover, Chronbach's Alpha was 0.886, it was ranged from 0.873 – 0.903.

Table 3 Statistical summary of Tryout (Mean, SD, Item-total correlation, and Chronbatch's Alpha (n = 29))

Items	Mean	SD	Item-total correlation	Chronbatch Alpha
43	4.26	.69	-.03 - .30	.886
				Ranged .87 - .90

### Step 6: conducting field-test for psychometric property testing

The expected outcome of this step is a valid and reliable scale instrument of measuring NCQ. A criterion of sample size was 5 to 10 subjects per item (Cowin et al., 2008; DeVellis, 2016). This study was comprised of 43-item, therefore, the sample size was 240 subjects, it was added 10% in cases missing data or not return questionnaire.

The process of selection participants was the same process to select participants for the main study.

### Step 7: developing scoring and interpretation of the test score

According to the score of NCQ perceived by individual professional nurses range from 1 to 5, containing five ranks, the mean score was divided into five levels by using the class interval formula  $\bar{x} = (\bar{x}_{\max} - \bar{x}_{\min})/k$ . Furthermore, in order to keep the intervals from overlapping, 0.01 was added to each subsequent lower limit (Polit & Beck, 2014). The interpretations of ranges of Mean scores are presented in *Table 4*.

Table 4 Levels of Interpretation of NCQ

Range of Mean Scores	Levels of Interpretation
4.21 – 5.00	Highest NCQ
3.41 – 4.20	High NCQ
2.61 – 3.40	Moderate NCQ
1.81 – 2.60	Low NCQ
1.00 – 1.80	Lowest NCQ

## **2. Content validity and psychometric properties of CNCQS testing**

The content validity, construct validity of initial CNCQS by using EFA, internal consistency reliability, and construct reliability of CNJSS are presented as followings.

### **2.1 Content validity of initial CNCQS**

The purpose was to verify the NCQ concept. The experts were asked to re-rate the items in the light of the overall response to the questionnaire. The experts were asked to return the completed questionnaire within two weeks using the enclosed stamped addressed envelope or E-mail.

Content Validity Indexing (CVI) is one of the most important aspects in the adaptation and validation of CNCQS, especially previous measurements were to be used in international research with samples from different languages, or are to be applied in different contexts (Squires et al., 2013).

Content validity concerns the degree to which the items in an instrument adequately represent the universe of content for the concept being measured. Content validity index ranges from 0 to 1, and value of .90 or higher is the standard for establishing excellence in a scale's content validity (Polit & Beck, 2014).

Content validity refers to the degree to which a sample of items, as a whole, constitutes an adequate operational definition of a construct. Determining the content validity of an instrument depends largely on the investigator's judgment through two different methodological phases:

At first, a prior approach involves the creation of a new instrument that begins with developing a comprehensive conceptualization of the construct of interest of NCQ so that the measure would adequately capture the entire domain. Including panels of experts in a review of the content area adds rigor to the process (Polit & Beck, 2014). Then, the process requires a minimum of five experts. The panel members were asked to evaluate the items of the instrument both English and Khmer versions in order to be compared the versions, which was the exactly the same process of translation in step 6 of instrument development process. Finally, the CVI process is an important step in the instrument translation and cross-cultural adaptation process from English to Khmer version.

Then, the process developed to obtain the experts' assessments and, subsequently, the CVI-the Khmer version of the instrument is described below:

The previous five experts were invited to determine whether each of the items was suitable for the study population and whether the question format was appropriate. This required the items to be evaluated using a four-point ordinal scale from 1 (irrelevant) to 4 (extremely important). This scale was categorized as followings 1=Irrelevant; 2=somewhat important; 3=quite important and 4=extremely important.

Microsoft Excel 2007 software was used for all CVI calculations in the study. There were 43 items in the whole scale, as the result reported that the total agreement was 43, the I-CVI was 1, S-CVI/Ave was 1; and S-CVI/UA was 1.00. Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2014). Therefore, the CNCQS was 1.00 indicated that it was very good content validity.

## **2.2. Construct validity of initial CNCQS by EFA**

The Statistic Package of the Social Science for Personal Computer (SPSS/PC) version 22 was used for data analysis in this study.

**2.2.1** Demographic characteristics of samples were analyzed by descriptive statistics including frequency, percentage, mean, and standard deviation.

**2.2.2** Descriptive was examined by using mean, standard deviation, min, max, skewness, and kurtosis. Skewness measures the symmetry of the distribution. Kurtosis measures the peaked or flat relative to a normal distribution. Skewness values were ranged from -1 to +1 (Hair et al., 2010), and kurtosis values, which is less than 2 (Wagner, 2010).

**2.2.3** Pearson product-moment correlation: Item-total correlation was proposed in terms of the precision of the item indicating how strongly an individual item reflected the total scale. Those less than 0.30 did not contribute much to the measurement of the concept, while those greater than 0.70 were probably redundant (Idvall & Rooke, 1998).

**2.2.4** Content validity concerns the degree to which the items in an instrument adequately represent the universe of content for the concept being measured. Content validity index value was .90 or higher is excellence of scale (Polit & Beck, 2014).

**2.2.5** Exploratory Factor Analysis was to “identify a group of linear combinations of the items that are called factors. These underlying factors are defined in mathematical terms” (Waltz, Strickland, & Lenz, 2010). The process of EFA is followings:

**2.2.5.1** Item analysis: Skewness ranged from -.83 to .05. The kurtosis ranged from -1.28 to 2.24 (R. Kline, 2011);

**2.2.5.2** Internal consistency reliability: was more than .30 as suggested by (Nunnally, 1978). The Cronbach’s alpha of each dimension was more than .70 for newly developed instrument;

**2.2.5.3** EFA: Kaiser-Meyer-Olkin (KMO) test and Bartlett’s test. KMO values were between 0.8 and 1 indicates the sampling is adequate. KMO value was less than 0.6 indicate the sampling is not adequate and that remedial action should be taken. If the KMO value was close to zero means that there are large partial correlations compared to the sum of correlations. In other words, there are widespread correlations, which are a large problem for factor analysis (Leech, Barrett, & Morgan, 2005).

The principal axis factoring extraction method using varimax rotation method was used for EFA. Since the sample size is 240, the cutoff point of factor loading was set up as .30 (Polit & Beck, 2014). Internal consistency reliability was used to examine the extent to which all of the instrument’s items or subscale invoked the same attribute. Internal consistency would be used Cronbach’s alpha coefficient to evaluate the NCQ. A value above .70 was considered satisfactory for the new scale (Nunnally & Bernstein, 1994). Pearson product moment correlation was used to test stability of the NCQ. The value of relationships was determined by the following criteria:  $r > .51$  = moderate relationship, and  $r > .70$  = strong or high relationship.

The purpose of EFA was to “identify a group of linear combinations of the items that are called factors. These underlying factors are defined in mathematical terms” (Waltz et al., 2010). Thus, the process of EFA is considered data-driven. Item analysis and the internal consistency reliability were analyzed first before testing the construct validity by EFA. The process of EFA is followings:

**Internal consistency:** the item-total correlation coefficients shown that there were some items were lower than standard criteria (0.30), then the researcher removed

item 1, 2, 3, 4, 5, 6, 10, 12, and 13. Therefore, the total items remained 34 items. The item-total correlation ranked from 0.35 to 0.67, which were higher than 0.30 suggested by Nunnally (1978). The total *Cronbach's Alpha* was 0.92, 34-item ranked from 0.92 to 0.93, which was more than 0.70 (Polit & Beck 2014).

**EFA:** KMO testing result was 0.89 and Bartlett's testing result was significant ( $\chi^2 = 3526.56, p = .000$ ), which indicates the sample size is adequate for EFA, and all items are significant correlated. The Principal Component Analysis (PCA) factoring extraction by using Varimax rotation method was used for EFA. Since this study's sample size is 225, the cutoff point of factor loading was set up as .30, which was suggested by (Hair et al., 2010). The result of EFA extracted 8 factors (34 items) with eigenvalues ranked from 1.09 to 11.05, the total variance explained for 61.79%.

Table 5 KMO and Bartlett's test results

Statistics		Values
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.897
Bartlett's Test of Sphericity	Approx. Chi-Square	3436.356
	df	561
	Sign.	.000

There were 8 factors included as following (1) moral commitment (6 items); (2) professional commitment (6 items); (3) environment management (3 items); (4) quality-safety conscious care (7 items); (5) total care (4 items); (6) emotional supportive care (3 items); (7) information supportive care (2 items); and (8) patient satisfaction (3 items) (**Appendix E3**). Therefore, the CNCQS was 34 items. Item 39 moved from professional commitment (0.37) to moral commitment, item 36 moved from environment management (0.48) to quality-safety conscious care; item 7 moved from total care (0.44) to quality-safety conscious care; item 14 moved from information supportive care (0.53) to quality-safety conscious care (**Appendix H1**). There were two reasons to move some items from one factor to another as follows (1) they were not made any sense if they were in original factors, (2) this movement based on loading factor was higher than 0.30, where was in the factor moved

preferably. The number of factors was based on the rule of Kaiser's criterion. This criterion suggests retaining all factors that are above the eigenvalue of 1 (Kaiser, 1991).

Furthermore, the name of each factor was developed based on the main key words of all loading (Yong & Pearce, 2013), for examples, moral commitment (polite, kind, observing patient, given fair nursing, protect patient right, and resolving moral issues), professional commitment (responsible for own competence, delegate appropriate tasks, upgrade knowledge, and develop nursing care plan), environmental management (rooms are clean, good ventilation, and quiet); quality-safety conscious care (safety, comfort, good basic nursing care, high quality, ); total care (helping patient, holistic care, reduce anxiety, worry about illness); emotional supportive care (satisfaction with nurse's teaching, satisfaction with information, and have enough time for patients); information supportive care (provide knowledge to patients, and explain patients); and patient satisfaction (patient satisfied with symptoms management, discharge planning, and waiting time).

### *2.3 Internal consistency reliability of initial CNCQS*

In this study, after EFA, CNCQS retained 34 items and overall scale internal consistency Cronbach's alpha was 0.896. The eight dimensions Cronbach's alpha ranged from 0.894 to 0.898 as shown in Table 6. The item-total correlation ranged from .32 to .81.

Table 6 Description 34-item of CNCQS After EFA (n=225)

Dimensions	Eigen values	Total variance explained	Number of items	Cronbach's Alpha after EFA	Item-total correlation
1. Moral commitment	11.05	32.49	6	.895	.54 - .65
2. Professional commitment	1.94	5.77	6	.894	.33 - .71
3. Environmental management	1.71	5.04	3	.897	.70 - .81
4. Quality-safety conscious care	1.44	4.24	7	.896	.40 - .74
5. Total care	1.35	3.98	4	.898	.54 - .64
6. Emotional supportive care	1.22	3.60	3	.898	.56 - .81
7. Information supportive care	1.16	3.42	2	.895	.65 - .75
8. Patient satisfaction	1.09	3.22	3	.895	.71 - .72
<b>Overall CNCQS</b>	<b>20.98</b>	<b>61.86</b>	<b>34</b>	<b>.896</b>	<b>.45 - .58</b>

### 3. Construct validity of study measurements by CFA

In the CFA, the construct validity is extend to which a set of measured items actually reflects the theoretical latent construct those items are designed to measure (Hair et al., 2010). The aim of CFA is to test hypothesize construct validity of the instrument. Therefore, CFA could be defined the direct factors and then determined how well the defined measurement model fits the observed data. Before conducting CFA, the assumption of normality, linearity, and multicollinearity were tested.

1) Normality: The univariate normality was tested by Critical Ratio (CR) of Skewness (SI) and Kurtosis (SK) among 34 items. The CR of SI the total score of skewness was (-.92), which ranged from -0.09 to -1.49, which was in between an absolute value of 1.96 ( $\alpha = .05$ ) (Hair et al., 2010). The CR of kurtosis was 1.78, which ranged from 0.34 to 4.22, which were within an absolute value of 1.96 ( $\alpha = .05$ ) as well. Thus, the assumption of normality was not violated.

2) Linearity: It was tested by the scatterplot matrix. Since the scatterplots revealed a linear relationship between each pair of variables, the assumption of linearity was not violated.

3) Multicollinearity: Both the latent variables and observed variables were tested. The Tolerance was 0.53, which was ranged from 0.36 to 0.76. The VIF was 1.89, which ranged from 1.36 to 2.47. Thus, the assumption of multicollinearity was not violated 34-item's CNNQS.

The construct validity of CNCQS with 34 items was tested by 396 RNs through the assessment of measurement model by CFA. Since the data violated the normality assumption, the estimation method of Robust Maximum Likelihood (RML) was used to run the measurement model of CNCQS. The second-order CFA was used to analyze the CNCQS construct validity. The result confirmed CNCQS has 34 items with 8 dimensions as showed in **Figure 4**. The Goodness of fit statistics presented that CNCQS fitness was acceptable ( $\chi^2 = 1213.03$ ,  $df = 499$ ;  $\chi^2/df = 2.43$ ;  $p\text{-value} = .00$ ,  $GFI = 0.84$ ,  $AGFI = 0.81$ ,  $RMSEA = .062$ , and  $CFI = 0.98$ ;  $NFI = 0.96$ ,  $SRNSR = 0.04$ ) as what is showed in Table 7. The items' statistic reports are presented in Table 7, which includes unstandardized factor loading (b), complete standardized factor loading (B), standard error (SE), t-value (t), squared multiple correlation ( $R^2$ ), and error/residual variances (EVs). The unstandardized factor loading (b) of each



dimension ranged from 0.56 to 0.95 at a statistically significant level of .05. The dimension of total care had the highest unstandardized factor loading ( $b = 0.95$ ), followed by quality-safety conscious care ( $b = 0.93$ ), information supportive care ( $b = .84$ ), moral commitment ( $b = .81$ ), professional commitment ( $b = .80$ ), patient satisfaction ( $b = .79$ ), environment management ( $b = .59$ ), and emotional supportive care ( $b = .56$ ). The factor loading ( $B$ ) of each item ranged from .39 to .85 at a statistically significant level of .05, which was the item (12) highest score (.85). The factor loading of each dimension was ranged from 0.59 to 1.01; the quality-safety conscious care (1.01), followed by emotional supportive care (.92), total care (= .91), moral commitment (= .86), professional commitment (= .85), patient satisfaction (= .77), and environment management (= .59). The basic measurement model of CNCQS is showed in *Figure 4*.

Table 7 Goodness of Fit Statistics of Cambodia Nursing Care Quality Scale (CNCQS) Measurement Model (n = 375)

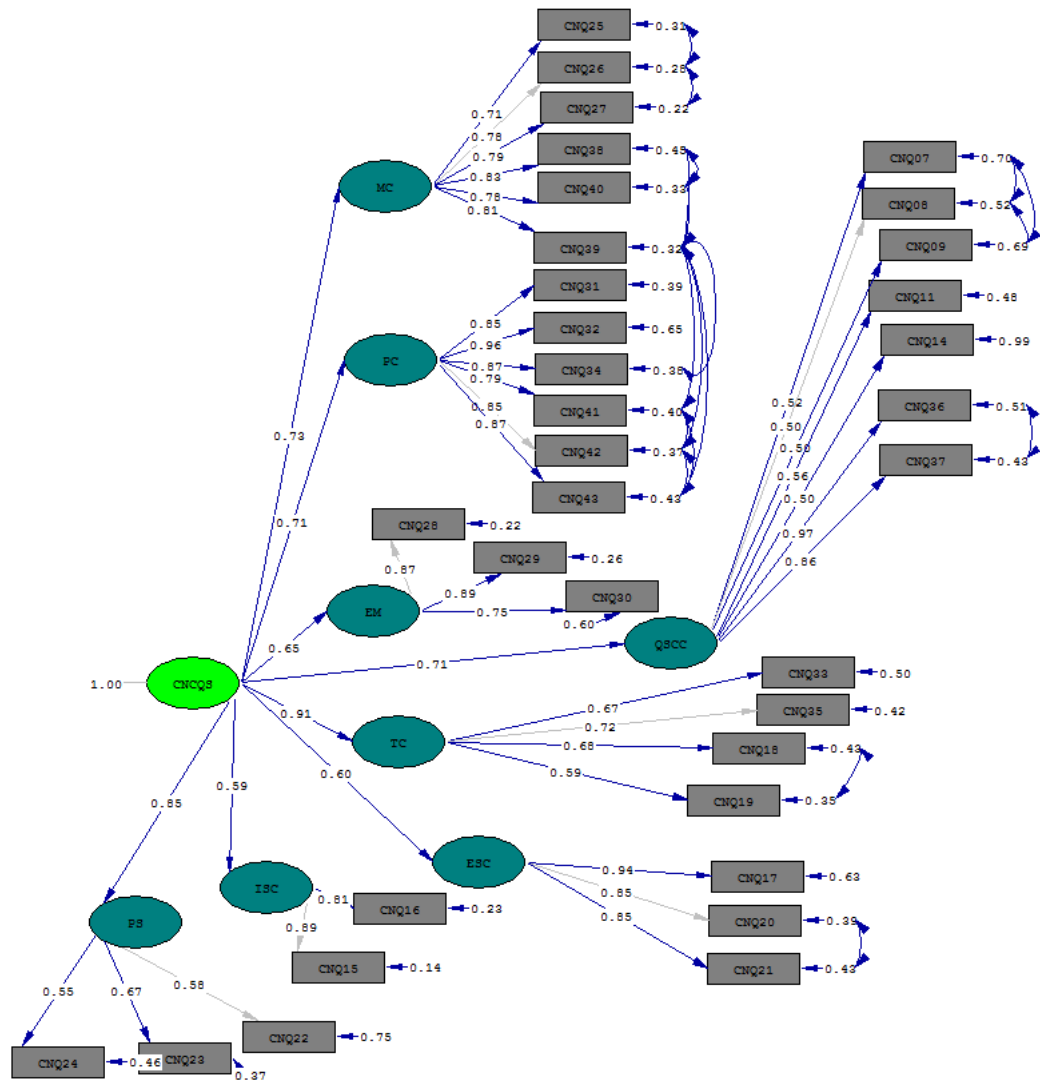
Relative Fit Index	Threshold	Findings values	Model achieve criteria
Chi-square – test, p-value	>0.05	0.00	Not met
Chi-square/degree of freedom	<3.00	2.43	Met
Comparative Fit Index (CFI)	>0.90	0.98	Met
Goodness of Fit Index (GFI)	>0.90	0.84	Not met
Adjusted Goodness of Fit Index (AGFI)	$\geq 0.80$	0.81	Met
Normed fit index (NFI)	$\geq 0.90$	0.96	Met
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.06	Met
Standardized Root Mean Square Residual (SRMSR)	<0.70	0.04	Met

Table 8 Factor Loading of Cambodian Nursing Care Quality Scale (CNCQS) (n=375)

<b>Nursing Care Quality of Latent Construct</b>	<b>B</b>	<b>SE</b>	<b>t-value</b>	<b>R<sup>2</sup></b>	<b>Error</b>
<b>1. Moral Commitment (MC)</b>	<b>.72</b>	<b>.06</b>	<b>12.87</b>	<b>.75</b>	<b>.22</b>
Item26 Observe patients	.78			.56	.28
Item25 Polite to patients	.71	.04	16.68	.49	.31
Item27 Fair nursing care	.79	.04	17.64	.62	.22
Item38 Kind to patients	.83	.06	13.12	.47	.45
Item40 Protect patients' rights	.78	.05	13.76	.51	.33
Item39 Resolving moral issues	.81	.05	14.21	.51	.33
<b>2. Professional Commitment (PC)</b>	<b>.71</b>	<b>.09</b>	<b>8.44</b>	<b>.72</b>	<b>.25</b>
Item42 Knowledge is Up-to-date	.85			.51	.37
Item31 Maintain their competence	.85	.06	13.00	.50	.39
Item32 Professional development	.96	.07	12.11	.43	.65
Item34 Develop own competencies	.87	.06	13.31	.52	.38
Item41 Appropriate delegation of tasks	.79	.04	17.86	.46	.40
Item43 Develop nursing care plans	.87	.04	18.61	.48	.43
<b>3. Environmental management</b>	<b>.65</b>	<b>.05</b>	<b>10.37</b>	<b>.72</b>	<b>.25</b>
Item28 Rooms are clean	.87			.76	.22
Item29 Rooms have good ventilation	.89	.04	18.43	.73	.26
Item30 Rooms are quiet	.75	.05	14.08	.46	.60
<b>4. Quality-safety conscious care (QSCC)</b>	<b>.71</b>	<b>.06</b>	<b>12.87</b>	<b>.75</b>	<b>.22</b>
Item8 Patients have comfortable conditions	.50			.20	.52
Item7 Patients receive safety care	.52	.06	7.63	.17	.70
Item9 Pain is treated appropriately	.50	.06	8.16	.16	.69

Table 8 Factor Loading of Cambodian Nursing Care Quality Scale (CNCQS) (n=375)  
(Cont.)

Nursing Care Quality of Latent Construct	B	SE	t-value	R <sup>2</sup>	Error
Item11 Practices with caring behavior	.56	.08	7.05	.25	.48
Item14 Received high quality care	.50	.09	5.46	.12	.99
Item36 Provide good basic nursing care	.97	.12	8.23	.49	.51
Item37 practices with caring behavior	.86	.11	8.16	.47	.43
<b>5. Total care (TC)</b>	<b>.91</b>	<b>.08</b>	<b>11.65</b>	<b>.82</b>	<b>.20</b>
Item35 Help as needed	.72			.53	.42
Item33 Holistic care	.67	.06	12.44	.52	.38
Item18 Reduce patients' anxiety	.68	.05	12.95	.49	.43
Item19 Relieve worry illness	.59	.04	12.79	.48	.35
<b>6. Emotional supportive care (ESC)</b>	<b>.60</b>	<b>.06</b>	<b>8.38</b>	<b>.85</b>	<b>.05</b>
Item20 Nurses' teaching	.85			.53	.39
Item17 Enough time for patients	.94	.09	10.02	.46	.63
Item21 Happy with the information being taught	.85	.05	15.07	.50	.43
<b>7. Information supportive care (ISC)</b>	<b>.59</b>	<b>.07</b>	<b>11.17</b>	<b>.67</b>	<b>.35</b>
Item15 Nurses explain information	.89			.14	.78
Item16 knowledge of disease	.81	.05	15.22	.65	.23
<b>8. Patient satisfaction (PS)</b>	<b>.85</b>	<b>.09</b>	<b>8.12</b>	<b>.60</b>	<b>.43</b>
Item22 Satisfied with waiting time	.58			.33	.75
Item23 Satisfied with discharge planning	.55	.06	9.79	.57	.37
Item24 Satisfied with symptom management	.55	.06	9.03	.27	.53



Chi-Square=1213.03, df=499, P-value=0.00000, RMSEA=0.062

Figure 4 Measurement Model of Cambodian Nursing Care Quality Scale (CNCQS) Cambodian Version

## **Part II: Instrument translation procedures and modification:**

In order to study the health care needs of people with diverse cultural backgrounds, research instruments must be reliable and valid in each culture studied (Fu et al., 2015). Thus, of the translated instrument plays a significant role in ensuring that the results obtained in cross-cultural research are not due to errors in translation, but rather are due to real differences or similarities between cultures in the phenomena being measured.

After obtaining the author's permission of the existing instruments, forward (English to Khmer) and backward (Khmer to English) translation was applied. First, the translation process initiates by translating the original English version of the instrument into Khmer language by one linguistic expert who working at translation and interpretation service unit, Faculty of Arts, University of Chenla, Cambodia. Second, another independent translator has been undertaken back-translation to English. Third, the back-translated versions were compared with the original (English language) versions. Forth, the investigator and advisors compared both versions in the original language, conducted checks with the translators to examine and modify these items with apparent discrepancies in translation, wording and grammar, and produced a final consensus version. Finally, the instruments were acceptable and reflected the meaning of each item. All the instruments were accepted but they were used in different wordings. After this, the final of Khmer version is achieved and translated validity had been established.

In this study, there are four instruments to be translated into Khmer language; those include Cambodian Nursing Care Quality Scale, Index of Work Satisfaction (IWS), Practice Environment Scale of the Nursing Work Index PES-NWI, and Copenhagen Burnout Inventory. However, CNCQS was translated in instrument development.

### **1) Index of Work Satisfaction**

It was measured by adapted the Index of Work Satisfaction (IWS) that developed by Stamps (1997). The instrument consists the 6 component including pay, autonomy, task requirements, organizational policies, interaction, and professional status; to determine the ranking or level of importance of each factor that obtained by

component weighting coefficient. Higher values for the component-weighting coefficient represent higher levels of importance of the nurses & work satisfaction.

The original IWS consists of 44 statements that allow respondents to rate their present feelings of nurse work satisfaction on a Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree). Half of the items are positively while the other half is negatively worded. Conversions were made to unify scoring of the responses so as to indicate higher satisfaction with a higher score of items using the conversion instructions in the instrument's manual (Stamps, 1997). Possible scores range from 44 to 155 Autonomy (6-item), Task Requirements (6-item), Organizational Policies (6-item), Professional Status (5-item), Interaction (8-item). However, the subconstruct of Pay was not appropriate to Cambodian context, the researcher removed it because RNs received low salary already. This instrument was adapted for this study. As the result, the original instrument were six dimensions with 44 items; the adapted instrument were five dimensions with 31 items.

Previous research has determined the instrument is reliable and valid, with coefficient alpha ranging from .82 to .91 for the overall scale. The instrument's validity was reestablished in the form of a factor analysis, which supported the previous revisions of the instrument. The IWS has been used numerous times for clinical and administrative purposes and was found to be a valid and reliable measure of nurse work satisfaction (Best & Thurston, 2004; P. Stamps, 1998).

After obtaining the author's permission, forward (English to Khmer) and backward (Khmer to English) translation was applied. The back-translated versions were compared with the original (English language) versions. It follows that the advisors verified both versions and found out that there were some items' meaning were not consistency, which needed to discuss with translators. Then, the researcher and translators compared both versions original language and backward, the translators examined and modified these items with apparent discrepancies in translation, wording and grammar, and produced a final consensus version. Finally, the instruments were acceptable and reflect the meaning of each item. After this, the final of Khmer version is achieved and translation validity had been established.

### **1.1 Content validity**

After translation, for ensuring the translated instruments to achieve the relevance and represent the targeted construct for a particular assessment purpose, the content validity has been established. The content validity index (CVI) is the most widely used method of quantifying content validity for multi-item scales based on expert ratings of relevance. Every element of an assessment instrument would be judged by multiple experts. This study, the content validity was established by a panel of five experts specializing in nursing administration area. These experts were rigorously chosen in accordance with established criteria and represented excellence in the nursing administrative field. The qualifications of the expert for validating research instrument are included as the following:

- 1) Two experts are professional nurse who work as nurse administrator in governmental hospital, at least 5 years experiences.
- 2) Two professional nurses with master prepare in nursing science, who were involve in quality improvement program.
- 3) One nurse instructor who taught nursing management and leadership and master of nursing science.

The experts were instructed to rate each scale item in terms of its relevance to the underlying construct as the definition of the concepts represented. The standard four-point CVI rating scale was used to evaluate the items for their content, construct and conceptual relevance. This 4-point rating scale is ordinal scale in order to avoid having a neutral and ambivalent midpoint, ranging from 1 (not relevant), 2 (somewhat relevant), 3 (quite relevant), 4 (highly relevant) (Davis, 1992; Polit & Beck, 2006). In addition, the experts were also invited to suggest revised wordings for any items that seemed ambiguous, unclear, or inappropriate by using open suggestions.

The content validity of the measure was based on the expert concurrence using the content validity index (CVI), calculated for category evaluation and item evaluation. The CVI was calculated based on the number of experts giving a rating of either 3 or 4, divided by the number of experts. Additionally, the experts were asked to clarify their reasons if they did not agree with any of the items.

The Index of Work Satisfaction was shown that there were 38 items in the whole scale, as the result reported that the total agreement was 100%, the I-CVI was

1, S-CVI/Ave was 1; and S-CVI/UA was 1. Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2010). Therefore, the IWS-Cambodian Version was 1.00 indicated that it was very good content validity.

### 1.2 Construct validity

Construct validity is the validity of theoretical involving building variables to be measured (Said, Badru, & Shahid, 2011). Confirmatory factor analysis (Shore, Newton, & Thornton, 1990) was utilized to assess construct validity in order to assess whether the chosen component solution fitted the data adequately. The significant loadings is greater than 0.30. The present study results showed that factor loading of all items ranging from 0.32 to 0.73 were statistically significant at 0.05.

For the second level of the CFA, all regression weights 0.46 to 0.92 were statistically significant at 0.05, and squared multiple correlation ranged from 0.22 to 0.85 (*Table 9*). All indices of the model were acceptable: chi-square ( $\chi^2$ ) = 455.98; degree of freedom (df) = 152; the normed fit chi-square ( $\chi^2/df$ ) = 2.99; the goodness-of-fit index (GFI) = 0.91; comparative fit index (CFI) = 0.95; normed fit index (NFI) = 0.93; root-mean-square error of approximation (RMSEA) = 0.07; standardized root-mean-square residual (SRMR) = 0.05), except for chi-square significance (p-value = .00) as showed in *Figure 6*.

Table 9 Goodness of Fit Statistics of Index of Work Satisfaction-Cambodian version Measurement Model (n = 375)

Relative Fit Index	Threshold	Findings values	Model achieve criteria
Chi-square – test, p-value	>0.05	0.00	Not met
Chi-square/degree of freedom	<3.00	2.99	Met
Comparative Fit Index (CFI)	>0.90	0.95	Met
Goodness of Fit Index (GFI)	>0.90	0.91	Met
Adjusted Goodness of Fit Index (AGFI)	$\geq$ 0.80	0.88	Met
Normed fit index (NFI)	$\geq$ 0.90	0.93	Met
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.07	Met
Standardized Root Mean Square Residual (SRMSR)	<0.70	0.04	Met



Internal consistency: the item-total correlation coefficients shown that there were seven items lower than standard criteria (0.30), therefore item 1, 4, 18, 19, 25, 31, and 37 by descriptive statistics (total-item correlation) for the first time. After running by CFA, there was cut off some more items (PS5, TR6, TR7, Int16, Int17, Int18, OP21, OP23, Aut27, Aut28, Aut30). Therefore, the Index of Work Satisfaction was 20 items (**Table 9**).

The items' statistic reports are presented in Table 9, which includes unstandardized factor loading (b), complete standardized factor loading (B), standard error (SE), t-value (t), squared multiple correlation ( $R^2$ ), and error/residual variances (EVs). The unstandardized factor loading (b) of each dimension ranged from 0.56 to 1.00 at a statistically significant level of .05. The dimension of autonomy had the highest unstandardized factor loading (b = 1.00), followed by task requirement (b = 0.70), policy of the organization (b = .67), interaction (b = .63), and professional status was the lowest (b = .56). The factor loading (B) of each item ranged from .70 to .94 at a statistically significant level of .05. The dimension of task requirement was highest (B = 0.94), followed by followed by interaction (B = 0.83), policy of the organization (B = .82), autonomy (B = .82), and the lowest was professional status (B = .70). The basic measurement model of IWS-Cambodian Version is showed in Figure 5.

Table 10 Standardized Factor Loading of Index Work Satisfaction-Cambodian Version (n=457)

<b>Index of Work Satisfaction-Cambodian Version</b>	<b>b</b>	<b>B</b>	<b>SE</b>	<b>T value</b>	<b>R<sup>2</sup></b>	<b>Error</b>
<b>Professional status</b>	<b>.56</b>	<b>.70</b>	<b>.07</b>	<b>7.29</b>	<b>.88</b>	<b>.67</b>
1. My work that is very important	.46	.44			.19	.57
2. To be recognized as a profession	.57	.63	.08	7.10	.40	.32
3. It is so proud for me to speak	.53	.52	.08	6.66	.27	.48
4. I would still choose nursing	.65	.57	.09	6.84	.32	.57
<b>Task requirement</b>	<b>.70</b>	<b>.94</b>	<b>.07</b>	<b>9.33</b>	<b>.49</b>	<b>.32</b>
5 I am satisfied with all kinds of activities	.49	.47			.22	.47
9. I have enough time	1.1	.72	.12	9.00	.53	.59

Table 10 Standardized Factor Loading of Index Work Satisfaction-Cambodian Version (n=457) (Cont.)

<b>Index of Work Satisfaction-Cambodian Version</b>	<b>b</b>	<b>B</b>	<b>SE</b>	<b>T value</b>	<b>R<sup>2</sup></b>	<b>Error</b>
10. I have enough time for direct patient care	1.02	.66	.12	8.65	.43	.76
11. I could provide a better nursing care	.40	.37	.06	6.21	.14	.57
<b>Interaction</b>	<b>.63</b>	<b>.83</b>	<b>.05</b>	<b>11.12</b>	<b>.70</b>	<b>.17</b>
12. Physicians collaborate with nurses.	.67	.61			.37	.44
13. There are a lot of teamwork between nurses and physicians.	.75	.62	.07	9.69	.38	.60
14. Physicians respect for skills and knowledge of nursing staff.	.36	.33	.06	5.94	.11	.60
15. Physicians understand and appreciate nursing staff does.	.68	.49	.06	10.05	.24	.82
19. Good teamwork between different level staff nurses.	.74	.67	.07	10.22	.44	.39
<b>Policy of the organization</b>	<b>.67</b>	<b>.82</b>	<b>.08</b>	<b>7.57</b>	<b>.67</b>	<b>.50</b>
20. Nursing staff has a control over the schedule.	.42	.39			.16	.61
22. Nursing staff to participate decision-making process.	.94	.70	.13	7.43	.49	.58
24. Planning policies and protocols.	.98	.70	.13	7.65	.49	.66
25. Nursing Manager discuss about daily problems.	.76	.66	.10	7.26	.44	.48
<b>Autonomy</b>	<b>1.0</b>	<b>.82</b>	<b>.07</b>	<b>13.40</b>	<b>.67</b>	<b>.50</b>
26. I have enough contribution in nursing program.	.69	.75			.56	.58
29. I am able to practice independently.	.52	.62	.05	9.47	.39	.66
31. I have freedom in my work	.47	.54	.05	8.85	.29	.80

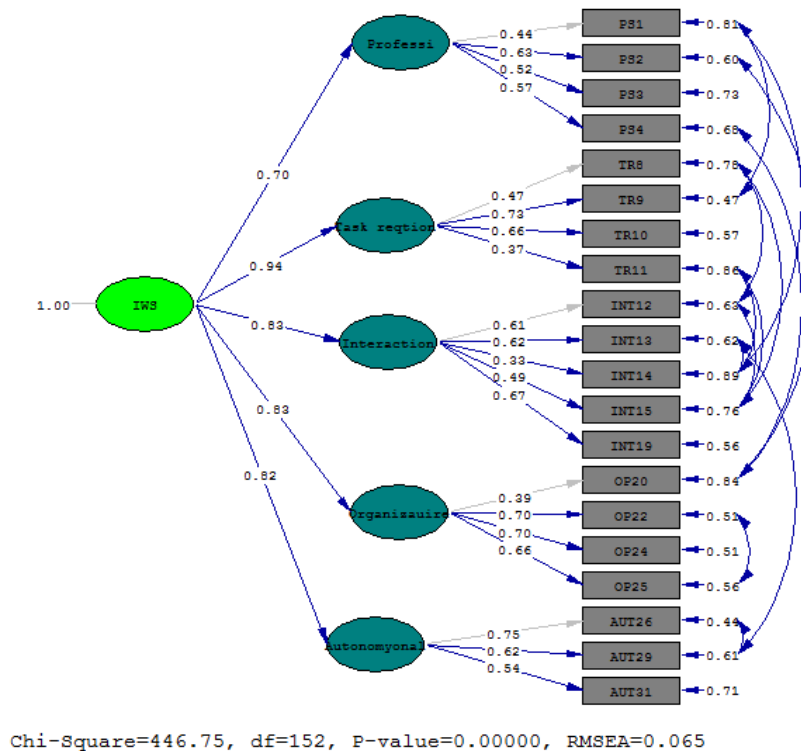


Figure 5 Measurement Model of Index Work Satisfaction-Cambodian Version

### 4.1.3 Reliability

For instrument reliability, reliability is an essential component in indicating the repeatable and consistent of instrument (Ferketich, 1990). The present study focused on internal consistency, which is a major criterion for assessing its quality and adequacy. It describes estimates of reliability based on the average correlation among items within a test (J. C. Nunnally & I. H. Bernstein, 1994). Cronbach's alpha coefficient should be above the 0.70 (J. C. Nunnally & I. Bernstein, 1994).

The Index of Work Satisfaction Cambodian version was determined by using Cronbach's alpha coefficient ( $\alpha$ ) for estimate the internal consistency. The result showed that the Cronbach's alpha of total scale was 0.85. The Cronbach's alpha of all dimension were ranged from 0.85 to 0.86. The summary of the instrument is presented in *Table 11*.

Table 11 Number of Items, S-CVI, I-CVI, and Reliability of Index Work Satisfaction (n=457)

<b>IWS Cambodian version</b>	<b># of items</b>	<b>S-CVI</b>	<b>I-CVI</b>	<b>Reliability <math>\alpha</math></b>
Professional status	4			.86
Task requirement	4			.85
Interaction	5			.85
Policy of organization	4			.85
Autonomy	3			.85
<b>Total</b>	<b>20</b>	<b>1</b>	<b>1</b>	<b>.85</b>

## 2) Nurse practice environment

Nurse practice environment questionnaire was measured by using the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002). The PES-NWI composes of 31-item scales and defines in five subscales: nurse participation in hospital affairs, nursing foundation for quality of care, nurse manager ability, leadership, and support of nurses, staffing and resource adequacy, and collegial nurse-physician relations. A four-point scale is used to score agreement with each item from 1 (strongly disagree) to 4 (strongly agree).

In the original version of PES-NWI, Cronbach's alpha values for these five subscales and the entire scale were .71 to .84 and .82, respectively. In addition, the intraclass correlations of the five subscales and the entire scale were .86 to .97 and .96, respectively (Lake, 2007).

The nurse practice environment scale was translated from English into Khmer language with the same process of previous instruments. The nurse practice environment scale – Khmer version contain the same format as the original one.

### 2.1 Content validity

The process of translation, content validity index, qualified experts, and the scale were the same Index of Work Satisfaction.

The Practice Environment Scale of the Nursing Work Index (PES-NWI)-Cambodian Version was shown that there were 31 items in the whole scale, as the

result reported that the total agreement was 100%, the I-CVI was 1, S-CVI/Ave was 1; and S-CVI/UA was 1. Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2014). Therefore, the PES-NWI-Cambodian Version was 1.00 indicated that it was very good content validity.

## 2.2 Construct validity

For the second level of the CFA, all regression weights 0.46 to 0.70 were statistically significant at 0.05. The squared multiple correlation ranging from 0.87 to 1.02. All indices of the model were acceptable: chi-square ( $\chi^2$ ) = 390.91, degree of freedom (df) = 112, the normed fit chi-square ( $\chi^2/df$ ) = 3.49, the goodness-of-fit index (GFI) = 0.91, comparative fit index (CFI) = 0.98, normed fit index (NFI) = 0.97, root-mean-square error of approximation (RMSEA) = 0.07, standardized root-mean-square residual (SRMR) = 0.09, except for chi-square significance (p-value = 0.00) as showed in (*Table 12 & Figure 6*).

Table 12 Goodness of Fit Statistics of Practice Environment Scale of Nursing Work Index-Cambodian version Measurement Model (n = 475)

Relative Fit Index	Threshold	Findings values	Model achieve criteria
Chi-square – test, p-value	>0.05	0.00	Not met
Chi-square/degree of freedom	<3.00	2.26	Met
Comparative Fit Index (CFI)	>0.90	0.98	Met
Goodness of Fit Index (GFI)	>0.90	0.89	Not met
Adjusted Goodness of Fit Index (AGFI)	≥ 0.80	0.87	Met
Normed fit index (NFI)	≥ 0.90	0.96	Met
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.05	Met
Standardized Root Mean Square Residual (SRMSR)	<0.70	0.03	Met

The items' statistic reports are presented in Table 12, which includes unstandardized factor loading (b), complete standardized factor loading (B), standard error (SE), t-value (t), squared multiple correlation ( $R^2$ ), and error/residual variances

(EVs). The unstandardized factor loading (b) of each dimension ranged from 0.60 to 0.96 at a statistically significant level of .05. The dimension of nurse manager ability, leadership, and support of nurses had the highest unstandardized factor loading (b = 0.96), followed by nurse participation in hospital affairs (b = 0.89), nursing foundations for quality care (b = .85), staffing and resource adequacy (b = .83), and collegial nurse-physician relations was the lowest (b = 0.60). The factor loading (B) of each item ranged from .87 to 1.02 at a statistically significant level of .05. The dimension of nurse manager ability, leadership, and support of nurses had the highest was highest (B = 1.02), followed by followed by nurse participation in hospital affairs (B = 0.95), nurse foundations for quality (B = .95), staffing and resource adequacy (B = .90), and the lowest was collegial nurse-physician relations (B = .87). The basic measurement model of PES-NWI-Cambodian Version is showed in (*Table 13 & Figure 7*).

Table 13 Factor loading and construct validity of Practice Environment Scale of the Nursing Work Index – Cambodian version (n = 457)

PES-NWI-Cambodian Version	b	B	Se	T value	R <sup>2</sup>	Error
<b>Nurse Participation in Hospital Affairs</b>	<b>.89</b>	<b>.95</b>	<b>.07</b>	<b>11.92</b>	<b>.89</b>	<b>.94</b>
1. Enough supportive services so that I can spend time with my patients	.56	.56			.30	.66
2. Good working relationship between doctors and nurses	.57	.58	.05	10.15	.28	.73
3. Nurses manager provide support for nurses	.63	.61	.06	10.22	.38	.58
4. Available staff development or continued education program for nurses	.51	.51	.05	8.94	.26	.68
5. Opportunity for career development /clinical ranking	.76	.69	.07	10.90	.46	.59
6. Nurses are given an opportunity to participate in policy decisions	.73	.70	.06	11.12	.49	.49
7. Managers use mistakes as learning opportunity rather than criticizing	.55	.52	.06	9.08	.27	.74

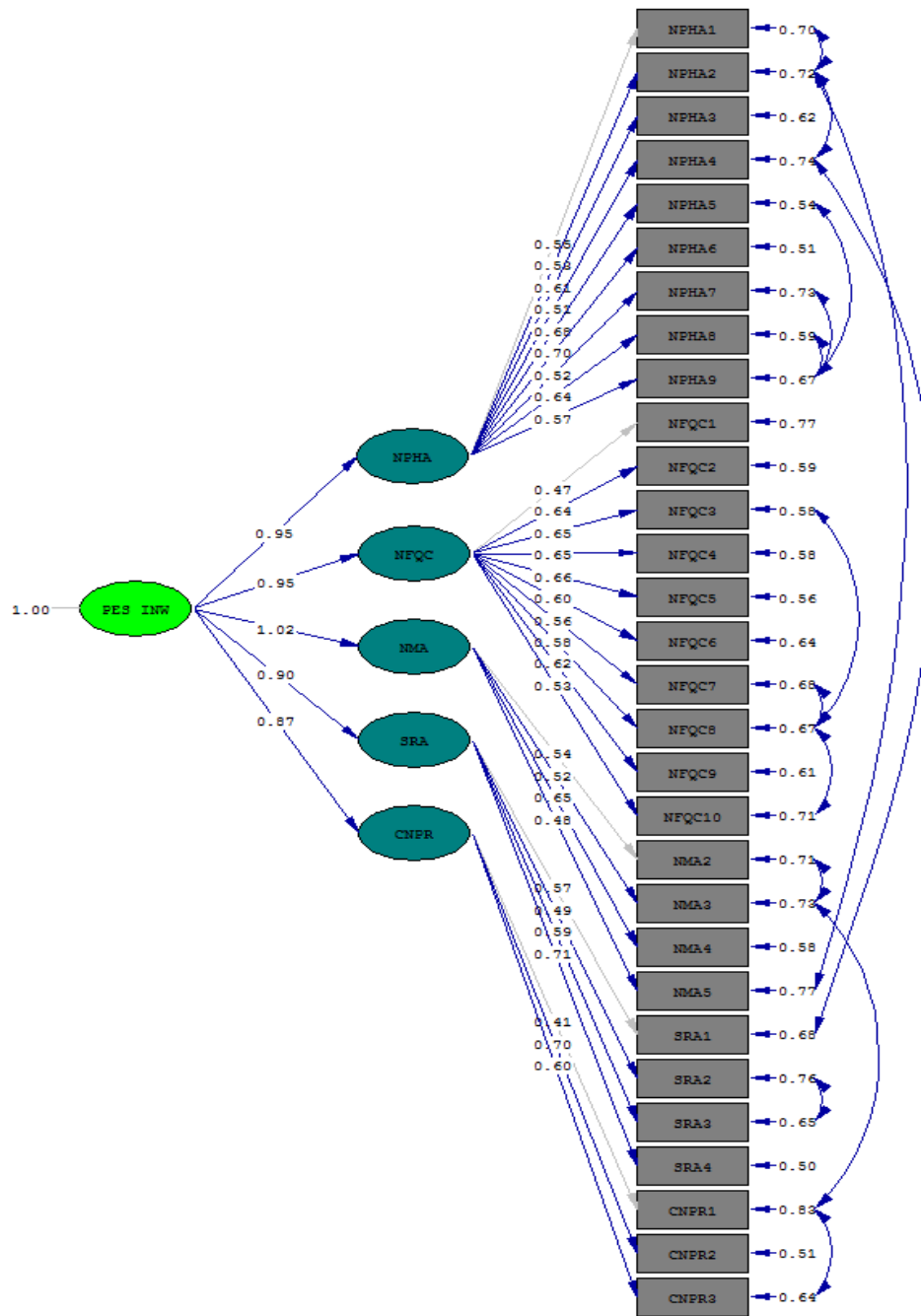
Table 13 Factor loading and construct validity of Practice Environment Scale of the Nursing Work Index – Cambodian version (n = 457) (Cont.)

<b>PES-NWI-Cambodian Version</b>	<b>b</b>	<b>B</b>	<b>Se</b>	<b>T value</b>	<b>R<sup>2</sup></b>	<b>Error</b>
8. Enough time and opportunity to discuss patient care issues with other nurses	.58	.64	.05	10.46	.41	.44
9. There enough registered nurses in providing quality nursing care to patients	.54	.57	.05	10.46	.41	.44
<b>Nursing Foundations for Quality of Care</b>	<b>.85</b>	<b>.95</b>	<b>.08</b>	<b>10.28</b>	<b>.91</b>	<b>.75</b>
10. Nursing manager is a good manager and leader	.48	.47			.23	.64
11. High level nursing manager allows for seeing and the accessing to staff	.62	.64	.06	9.35	.41	.45
12. There are enough personnel to perform the job done	.69	.65	.07	9.41	.42	.45
13. Appreciation and recognition when there is a good achievement of work	.70	.65	.07	9.42	.42	.54
14. High standard of nursing care as expected by the management	.68	.66	.07	9.51	.44	.47
15. A chief nurse officer has power and authority equally to other management.	.63	.60	.07	9.06	.36	.54
16. Have several team works between doctors and nurses	.53	.56	.06	8.73	.32	.48
17. Opportunity for promotion	.63	.58	.07	8.81	.33	.63
18. A clear philosophy in nursing,	.63	.62	.06	9.19	.39	.52
19. Work with nurses who have clinical competency	.47	.52	.06	8.46	.29	.44

Table 13 Factor loading and construct validity of Practice Environment Scale of the Nursing Work Index – Cambodian version (n = 457) (Cont.)

<b>PES-NWI-Cambodian Version</b>	<b>b</b>	<b>B</b>	<b>Se</b>	<b>T value</b>	<b>R<sup>2</sup></b>	<b>Error</b>
<b>Nurse Manager Ability, Leadership, and Support of Nurses</b>	<b>.96</b>	<b>1.02</b>	<b>.08</b>	<b>12.40</b>	<b>1.05</b>	<b>.07</b>
21. The administrative listens and responds to concerns from personnel	.57	.54			.29	.70
22. Active quality assurance program is available	.52	.52	.05	10.19	.27	.62
23. Nursing personnel take part in the internal control	.66	.65	.06	10.78	.42	.52
24. Collaboration (participating in practice) between nurses and doctors	.49	.48	.05	8.82	.23	.69
<b>Staffing and Resource Adequacy</b>	<b>.83</b>	<b>.90</b>	<b>.07</b>	<b>11.72</b>	<b>.82</b>	<b>.15</b>
25. Preceptor program is available for novice nurse	.57	.57			.32	.57
26. Nursing care is based on nursing model rather than medical model	.45	.49	.05	8.52	.24	.52
27. Nurses have the opportunity to work on hospital	.58	.59	.06	9.72	.35	.53
28. Discuss with personnel about daily problems and procedures	.78	.71	.07	10.97	.50	.51
<b>Collegial Nurse-Physician Relations</b>	<b>.60</b>	<b>.87</b>	<b>.07</b>	<b>7.81</b>	<b>.75</b>	<b>.12</b>
29. Writing, updating nursing care plan for all patients	.47	.41			.17	.44
30. Promote continuing care	.93	.70	.12	7.50	.49	.53
31. Using nursing diagnoses	.61	.60	.07	7.99	.36	.31





Chi-Square=849.51, df=386, P-value=0.00000, RMSEA=0.050

Figure 6 Measurement Model of PES-NWI-Cambodian Version

### 4.2.3 Reliability

The PES-NWI-Cambodian version was determined by using Cronbach's alpha coefficient ( $\alpha$ ) for estimate the internal consistency. The result showed that the Cronbach's alpha of total scale was 0.93. The Cronbach's alpha of all dimension were ranged from 0.92 to 0.93. The summary of the instrument is presented in *Table 14*.

Table 14 Number of Items, S-CVI, I-CVI, and Reliability of PES-NWI-Cambodian Version (n=457)

PES-NWI Cambodian version	# of items	S-CVI	I-CVI	Reliability $\alpha$
Nurse Participation in Hospital Affairs	9			.93
Nursing Foundations for Quality of Care	10			.93
Nurse Manager Ability, Leadership, and Support of Nurses	4			.92
Staffing and Resource Adequacy	4			.92
Collegial Nurse-Physician Relations	3			.92
<b>Total</b>	<b>30</b>	<b>1</b>	<b>1</b>	<b>.93</b>

### 3) Nurse burnout:

Burnout questionnaire was measured by the Copenhagen Burnout Inventory (CBI), which developed by Borritz and colleague (2006). This scale comprised of 3 subscales that measured: 1) Personal burnout, 2) Work-related burnout, and 3) Client-related burnout. All items have five response categories. The responses are rescaled to a 0-100 metric (Scoring: Always=100; Often=75; Sometimes=50; Seldom=25; Never/almost never= 0). Scale scores are calculated by taking the mean of the items in that scale. Reliability of this instrument found to be high for the three CBI scales (Cronbach's alpha= 0.87 for both personal and work- related burnout; and 0.85 for client related burnout). The correlation coefficients between the scales were 0.73 for personal and work burnout, 0.46 for personal and client burnout, and 0.61 for work and client burnout.

### 3.1 Content validity

The process of translation, content validity index, qualified experts, and the scale were the same Index of Work Satisfaction.

The Copenhagen Burnout Inventory (CBI)-Cambodian Version was shown that there were 19 items in the whole scale, as the result reported that the total agreement was 100%, the I-CVI was 1, S-CVI/Ave was 1; and S-CVI/UA was 1. Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2014). Therefore, the CBI-Cambodian Version was 1.00 indicated that it was very good content validity.

### 3.2 Construct validity

The construct validity of the burnout scale – Khmer version was tested on the same process of the scale. The result showed that there were 19 items and 3 domains in the first level of confirmatory factor analysis (Shore et al., 1990).

For the second level of the CFA, all regression weights 0.66 to 1.11 were statistically significant at 0.05, and squared multiple correlations ranging from 0.42 to 0.74 (*Table 14*). All indices of the model were acceptable: chi-square ( $\chi^2$ ) = 390.91, degree of freedom (df) = 112, the normed fit chi-square ( $\chi^2/df$ ) = 3.49, the goodness-of-fit index (GFI) = 0.91, comparative fit index (CFI) = 0.98, normed fit index (NFI) = 0.97, root-mean-square error of approximation (RMSEA) = 0.07, standardized root-mean-square residual (SRMR) = 0.09, except for chi-square significance (p-value = 0.00) as showed in Table 15 & Figure 8.

Internal consistency: the item-total correlation coefficients shown that there were seven items lower than standard criteria (0.30), therefore item 13 removed from the CBI. Inclusion, Copenhagen Burnout Inventory-Cambodian version was only 18-item (*Appendix Q*).

Table 15 Goodness of Fit Statistics of Copenhagen Inventory Index-Cambodian version Measurement Model (n = 475)

Relative Fit Index	Threshold	Findings values	Model achieve criteria
Chi-square – test, p-value	>0.05	0.00	Not met
Chi-square/degree of freedom	<3.00	3.49	Not met
Comparative Fit Index (CFI)	>0.90	0.98	Met
Goodness of Fit Index (GFI)	>0.90	0.91	Met
Adjusted Goodness of Fit Index (AGFI)	$\geq 0.80$	0.86	Met
Normed fit index (NFI)	$\geq 0.90$	0.97	Met
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.07	Met
Standardized Root Mean Square Residual (SRMSR)	<0.70	0.09	Mot met

The items' statistic reports are presented in Table 14, which includes unstandardized factor loading (b), complete standardized factor loading (B), standard error (SE), t-value (t), squared multiple correlation ( $R^2$ ), and error/residual variances (EVs). The unstandardized factor loading (b) of each dimension ranged from 0.67 to 1.21 at a statistically significant level of .05. The dimension of work-related burnout had the highest unstandardized factor loading ( $b = 1.21$ ), followed by professional burnout ( $b = 0.82$ ), and client-related burnout ( $b = .67$ ). The factor loading (B) of each item ranged from .66 to 1.11 at a statistically significant level of .05. The dimension of work-related burnout had the highest was highest ( $B = 1.11$ ), followed by followed by professional burnout ( $B = 0.92$ ), and client-related burnout was lowest ( $B = 0.66$ ). The basic measurement model of CBI-Cambodian Version is showed in (*Table 16 & Figure 7*).

Table 16 Factor loading and construct validity of Copenhagen Inventory Burnout – Cambodian version (n = 457)

Copenhagen Burnout Inventory- Cambodian Version	b	B	SE	T	R <sup>2</sup>	Error
				value		
<b>Professional Burnout</b>	<b>.82</b>	<b>.92</b>	<b>.14</b>	<b>6.36</b>	<b>.85</b>	<b>.13</b>
1. I feel tired	.49	.42			.23	.89
2. Physically tiredness	.54	.51	.07	7.19	.33	.77
3. Psychological tiredness	.66	.59	.09	6.53	.34	.89
4. I cannot do it anymore	1.01	.65	.10	6.05	.35	1.04
5. I extremely tired	1.04	.72	.12	6.00	.47	.80
6. I feel weak and susceptible of sickness	1.01	.90	.14	6.36	.60	.69
<b>Work-related burnout</b>	<b>1.21</b>	<b>.98</b>	<b>.09</b>	<b>10.67</b>	<b>.96</b>	<b>-.27</b>
7. Having work psychological tiredness	.74	.81			.53	.56
8. Feel mental exhausted because of your work	.80	.87	.07	11.24	.56	.63
9. Work make me feel tension	.74	.74	.08	9.23	.48	.49
10. Feel tired at the end of the day	.81	.79	.09	8.81	.45	1.01
11. Extremely tired in the morning at thought of previous work day	.81	.75	.08	8.71	.43	.76
12. Every working hour made you feel tiredness	.78	.74	.08	8.43	.41	.65
<b>Client-related burnout</b>	<b>.67</b>	<b>.74</b>	<b>.10</b>	<b>7.07</b>	<b>.54</b>	<b>.57</b>
13. Having difficulty in working with client	.80	.67			.35	.47
14. Having tension when working with client	.76	.88	.08	10.76	.68	.64
15. Losing your energy to work with client	.74	.72	.10	6.73	.52	.64
16. Feel give more than you get back when working with client	.97	.65	.09	7.04	.42	.96
17. Work tiredness with client	.97	.78	.09	7.86	.63	.37
18. Wonder how long you will continue to work with client	.89	.58	.09	5.93	.25	1.02

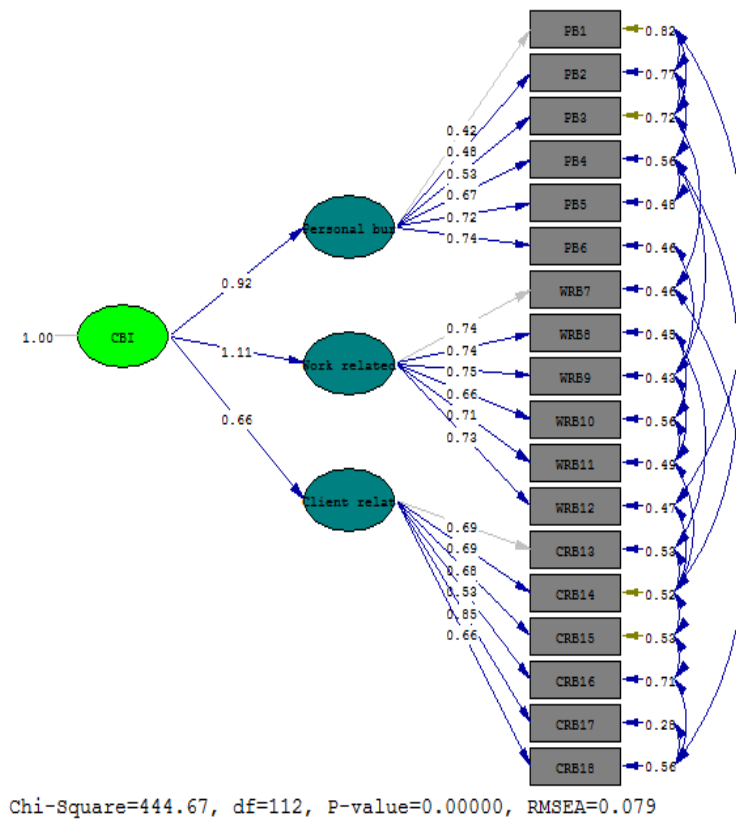


Figure 7 Measurement Model of CBI-Cambodian Version

### 3.4 Reliability

The CBI-Cambodian version was determined by using Cronbach's alpha coefficient ( $\alpha$ ) for estimate the internal consistency. The result showed that the Cronbach's alpha of total scale was 0.92. The Cronbach's alpha of all dimension were 0.92. The summary of the instrument is presented in *Table 17*.

Table 17 Number of Items, S-CVI, I-CVI, and Reliability of CBI-Cambodian Version (n=457)

<b>IWS Cambodian version</b>	<b># of items</b>	<b>S-CVI</b>	<b>I-CVI</b>	<b>Reliability <math>\alpha</math></b>
Personal burnout	6			<b>.92</b>
Work-related burnout	6			<b>.92</b>
Client-related burnout	6			<b>.92</b>
<b>Total</b>	<b>18</b>	<b>1</b>	<b>1</b>	<b>.92</b>

### Part 3: Description of demographic data form with nursing staffing form

The demographic data form was developed by the researcher to collect the information related to the RNs' personal background. In addition, the nurse staffing measurement form was developed to measure patient to nurse ratio. Since it was a single table, it was considered as part of the demographic data.

#### 1. Demographic data form

The researcher developed a demographic data form. It was designed to collect the participants' information including ages, genders, marital status, highest degree, years as registered nurse, years as current working unit, employment status, type of shift, hospital size, and the average number of patients taken care by one RN's in each shift during the last shift.

#### 2. Nurse staffing

Nurse staffing was measured based on nurse reports of the number of patients assigned to each nurse. Nurses were asked to indicate how many patients were assigned on their last shift. Nurse responses were calculated as the mean patient load

across all nurses in a hospital who reported having responsibility for at least 2 patients.

### **2.1 Scoring and interpretation of the score**

The average number of patients that cared by one RN through different working shifts was calculated to interpret the patient to nurse ratio. Higher number of patients indicates one nurse takes care more patients. Lower number of patients indicates one nurse takes care less number of patients. The average number of patient to nurse ratio from different working shifts was used for data analysis.

### **2.2 Content validity**

The five nurse experts were the same qualification as other instruments' content validity testing experts. After these five experts' evaluation, the I-CVI was 1.00, which is acceptable (Polit & Beck, 2014).

## **4. Instrument summary**

Four instruments had been translated and adapted from existing instrument including the Index of Work Satisfaction scale (Stamps, 1997), the Copenhagen Burnout Inventory (Borritz, 2006), and the Practice Environment Scale of the Nursing Work Index (Lake, 2002), and Researcher developed Cambodian Nursing Care Quality Scale.

Translation of the instrument used Brislin's translation model (Brislin, 1980) for approaching. Then, for ensuring the translated instruments to achieve the relevance and represent the targeted construct, the content validity has been established by the panel of five experts and the content validity index (CVI) was calculated for category evaluation and item evaluation. Next, the item selection process and the precision of items were examined using corrected item-total correlation.

Psychometric properties were tested validity and reliability. The reliability of total scale and subscale was evaluated by the following: a) Cronbach's alpha coefficient that estimates the internal consistency; b) corrected item-total correlation, with low item-total correlation ( $r < 0.30$ ); items were deleted. Construct validity was established by confirmatory factor analysis (CFA) technique. All instruments in the study demonstrated satisfactory validity and reliability.



However, the CNCQS was tested by EFA: KMO and Bartlett's. The principal axis factoring extraction by Varimax rotation method was used for EFA. The extracted factors were based on at least 1.00 of eigenvalues. The total variance explained was calculated.

There are instruments to be used for the main study as followings: (1) the instrument was developed by the researcher, was Cambodian Nursing Care Quality (CNCQS); and (2) the three existing instruments were Index of Work Satisfaction (IWS), Practice Environment Scale of Nursing Work Index (PES-NWI), Copenhagen Burnout Inventory (CBI). However, Nurse staffing measurement was included in demographic data. These three instruments were translated to Cambodian version. The testing of psychometric properties of CNCQS included content validity testing, internal consistency reliability, and EFA. IWS, PES-NWI, and CBI were tested with internal consistency reliability, CFA and construct reliability. In addition, nurse staffing measurement form was tested only content validity. Therefore, all of the instruments illustrated acceptable validity and reliability. The summary of all instruments' reliability and validity are presented in *Table 18*.

## **5. Protection of the rights of human subjects**

Researchers obtained approval from the National Ethics Committee for Health Research (Approval No. 319 NECHR), Ministry of Health and each hospital directors. Permission for collecting the data was gathered by formal approval from the hospitals to conduct the study.

Participation in the study is voluntary and based on the staff nurses ability to give informed consent, and then the staff nurses were invited to participate. The participants would be received the explanation about the purpose of the study, benefits, risks, the types of questionnaires and tasks to be completed, and the length of time to complete the questionnaires. The potential risks to participants are minimal, such as emotional discomforts when answering some questions. Participants were encouraged that if any time they felt discomfort, they would able to discuss the importance of the question with the researcher and they can refuse to answer any question. Their names were not addressed in the data; a code number was used to ensure confidentiality. There is no harm to participants in this study and it would take

approximate 60 minutes to complete a packet of the questionnaires. After completing the questionnaire, participants put it in an envelope and seal it. Data were computerized and accessible only by researcher. Results of the study would report as a whole picture. Any personal information was not appearing in the report.

## 6. Data Collection

Data was collected by individual questionnaire. The following steps were performed.

1. Received approval to collect research data from the National Ethics Committee of Health Research (NECHR), Cambodia.
2. Sought permission from nursing division directors of eight-selected tertiary provincial and three national hospitals to conduct this research.
3. Sent a letter to selected hospitals' nursing directors. The letter clearly explained the purpose of the study, the procedure of data collection, the request permission to collect data, and the copy of Khmer version questionnaires.

Table 18 Summary of Instruments' Reliability and Validity

Instruments' name	# Item	Reliability		Validity	
		Internal Consistency (n = 225)	Construct reliability (n=457)	Content validity	Construct Validity (n = 457)
CNCQS	34	Total = .52, ranged from .51 - .53.	Total = .93, ranged from .92-.93.	I-CVI: 1 S-CVI: 1 S-CVI/UA: .95	
IWS-Cam	20	Total = .37, ranged from .34 - .38.	Total = .85, averaged = .85.	I-CVI=1 S-CVI=1 S-CVI/UA=1 0.48-0.92	Model met criteria
PES-NWI-Cam	30	Total = .54, ranged from .51-.57.	Total = .93, average = .93.	I-CVI=1 S-CVI=1 S-CVI/UA=1 0.72-0.90	Model met criteria

Table 18 Summary of Instruments' Reliability and Validity

Instruments' name	# Item	Reliability		Validity	
		Internal Consistency (n = 225)	Construct reliability (n=457)	Content validity	Construct Validity (n = 457)
CBI-Cam	18	Total = .59; ranged from .56-.63	Total: .92; Average .92	I-CVI=1 S-CVI=1 S-CVI/UA=1 0.74-0.98	Model met criteria
Nurse Staffing	1			I-CVI = 1	

4. Obtained the total number and each strata inpatient units' number of RNs from hospitals' nursing units. The researcher provided orientation session to three research assistants about the inclusion criteria of participants' selection and the sampling technique required for data collection. This session conducted with video Skype call. Researcher explained how to collected data, checked missing data, and the meaning of each item. At the last session, researcher controlled their understanding by asking them to present their ideas included feedback was given.

5. Given the information sheet, informed consent form and questionnaires to selected participants by the researcher and the research assistants. The information sheet revealed the purpose of study, time needed to complete questionnaires (40 min to 50 min), and method for assurance of confidentially and anonymity. Moreover, it explained the importance of answering questionnaires' authenticity and integrity.

6. Collected six questionnaires from selected participants by the researcher and the research assistants.

## 7. Data Analysis

Univariate outliers for each variable were tested by inspecting frequency distribution of the Z score. According to Kline (2011),  $|Z| > 3.00$  indicates an outlier. Thereby, 26 outlier cases were deleted from the final dataset. Multivariate outliers were tested by Mahalanobis distance at  $p < .001$ . Mahalanobis distance is evaluated as “ $\chi^2$  with the degrees of freedom equal to the number of variables” (Tabachnick & Fidell, 2007). This study included six variables. Any cases with Mahalanobis Distance score greater than  $\chi^2 (6) = 22.458$  were deleted, one case in this instance.

Examined the completeness of the questionnaires by the researcher. 225 out of 240 (93.75%) were returned for instrument development, 375 out of 396 (94.69%) were returned for the main study; and 457 out of 484 (94.42%) questionnaires were returned CFA.

Finally, there were 240, 396, and 484 participants for instrument development, main study, and psychometric testing of existing instruments respectively for data analysis. A p-value of .05 was set up as the accepted level of significance for this study. The procedures for data analysis were conducted by the following methods.

**7.1** By using SPSS 22.0, descriptive statistics including frequency, percentage, range, mean and standard deviation were used to describe the characteristics of participants and study variables.

**7.2** Reliability of all instruments was tested among 300 RNs, who were parallel subjects for the main study. According to (Polit & Beck, 2012), it is acceptable that the Cronbach’s Alpha Coefficient of the total score is more than 0.7 for new developed instrument and more than 0.8 for existing instrument.

**7.3** EFA was used to determine CNCQS construct validity. With the sample size of 225 RNs, the item’s factor loading more than .30, factors Eigenvalues more than 1.0, and more than three items in each construct were reported (Hair et al., 2010).

**7.4** The assumptions for conducting SEM include normality, linearity, homoscedasticity, and multicollinearity testing.

**Normality** was tested by skew, kurtosis statistics and qq-normal probability plot.

**Linearity** was tested by examining the residuals plots, which is the graph between the standardized residuals (Y-axis) versus the predicted value (X-axis).

*Homoscedasticity* was checked by residuals scatter plot.

*Multicollinearity* was assessed by Pearson Product Moment correlations for bivariate relationships among 22 observed variables. Multiple regression was used to test multicollinearity by the variance inflation factor (VIF) and the tolerance value among 12 exogenous observed variables and 8 endogenous observed variables (Hair et al., 2010).

7.5 By using LISREL 8.72 for Windows program, the construct validity of Practice Environment Scale of the Nursing Work Index, Index of Work satisfaction, and Copenhagen Burnout Inventory were tested by second-order CFA model. The measurement model's p-value  $>.05$ ,  $X^2/df < 2$ ,  $GFI >.90$ ,  $NFI >.90$ ,  $CFI >.90$ ,  $AGFI >.80$ ,  $RMSEA < .08$ ,  $SRMR < .07$ . The hypothesized causal model was tested and modified for best fit and parsimony by SEM. With the sample size of more than 400, the p-value  $>.05$ ,  $X^2/df < 3$ ,  $GFI >.90$ ,  $TFI >.90$ ,  $CFI >.90$ ,  $AGFI >.80$ ,  $RMSEA <.08$ ,  $SRMR < .07$  were used to test the model fitness (Hair et al., 2010).

## **CHAPTER IV**

### **RESULTS**

This chapter presents the findings of the study. The findings present (1) demographic characteristics of the participants; (2) Structural Equation Modeling (SEM); and (3) Findings of research questions and hypotheses.

#### **Part I: Descriptive statistics of variables**

##### **1. Demographic characteristics of the participants**

A total of 375 from 396 questionnaires (94.69%) were returned and all of them were determined to be usable for analysis. The mean age of the participants was 36.82 years (SD = 11.27, range = 22-64 years). The majority of participants were female (n= 235, 62.70%). Participants had worked as RNs on average 14.13 years (SD=12.26, and ranged 1 – 39 years). The average of years as RN on the current unit was 11.42 (SD=11.01, Ranged from 1 years – 39 years). The majority of participants had an associate degree in nursing (303 = 80.80%), and BSN was about 72 = 19.20%. The fulltime job has taken 369 = 98.40%. Moreover, the family status illustrated that single was 139 (37.10%); marriage was 218 (58.10%); and divorce was about 18 (4.80%). The participants invited from as followings: surgical 118 (31.50%); medicine was 94 (25.10%); ICU was 61 (16.30%); maternity was 53 (14.10%); pediatric unit was 49 (13.10%). The last variable was nursing shift, it was 375 (100%) 24-hour-shift (*Table 19*).

Table 19 Demographic Characteristics of Participants (375)

<b>Variables</b>	<b>Characteristics</b>	<b>Freq.</b>	<b>%</b>	<b>Mean</b>	<b>SD</b>	<b>Range</b>
<b>Gender</b>	Male nurses	140	37.30			
	Female nurses	235	62.70			
<b>Age</b>	22 years – 25 years	60	16	<b>36.82</b>	<b>11.27</b>	<b>22-64</b>
	26 years – 30 years	102	27.20			
	31 years – 35 years	56	14.94			
	36 years – 40 years	14	3.74			
	41 years – 45 years	34	9.06			
	46 years – 50 years	57	15.20			
	> 50 years	52	13.86			
<b>Years as RN</b>	1 years – 5 years	145	37.56	<b>14.13</b>	<b>12.26</b>	<b>1-39</b>
	6 years – 10 years	72	19.10			
	11 years – 15 years	13	4.46			
	16 years – 20 years	11	2.83			
	21 years – 25 years	30	7.80			
	26 years – 30 years	49	13.06			
	31 years – 35 years	33	8.79			
	> 35 years	24	6.40			
<b>Years as RN on the current unit</b>	1 years – 10 years	250	66.67	<b>11.42</b>	<b>11.01</b>	<b>1-39</b>
	11 years – 20 years	31	8.27			
	21 years – 30 years	61	16.26			
	> 30 years	33	8.80			
<b>Degree of RNs</b>	ADN	303	80.80			
	BSN	72	19.20			
<b>Schedule characteristic</b>	Fulltime job	369	98.40			
	Part time job	6	1.60			
<b>Family status</b>	Single	139	37.10			
	Marriage	218	58.10			
	Divorce	18	4.80			

Table 19 Demographic characteristics of participants (n=375) (Cont.)

Variables	Characteristics	Freq.	%	Mean	SD	Range
<b>Units</b>	Surgical	118	31.50			
	Pediatric	49	13.10			
	Medicine	94	25.10			
	ICU	61	16.30			
	Maternity	53	14.10			
<b>Nurse-</b>	2 – 7	66	17.6			
<b>Patient-Ratio</b>	8 – 15	113	30.1			
	16 – 22	127	33.9			
	23 – 24	44	11.7			
	30 – 39	25	6.7			
<b>Shift</b>	24-hour-shift	375	100			

## 2. Descriptive statistics of study variables

The study variables in this study included NCQ, nurse staffing, nurse work environment, nurses' work satisfaction, and nurse burnout. The description of each study variables and observed variables' Skewness (SI) and Kurtosis (SK) are presented in *Table 20*. The NCQ had a negative Skewness value was -1.07, which suggested that most of the participants had given score to left tail. The kurtosis value of NCQ was positive (1.85), which indicated that RNs perceived NCQ scores was platykurtic (flattened) (*Table 20*).

The nurse work satisfaction had a negative skewness value close to zero (-0.47), which suggested that most of the participants had a score of nurse work satisfaction to the left of mean score. The kurtosis value of nurse work satisfaction was positive (2.11), which indicated nurse work satisfaction scores were shaped like a platykurtic (flattened curve) (*see Table 20*). Therefore, the skewness and kurtosis values were normal distribution.

The nurse practice environment scores had a negative skewness value (-0.74), which suggested that most of the participants had a score of perceived nurse practice environment lower than the mean score. The kurtosis value of nurse practice environment was positive (1.16), which indicated that the scores of nurse practice



environment were shaped like a platykurtic (flattened curve). Therefore, the skewness and kurtosis values were normal distribution.

The nurse burnout had a positive skewness value (0.18), which suggested that most of the participants had a score of nurse burnout close to the mean score. The kurtosis value of nurse burnout was positive (-0.11), which indicated that nurse burnout scores were shaped like a platykurtic (flattened curve) (*see Table 20*). Therefore, the skewness and kurtosis values were normal distribution.

The nurse staffing score had a positive skewness value (0.36), which suggested that most of the participants had score of patient to nurse ratio close to the mean score. The kurtosis value of nurse staffing had a positive value (0.25), which indicated that the nurse staffing score was shaped like a platykurtic (*Table 20*). Therefore, the skewness and kurtosis values were normal distribution.

Table 20 Description of Study Variables and Observed Variables (n=375)

Variables	Skewness		Kurtosis	
	SI	SE	SI	SE
<b>Cambodian Nursing Care Quality Scale</b>	<b>-1.07</b>	<b>0.12</b>	<b>1.85</b>	<b>0.25</b>
1. Moral commitment	-1.08	.12	2.95	.25
2. Professional commitment	-1.03	.12	2.32	.25
3. Environmental management	-.77	.12	0.16	.25
4. Quality-safety conscious care	-1.08	.12	2.33	.25
5. Total care	-1.17	.12	2.22	.25
6. Emotional supportive care	-.85	.12	0.75	.25
7. Information supportive care	-1.16	.12	2.27	.25
8. Patient satisfaction	-1.08	.12	0.61	.25

Table 20 Description of Study Variables and Observed Variables (n=375) (Cont.)

Variables	Skewness		Kurtosis	
	SI	SE	SI	SE
<b>Index of Work Satisfaction</b>	<b>-0.45</b>	<b>0.12</b>	<b>2.11</b>	<b>0.25</b>
1. Professional status	-.87	.12	3.90	.25
2. Task requirement	-.51	.12	1.68	.25
3. Interaction	-.32	.12	3.00	.25
4. Organization and policy	-.14	.12	1.12	.25
5. Autonomy	-.45	.12	.87	.25
<b>Copenhagen Burnout Inventory</b>	<b>0.18</b>	<b>0.12</b>	<b>-0.11</b>	<b>0.25</b>
1. Personal burnout	.36	.12	-.02	.25
2. Work-related burnout	.34	.12	-.08	.25
3. Client-related burnout	-.16	.12	-.25	.25
<b>Practice Environment Scale of Nursing Work Index:</b>	<b>-0.74</b>	<b>0.12</b>	<b>1.16</b>	<b>0.25</b>
1. Nurse Participation in Hospital Affairs	-.62	.12	.83	.25
2. Nursing Foundations for Quality of Care	-.79	.12	1.34	.25
3. Nurse Manager Ability, Leadership, and Support of Nurses	-.53	.12	.68	.25
4. Staffing and Resource Adequacy	-.86	.12	1.38	.25
5. Collegial Nurse-Physician Relations	-.90	.12	1.61	.25
<b>Nurse Staffing</b>				
1. Nurse-patient ratio	.36	.12	-.42	.25

## Part II Structural Equation Modeling Analysis

**SEM Assumption Testing** includes normality, homoscedasticity, linearity, and multicollinearity.

### 1. Normality

The normality referred to “which the distribution of the sample data corresponds to a normal distribution” (Hair et al., 2010, p. 36). The normality of SEM was checked by univariate normality and multivariate normality. According to Schumacker and Lomax (2010), the interface of PRELIS in LISREL software program can screen data for both univariate normality and multivariate normality. The

results of univariate normality testing and multivariate normality testing are presented in (Appendix G 1 & G 2). Most of observed variables' p-value was less than .05, indicating non-normally distributed variables.

## 2. Homoscedasticity

The homoscedasticity referred to “assumption that dependent variable(s) exhibit equal levels of variance across the range of predictor variable(s)” (Hair et al., 2010). Residual scatter plots examined this assumption. The spread of residual variables randomly around the zero axis within  $\pm 3$  SD indicated the homoscedasticity. This assumption was not violated in this study as showed in (*Appendix G1*).

## 3. Linearity

Linearity referred to “predict values that fall in a straight line by having a constant unit change (slop) of the dependent variable for a constant unit change of the independent variable” (Hair et al., 2010). The residual plot tested it, which were the graphs between the standardized residuals (Y-axis) versus the predicted value (X-axis). As showed in *Appendix G1*, the scatter plots between standardized residuals and the predicted value illustrated such a linear relationship.

## 4. Multicollinearity

Multicollinearity referred to as “the extent to which a variable can be explained by the other variables in the analysis” (Hair et al., 2010, p. 2). Examining the correlation matrix among individual variables included in the analysis checked bivariate multicollinearity. Bivariate multicollinearity occurs when correlations of any variables is greater than + 0.80 (Hair et al., 2010). In addition, the multivariate multicollinearity occurs when the tolerance values are less than 0.1 and variance inflation factor (VIF) values are greater than 10 (*Appendix G2*).

The tolerance values ranged from .25 to .89 and VIF ranged from 1.11 to 3.87 as shown in *Table 21*. The tolerance value and VIF indicated no multicollinearity.

In summary, the assumptions for conducting SEM in this study did not violate the linearity, homoscedasticity, and multicollinearity. However, there was only the assumption of normality violated in this study.

Table 21 Assessment for Multicollinearity among the Study Variables (n=375)

Variables	Tolerance	VIF
<b>Exogenous variables</b>		
<b>Univariate normality testing</b>		
Nurse Participation in Hospital Affairs	0.27	3.66
Nursing Foundations for Quality of Care	0.28	3.53
Nurse Manager Ability, Leadership, and Support of Nurses	0.39	2.53
Staffing and Resource Adequacy	0.47	2.11
Collegial Nurse-Physician Relations	0.47	2.08
Nurse-patient ratio	0.89	1.11
Professional status	0.62	1.60
Task requirement	0.61	1.62
Interaction	0.49	2.04
Organization and policy	0.36	2.77
Autonomy	0.36	2.73
Personal burnout	0.34	2.92
Work-related burnout	0.29	3.42
Client-related burnout	0.59	1.68
Moral commitment	0.25	3.87
Professional commitment	0.36	2.78
Environment management	0.57	1.74
Quality-safety conscious care	0.43	2.31
Total care	0.33	2.95
Emotional supportive care	0.55	1.79
Information supportive care	0.54	1.84
Patient outcomes	0.50	1.98
<b>Multivariate normality testing</b>		
Set of study variables	9.96	53.06

### Part III: Findings of Research Questions and Hypothesis Testing

The findings related to research questions and hypothesis testing are presented as follows:

**Objective 1:** To explore the average levels of nurse staffing, nurse work environment, nurses' work satisfaction, nurse burnout, and NCQ at government hospitals as perceived by RNs.

In the table 22, the score of average nurse staffing ranged from 2 to 39 with a mean of 16.20 (SD = 7.83). The maximum number of patients that one nurse should take care of was 2. The highest number of patients that one nurse took care of was 39.

Table 22 Description the frequency, percentages, mean, and SD of Nurse-Patients Ratio (n=375)

Nurse-patient ratios	Freq.	Percentages	Mean	SD
1: 2 – 7	66	17.6	16.20	7.83
1: 8 – 15	113	30.1		
1: 16 – 22	127	33.9		
1: 23 – 29	44	11.7		
1: 30 – 39	25	6.7		

Table 23, the total mean score of NCQ was 3.11 (SD = 0.94) at moderate level. The dimension of Information supportive care had the highest mean (Mean = 3.97, SD = 0.80), which was followed by emotional supportive care (Mean = 3.63, SD = 0.92). Furthermore, other constructs were in moderate level were environmental management, professional commitment, moral commitment, total care, and quality-safety conscious care respectively (Mean = 3.16, SD = 1.07; Mean = 3.14, SD = 0.75; Mean = 3.00, SD = 0.70; Mean = 2.97, SD = 0.88; Mean = 2.70, SD = 0.90) as the moderate levels. However, the dimension of patient outcomes was lowest (Mean = 2.31, SD = 0.90). This result indicated that the total score was moderate; NCQ was not favorable perceptions of this study.

Table 23 Dimensions' Description of CNCQS (n=375)

Dimensions of CNCQS	Mean	SD	Level
<b>Information supportive care (ISC)</b>	<b>3.97</b>	<b>0.80</b>	<b>High</b>
Item15 Explain information to patients clearly	4.02	0.81	High
Item16 knowledge of disease	3.93	0.79	High
<b>Emotional supportive care (ESC)</b>	<b>3.63</b>	<b>0.92</b>	<b>High</b>
Item20 Nurses' teaching	3.66	0.90	High
Item21 Happy with the information being taught	3.69	0.85	High
Item17 Enough time for patients	3.50	1.03	High
<b>Environmental management (EM)</b>	<b>3.16</b>	<b>1.07</b>	<b>Moderate</b>
Item28 Rooms are clean	2.93	1.06	Moderate
Item29 Rooms have good ventilation	3.18	1.14	Moderate
Item30 Rooms are quiet	3.37	1.02	Moderate
<b>Professional Commitment (PC)</b>	<b>3.14</b>	<b>0.75</b>	<b>Moderate</b>
Item7 Maintain their own competence	2.28	0.52	Low
Item43 Professional development	2.27	0.54	Low
Item31 Develop own competencies	2.83	1.10	Low
Item41 Appropriate delegation of tasks	3.98	0.94	High
Item32 Knowledge is Up-to-date	3.65	0.94	High
Item34 Develop nursing care plans	3.86	0.71	High
<b>Moral Commitment (MC)</b>	<b>3.00</b>	<b>0.70</b>	<b>Moderate</b>
Item1. Polite to patients	2.51	0.66	Low
Item2. Observe patients	2.48	0.71	Low
Item3. Fair nursing care	3.01	1.00	Moderate
Item4. Kind to patients	4.17	0.64	High
Item5 Protect patients' rights	3.95	0.75	High
Item6 Resolving moral issues	2.34	0.52	Low
<b>Total care (TC)</b>	<b>2.97</b>	<b>0.88</b>	<b>Moderate</b>
Item35 Help as needed	3.35	0.84	Moderate
Item33 Holistic care	3.10	1.06	Moderate

Table 23 Dimensions' Description of CNCQS (n=375) (Cont.)

<b>Dimensions of CNCQS</b>	<b>Mean</b>	<b>SD</b>	<b>Level</b>
Item18 Reduce patients' anxiety	2.89	0.82	Moderate
Item19 Relieve worry illness b	2.54	0.82	Low
<b>Quality-safety conscious care (QSCC)</b>	<b>2.70</b>	<b>0.90</b>	<b>Moderate</b>
Item8 Patients receive safety care	2.85	0.76	Moderate
Item9 Patients have comfortable conditions	2.02	0.68	Moderate
Item11 Pain is treated appropriately	2.17	0.64	High
Item37 Practices with caring behavior	2.59	0.60	High
Item7 Protect patients physical injury	3.46	0.82	High
Item39 Received high quality care	2.44	0.75	High
Item14 Provide good basic nursing care	2.88	0.87	Moderate
<b>Patient satisfaction (PS)</b>	<b>2.31</b>	<b>0.90</b>	<b>Low</b>
Item24 Satisfied with symptom management	2.33	0.51	Low
Item23 Satisfied with discharge planning	2.32	0.52	Low
Item22 Satisfied with waiting time	2.28	0.55	Low
<b>Total of CNCQS</b>	<b>3.11</b>	<b>0.94</b>	<b>Moderate</b>

Table 24, the description of nurse work environment. The total mean score of nurse practice environment was 2.36 (SD = 0.59) at low level. The dimension of Nurse Participation in Hospital Affairs (Mean = 2.63, SD = 0.72) was at moderate level, which followed by Nursing Foundations for Quality of Care (Mean = 2.37, SD = 0.59), the dimension of Nurse Manager Ability, Leadership, and Support of Nurses score had the lowest mean score of 2.37 (SD = 0.65), and Collegial Nurse-Physician had the mean (Mean = 2.23, SD = 0.53). However, staffing and resource adequacy was the lowest level (Mean = 2.21, SD = 0.47). Since all five dimensions mean scores were lower than 2.50, it considered the nurse practice environment was not favorable in this study.

Table 24 Dimensions' description of PES-NWI (n=375)

<b>Dimensions of nurse practice environment</b>	<b>Mean</b>	<b>SD</b>	<b>Level</b>
Nurse participation in hospital affairs	2.63	0.72	Moderate
Nursing foundations for quality of care	2.37	0.59	Moderate
Nurse manager ability, leadership, and support of nurses	2.37	0.65	Moderate
Collegial nurse-physician relations	2.23	0.53	Low
Staffing and resource adequacy	2.21	0.47	Low
<b>Total</b>	<b>2.36</b>	<b>0.59</b>	<b>Low</b>

Table 25, described the nurse work satisfaction. The total mean score of nurses work satisfaction was 2.85 (SD = 0.86) at moderate level. The dimension of Professional status was high level (Mean = 3.46, SD = 0.89), which followed by autonomy (Mean = 2.84, SD = 0.86), interaction mean score (Mean = 2.83, SD = 0.81), and Organization and Policy had the mean score (Mean = 2.63, SD = 0.86). However, the dimension of had task requirement was lowest mean score (Mean = 2.53, SD = 0.91). This result was considered as not favorable in terms of nurse work satisfaction.

Table 25 Dimensions' Description of IWS (n=375)

<b>Dimensions of nurse work satisfaction</b>	<b>Mean</b>	<b>SD</b>	<b>Level</b>
Professional status	3.46	0.89	High
Autonomy	2.84	.86	Moderate
Interaction	2.83	0.81	Moderate
Organization and Policy	2.63	0.86	Moderate
Task requirement	2.53	0.91	Low
<b>Total</b>	<b>2.85</b>	<b>0.86</b>	<b>Moderate</b>

Table 26 described the nurses' burnout. The total score of nurse burnout was 2.88 (SD = 1.11) at the moderate level of burnout. The dimension of Client-related burnout's mean of total score was 3.05 (SD = 1.14), which indicated a moderate level. The dimension of Personal burnout's mean of total score was 2.84 (SD = 1.06), which



indicated a moderate level. However, the dimension of Work-related burnout's mean of total score was 2.70 (SD = 1.13), which indicated a lowest level. This result can be considered as moderate nurse burnout.

Table 26 Dimensions' description of Nurse Burnout (n=375)

Dimensions of nurses' burnout	Mean	SD	Level
Client-related burnout	3.05	1.14	Moderate
Personal burnout	2.84	1.06	Moderate
Work-related burnout	2.70	1.13	Moderate
<b>Total</b>	<b>2.86</b>	<b>1.11</b>	<b>Moderate</b>

### 2.1 Factors relating to NCQ

The table 27 below describes the relationship among factors influencing on NCQ, bivariate Pearson's correlations were used to evaluate. The magnitude of relationships was determined by the following criteria:  $r < .30$  = weak or low relationship,  $.30 \geq r \leq .50$  = moderate relationship and  $r > .50$  = strong or high relationship (Burns & Grove, 2009).

The results indicated that most of variables had a moderate correlation, at the statistical significance level of p-value  $< 0.01$ . It illustrated that a moderate positive correlation existed between existed between nurse work satisfaction and NCQ ( $r = .15$ ). Nurse practice environment had a moderate positive nurse work satisfaction ( $r = .24$ ), but it was not correlated with NCQ ( $r = .09$ ). Burnout had a moderate positive correlation with NCQ and nurse practice environment ( $r = .21$  and  $r = .34$ ) but it was not correlated with nurse work satisfaction ( $r = .03$ ), respectively. Nurse staffing had a moderate negative correlation with NCQ ( $r = -.31$ ) and had positive correlation with positive correlated with nurse work satisfaction and nurse practice environment ( $r = .25$ ;  $r = .30$ ) respectively; but it was not correlated with nurse burnout (*Table 27*).

Table 27 Observable Variables Pearson Correlation, Mean, SD (n=375)

	NCQ	NWS	NPE	NBO	NS
NCQ	1				
NWS	.15*	1			
NPE	.09	.24*	1		
NBO	.21*	.03	.34*	1	
NS	-.31*	.25*	.30*	.07	1

\*  $p < 0.05$

NCQ = Nursing Care Quality

NWS = Nursing Work Satisfaction

NPE = Nurse Practice Environment

NBO = Nurse Burnout

NS = Nurse Staffing

## 2.2 Model testing

The model of NCQ was tested using a two-step approach. First, the measurement model was tested, and second, followed by the structural equation model.

### 2.1.1 Assessment of measurement models

The measurement model determines how latent variables or construct are indicated by the observed variables. In this study, 3 instruments were investigated to specify reliability and construct validity using confirmatory factor analysis (CFA). This section presents the fit indices of the measurement models along with the reliability ( $R^2$ ) and standardized validity coefficient ( $\lambda_s$ ) using confirmatory factor analysis.

The results of CFA show that the three measurements had a good overall model fit (**Table 28**). The second-order CFA shows that all measurements had the normed fit chi-square ( $\chi^2/df$ ) within the recommended values less than three; the goodness-of-fit index (GFI) and the Comparative Fit Index (CFI) values close to 1.00 (displays a range of 0–1, with an acceptable fit index value of  $>0.90$  and  $>0.95$  is an excellent fit index); and finally the RMSEA  $<0.05$  (indicates a good fit when values of  $<0.05$  are achieved) ranged from 0.03 to 0.06 (Hu & Bentler, 1999; R. B. Kline, 1998).

Table 28 Statistical Overall Fitted Index values of measurement models (n = 375)

Variables	$\chi^2$	df	$\chi^2/df$	p-value	GFI	CFI	RMSEA
<b>PES-NWI</b>	450.60	405	1.11	.058	0.91	0.99	0.01
<b>IWS</b>	415.87	371	1.12	.065	0.95	0.99	0.01
<b>CBI</b>	122.27	109	1.12	0.181	0.93	0.99	0.02

Note: PES-NWI = Practice Environment Scale of Nursing Work Index  
 IWS = Index of Work Satisfaction  
 CBI = Copenhagen Burnout Inventory

In table 29 described an accepted level of .05, the t-value test statistic needs to be  $> +1.96$  before the hypothesis could be rejected. The loading with t-values and squared multiple correlations among all observed variables were presented in Table 29. The results indicate that all sub-scales of the measurement had significant low to high parameter estimates which were related to their specific constructs and validated the relationships among observed variables and their constructs. Furthermore, the squared multiple correlations ( $R^2$ ) for observed variables of the latent variables ranged from 0.28 to 1.00.

Table 29 Loading and reliability of indicators

Constructs and indicators	Factor loading	t-values	SE	$R^2$
<b>PES-NWI</b>				
• NPHA	0.97	12.37	0.009	0.95
• NFQC	0.92	9.46	0.018	0.85
• NMA	0.96	10.82	0.001	0.93
• SRA	0.80	7.92	0.007	0.64
• CNPR	0.89	6.33	0.022	0.80

Table 29 Loading and reliability of indicators (Cont.)

Constructs and indicators	Factor loading	t-values	SE	R <sup>2</sup>
<b>IWS</b>				
• PRS	0.82	10.35	0.016	0.67
• TR	0.93	6.46	0.006	0.88
• Int.	0.88	12.34	0.011	0.78
• OP	0.88	10.18	0.010	0.78
• Aut.	0.90	13.36	0.042	0.82
<b>CBI</b>				
• PB	0.93	6.63	0.076	0.85
• WRB	0.98	10.67	0.064	0.96
• CRB	0.74	7.07	0.121	0.54

Note: R<sup>2</sup> = Square Multiple Correlation

PES-NWI = Practice Environment Scale of Nursing Work Index

NPHA = Nurse Participation in Hospital Affairs

NFQC = Nursing Foundations for Quality of Care

NMALS = Nurse Manager Ability, Leadership, and Support of Nurse

SRA = Staffing and Resource Adequacy

CNPR = Collegial Nurse-Physician Relations

NPR = Nurse-Patient Ratio

IWS = Index of Work Satisfaction

PRS = Professional status

TR = Task requirement

Int = Interaction

OP = Organization and Policy

Aut = Autonomy

CBI = Copenhagen Burnout Inventory

PB = Personal burnout

WRB = Work-related burnout

CRB = Client-related burnout

In the SEM, the researcher fix the parameters of observed variables NQC nurse staffing (NS), moral commitment (MC), professional commitment (PC), environment management (EM), quality-safety conscious care (QSCC), total care (TC), emotional supportive care (ESC), information supportive care (ISC), and patient satisfaction (PS), nursing foundation of quality care (NFQC), nurse participation in hospital affairs (NPHA), autonomy (AUT), organization and policy (OP), collegial nurse-physician relations (CNPR) and staff and resource adequacy (SRA).

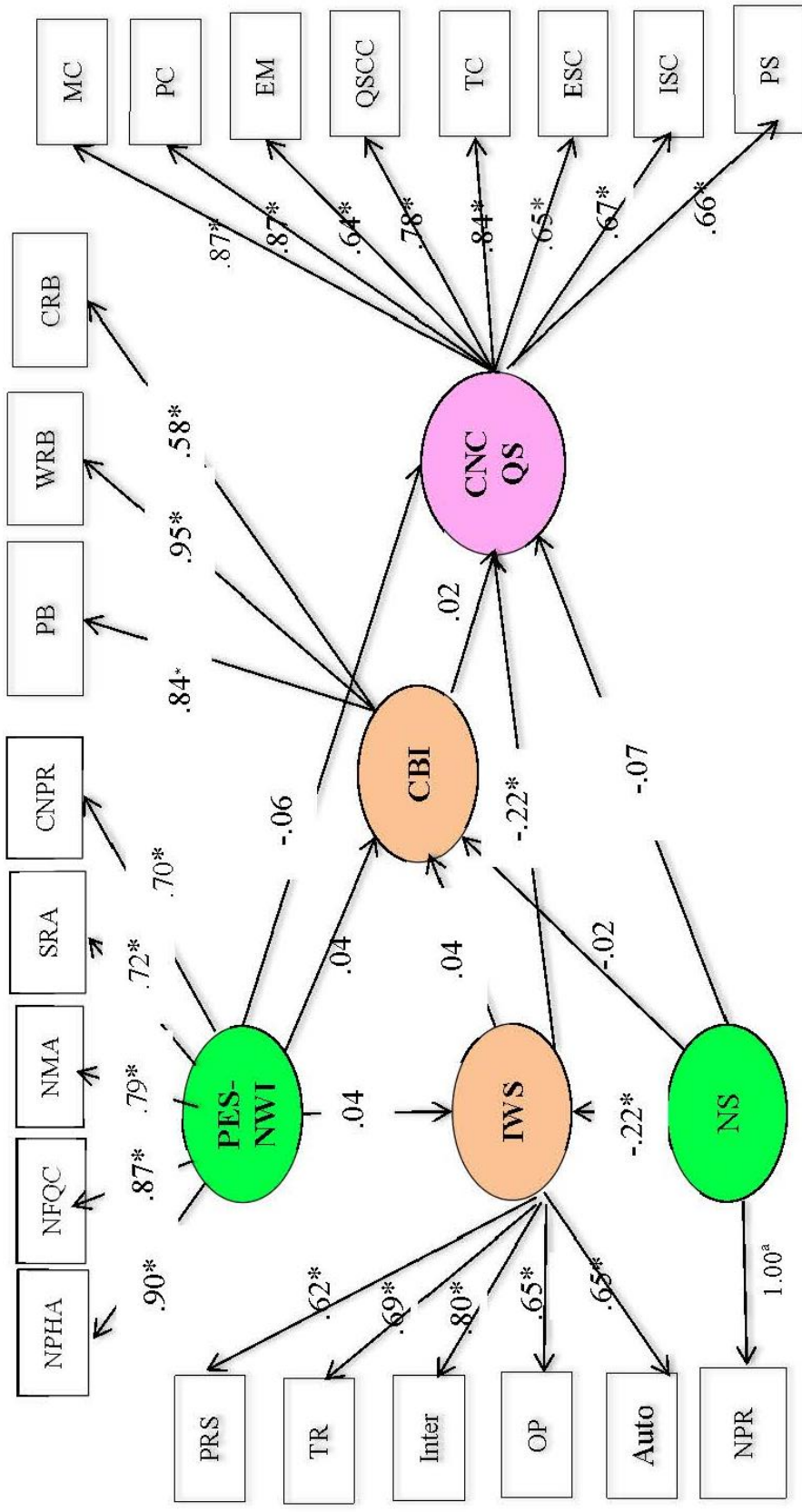
The initial hypothesized model did not achieve the acceptable goodness of fit measures ( $\chi^2 = 457.34$ ,  $df = 200$ ,  $p\text{-value} = 0.00$ ,  $\chi^2/df = 2.28$ ,  $CFI = 0.96$ ,  $GFI = 0.94$ ,  $AGFI = 0.87$ ;  $NFI = 0.94$ ;  $RMSEA = 0.059$ ,  $SRMSR = 0.047$ ) as shown in Table 30.

The progress of decreasing the  $\chi^2$  values was conducted by suggesting from the modification indices, which is the expected value change of freeing the highest value of Theta-Epsilon (TE), Theta-Delta (TD), and Theta-Delta-Epsilon (TH). This is because under the assumption of SEM, it allows correlation of error terms (Polit & Beck, 2012). Through model modification, the modified model (Figure 8) fitted the empirical data. The modified model had an acceptable goodness fit of index ( $\chi^2 = 266.78$ ,  $df = 187$ ,  $p\text{-value} = 0.00$ ,  $\chi^2/df = 1.42$ ,  $CFI = 0.99$ ,  $GFI = 0.94$ ,  $AGFI = 0.92$ ;  $NFI = 0.96$ ;  $RMSEA = 0.034$ ,  $SRMSR = 0.042$ ) as shown *in Table 30*.

Table 30 Goodness of Fit Measures for Overall Model (n=375)

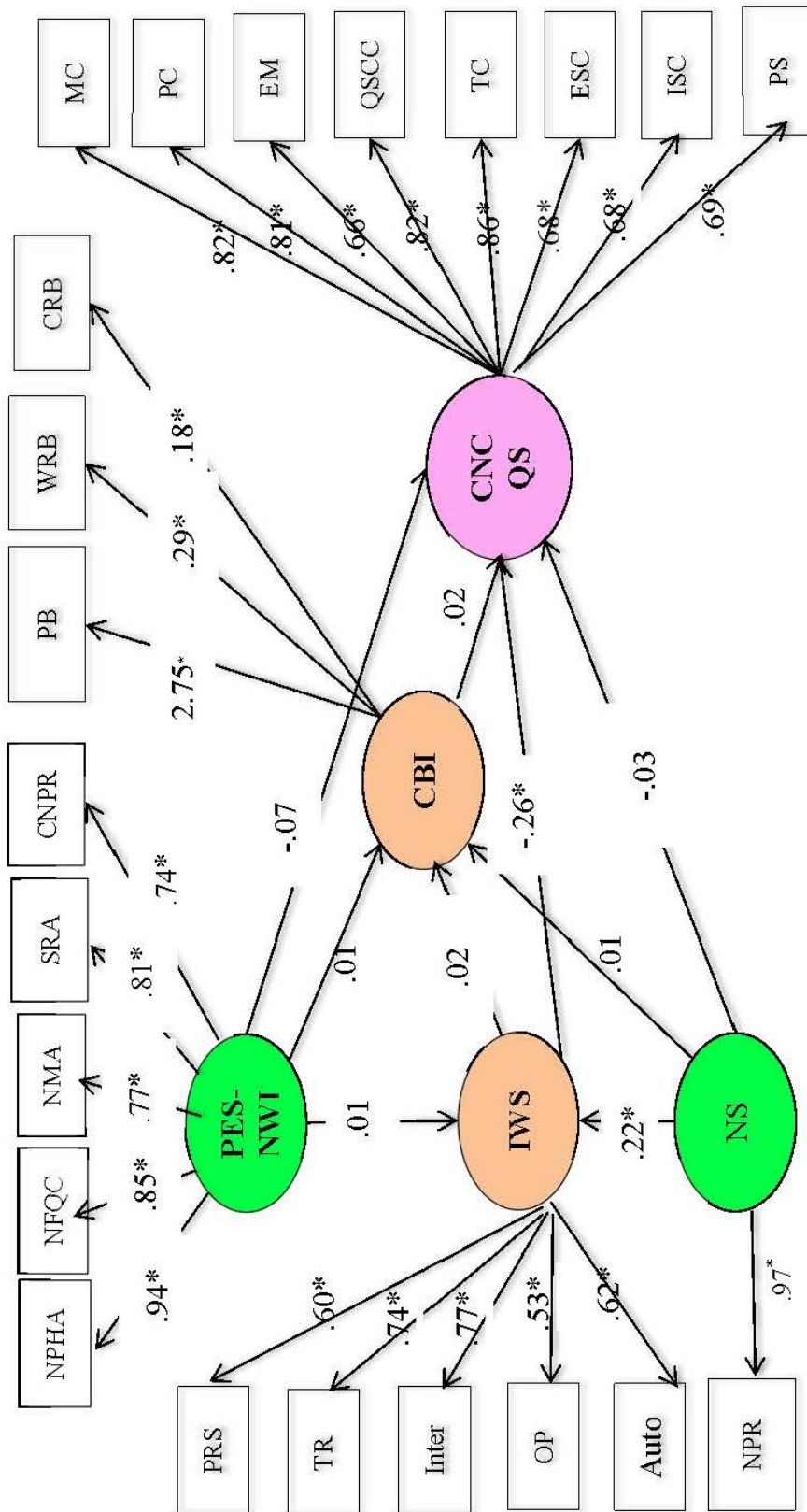
Relative Fit Index	Acceptable goodness of Fit Statistics	Hypothesized model		Modified Model	
		Statistics	Met criteria	Statistics	Met criteria
$\chi^2$	$P \geq .05$	457.34	No	266.78	No
		$p = 0.000$	No	$p = 0.001$	No
df		200		187	
$\chi^2/df$	$< 3.00$	2.28	No	1.42	Yes
CFI	$> .90$	0.96	Yes	0.99	Yes
GFI	$> .90$	0.90	No	0.94	Yes
AGFI	$\geq 0.80$	0.87	Yes	0.92	Yes
NFI	$\geq 0.90$	0.94	Yes	0.96	Yes
RMSEA	$< .08$	0.059	Yes	0.034	Yes
SRMSR	$< .07$	0.047	Yes	0.042	Yes

Note:  $\chi^2$  = Chi-square, df = degree of freedom, CFI = Comparative Fit Index, GFI = Goodness of Fit Index, AGFI = Adjust Goodness of Fit Index, NFI = Normed Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual



Chi-square = 457.34.78, df = 200, p-value = 0.000, RMSEA = 0.059, GFI = 0.90, AGFI = 0.87, SRMR = .047

Figure 8 The proposed model of NCQ among registered nurses in governmental hospitals



Chi-square = 266.78.37, df = 187, p-value = 0.000, RMSEA = 0.034, GFI = 0.94, AGFI = 0.89, RMR = 0.034

Figure 9 The modified model of NCQ among registered nurses in governmental hospitals



**NCQS = Cambodian Nursing Care Quality Scale**

MC = Moral commitment	PC = Professional commitment
EM = Environment management	QSCC = Quality-safety conscious care
TC = Total care	ESC = Emotional supportive care
ISC = Information supportive care	PS = Patient satisfaction

**IWS = Index of Work Satisfaction**

PRS = Professional status	TR = Task requirement
Int = Interaction	OP = Organization and Policy
Aut = Autonomy	

**PES-NWI = Practice Environment Scale of Nursing Work Index**

NPHA = Nurse Participation in Hospital Affairs
NFQC = Nursing Foundations for Quality of Care
NMA = Nurse Manager Ability
SRA = Staffing and Resource Adequacy
CNPR = Collegial Nurse-Physician Relations

**CBI = Copenhagen Burnout Inventory**

PB = Personal burnout	WRB = Work-related burnout
CRB = Client-related burnout	

**NS = Nurse staffing**

NPR = Nurse-Patient Ratio
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**2.3 Measurement model**

In this study, the measurement model reflected five constructs of latent variables, which included NCQ, nurse work satisfaction, nurse burnout, nurse work environment, and nurse staffing.

After the overall model received the goodness fit, the measurement model part of SEM was presented by 22 observed variables' standardized factor loading (B). In general, based on a p-value at the level of .05, the t-value test statistics needs to be more than an absolute value of 1.96 for acceptable value (Hair et al., 2010). In this study, factor loading (B) ranged from 0.69 to 1.00; the t-value of all observed

variables ranged from 11.49 to 45.68; and squared multiple correlation ( $R^2$ ) ranged from 0.47 to 1.00 as indicated in *Table 31*.

Six out of 22 observed variables (NPHA, NFQC, NMA, SRA, CNPR, and NPR,) described the constructs of exogenous variables. As shown in Table 31, the endogenous observed variables' standardized factor loading (B) ranged from 0.50 to 1.41; t-values ranged from 11.49 to 45.68; and the squared multiple correlation ( $R^2$ ) ranged from 0.13 to 0.85.

Sixteen out of 22 observed variables (PRS, TR, Int, OP, Aut, PB, WRB, CRB, MC, PC, EM, QSCC, TC, ESC, ISC, and PS) presented the constructs of endogenous observable variables. As illustrated in Table 31, the endogenous observed variables' standardized factor loading (B) ranged from 0.09 to 0.97 and the squared multiple correlation ( $R^2$ ) ranged from 0.02 to 1.00.

Table 31 Factor Loading of All Observable Variables (n=375)

Variables	B	SE	t	R <sup>2</sup>
<b>Exogenous observe variables</b>				
Nurse participation in hospital affairs	.85	.03	24.63*	.88
Nursing foundations for quality of care	.90	.02	18.65*	.73
Nurse manager ability, leadership, and support of nurses	.79	.02	14.92*	.59
Staffing and resource adequacy	.76	.02	14.35*	.55
Collegial nurse-physician relations	.69	.03	12.22*	.66
Nurse-patient ratio	1.0	.07	13.62*	.94
<b>Endogenous observe variables</b>				
Professional status	.63			.35
Task requirement	1.02	.11	9.67*	.55
Interaction	.73	.09	8.26*	.59
Organization and policy	.43	.06	6.74*	.28
Autonomy	.89	.10	9.38*	.38
Personal burnout	.84			.54
Work-related burnout	.10	.50	0.20	.08
Client-related burnout	.06	.28	0.20	.03

\* $p < 0.05$

Table 31 Factor loading of all observe variables (n = 375) (Cont.)

Variables	B	SE	t	R <sup>2</sup>
Moral commitment	.87			.68
Professional commitment	.91	.04	25.10*	.66
Environment management	.45	.03	13.15*	.43
Quality-safety conscious care	.87	.05	17.45*	.67
Total care	.67	.03	19.34*	.75
Emotional supportive care	.44	.03	14.22*	.47
Information supportive care	.27	.02	14.57*	.47
Patient satisfaction	.42	.03	14.74*	.48

\* $p < 0.05$

## 2.4 Structural model

The structural model tested causal relationships between latent constructs. This structural model included three endogenous variables (nursing care quality, nurse work satisfaction, and nurse burnout) with two observed exogenous variables (nurse practice environment, nurse staffing) as shown in Figure 9.

As shown in Table 32, the results of SEM showed that six path coefficients of exogenous variables were significant at the .05 level. The results indicated that nurse staffing had negatively effect on nurse work satisfaction ( $\gamma = -.22$ ,  $p < .05$ ) but it had not effect on nurse burnout either NCQ respectively ( $\gamma = -.02$ ,  $p > .05$ ;  $\gamma = -.07$ ,  $p > .05$ ). However, nurse practice environment had not effect on nursing care quality ( $\gamma = -.06$ ,  $p > .05$ ). In addition, nurse practice environment had not effect on nurse burnout and nurse work satisfaction respectively ( $\gamma = .04$ ,  $p > .05$ ,  $\gamma = .04$ ,  $p > .05$ ).

Three path coefficients of endogenous variables were significant at the .05 level. Nurse work satisfaction had not effect on NCQ ( $\gamma = -.22$ ,  $p < .05$ ). However, nurse work satisfaction had not nurse burnout ( $\gamma = .04$ ,  $p > .05$ ). In addition, nurse burnout had not effect on NCQ ( $\gamma = .02$ ,  $p > .05$ ).

Table 32 Standard Path Coefficients, Standard error (SE), and T-Values (n=375)

Parameters	Standardized		
	SE path coefficients	SE	t-value
<b>Gamma</b>			
Nurse practice environment → nursing quality care	-.26	.20	-1.30
Nurse practice environment → nurse work satisfaction	.02	.19	.10
Nurse practice environment → nurse burnout	.09	.20	.43
Nurse staffing → nursing quality care	-.33	.21	-1.60
Nurse staffing → nurse work satisfaction	.75	.21	3.56*
Nurse staffing → nurse burnout	.18	.22	.84
<b>BETA</b>			
Nurse work satisfaction → nursing quality care	-.29	.07	-3.93*
Nurse burnout → nursing quality care	.01	.03	.19
Nurse work satisfaction → nurse burnout	.11	.08	1.32

\* $p < .05$

In table 33, explained the direct, indirect and total effects between causal variables and affect variables are presented as followings and summarized.

The study results presented that the hypothesized model fit the empirical data and explained 12% ( $R^2 = .12$ ) the variance of NCQ by nurse staffing, nurse work environment, nurse work satisfaction, and nurse burnout. Eight percent ( $R^2 = .08$ ) the

variance of nurse work satisfaction explained by nurse staffing and nurse work environment. Six percent ( $R^2 = .06$ ) the variance of nurse burnout explained by nurse staffing, nurse work environment, and nurse work satisfaction (*Table 33*).

Table 33 Summary Total Direct, Indirect Effects of Causal Variables on Affected Variables (n=375)

Effectuated variables	R <sup>2</sup>	Causal variables	Direct effect	Indirect effect	Total effect
Nursing care quality	.12	Nurse practice environment	-.07	.00	-.07
		Nurse staffing	-.03	-.06	-.09
		Nurse work satisfaction	-.26*	.00	-.26*
		Nurse burnout	.02	-	.02
Nurse work satisfaction	.08	Nurse practice environment	.01	-	.01
		Nurse staffing	.22*	-	.22*
Nurse burnout	.06	Nurse practice environment	.01	.00	.01
		Nurse staffing	.01	.01	.01
		Nurse work satisfaction	.02	-	.02

\*p < 0.05

In table 34 explained the summary of the hypotheses testing results of the study. The explanation were followings:

***Effect of nurse staffing on nursing care quality***

Nurse staffing had no significant direct effect on NCQ ( $\gamma = -0.03$ ,  $p > 0.05$ ). Nurse staffing had significant positive direct effect on nurse work satisfaction ( $\gamma = 0.22$ ,  $p < 0.05$ ). Nurse staffing had not direct effect on nurse burnout ( $\gamma = 0.01$ ,  $p > 0.05$ ).

Total effect of nurse staffing on NCQ was -.09, which was not significant at a significant level of .05. This hypothesis was partially supported.

***Effect of nurse practice environment on nursing care quality***

Nurse practice environment had not a significant negative direct effect nursing care quality ( $\gamma = -0.07, p > 0.05$ ) and had not positive effect on nurse work satisfaction ( $\gamma = 0.01, p > 0.05$ ). Nurse practice environment had not significant direct effect on nurse burnout ( $\gamma = 0.01, p > 0.05$ ).

Nurse practice environment had no significant indirect negative effect on nursing care quality through nurse work satisfaction and nurse burnout ( $\gamma = -0.00, p > 0.05$ ).

The total effect of nurse practice environment on NCQ was -0.07, which was not significant at 0.05 level.

***Effect of nurse work satisfaction on nursing care quality***

Nurse work satisfaction had significant negative direct effect on nursing care quality ( $\gamma = -0.26, p < 0.05$ ), and had not direct effect on nurse burnout ( $\gamma = 0.02, p > 0.05$ ).

The total effect of nurse work satisfaction on nursing care quality was -0.26,  $p < 0.05$ , which was significant.

***Effect of nurse burnout on nursing care quality***

Nurse burnout had not significant effect on nursing care quality ( $\gamma = 0.02, p > 0.05$ ). The total effect of nurse burnout on nursing care quality was not significant ( $\gamma = 0.02, p > 0.05$ ).

### 3. Hypothesis testing

The following part presents findings of five hypotheses testing regarding the results from the structural model as aforementioned. The summary of all hypotheses was illustrated in *Table 34*.

**Hypothesis 1:** Nurse staffing has negative direct relationship on nurse work satisfaction, positive direct effect on nurse burnout, and negative direct effect on NCQ, and it has negative indirect relationship on NCQ through burnout.

The findings indicated that nurse staffing had a significant direct positive effect on nurse work satisfaction ( $\gamma = .22, p < .05$ ). However, nurse staffing had not significant direct negative effect on nurse care quality ( $\gamma = -.03, p > .05$ ). In addition, nurse staffing had not significant direct effect on nurse burnout ( $\gamma = .01, p > .05$ ). Therefore, this hypothesis was partially supported.

**Hypothesis 2:** Nursing practice environment has positive directly relationship on nurse work satisfaction, burnout, and NCQ, and it has positive indirectly relationship on NCQ through burnout. Nurse practice environment has positively indirect on NCQ through nurse work satisfaction.

The findings presented that nurse practice environment had not a significant direct effect on nursing care quality and nurse work satisfaction ( $\gamma = -.07, p > .05$ ;  $\gamma = .01, p > .05$ ). Nurse practice environment had not significant direct effect on nurse burnout ( $\gamma = .01, p > .05$ ). In addition, nurse practice environment had not significant indirect effect on nursing care quality ( $\gamma = -.00, p > .05$ ). Therefore, this hypothesis was not supported.

**Hypothesis 3:** Nurse work satisfaction has positive direct relationship on NCQ, and it has negative indirect relationship on NCQ through burnout.

The findings illustrated that nurse work satisfaction had a significant negative direct effect on nursing care quality ( $\gamma = -.26, p < .05$ ). It was not negative direct effect on burnout ( $\gamma = .02, p > .05$ ). Nurse work satisfaction had not significant indirect effect on nursing care quality ( $\gamma = .00, p > .05$ ) through nurse burnout. Therefore, this hypothesis 3 was partially supported.

**Hypothesis 4:** Nurse burnout had a negative direct effect on nursing care quality.

The findings showed that nurse burnout had not a significant directly negative effect on nursing care quality ( $\gamma = .02, p > .05$ ). Therefore, hypothesis 4 was not supported.

Table 34 Summary of Hypotheses Testing Results

Hypo	Structural Path relationship	t-value	P	Standardized regression coefficient		Hypothesis test SEM
				D	ID	
<b>Direct effects</b>						
H1	NPE → NCQ	-1.30	>.05		-.07	Not accept
H1	NPE → NWS	0.10	>.05		.01	Not accept
H1	NPE → NB	0.42	>.05		.01	Not accept
H2	NS → NCQ	-0.54	>.05		-.03	Not accept
H2	NS → NWS	3.56*	<.05		.22	Accept
H2	NS → NB	0.46	>.05		.01	Not accept
H3	NWS → NCQ	-3.93*	<.05		-.26	Accept
H3	NWS → NB	1.32	>.05		.02	Not accept
H4	NB → NCQ	0.19	>.05		.02	Not accept
<b>Indirect effects</b>						
H3	NPE, NWS → NCQ	-0.09	>.05		-0.00	Not accept
H5	NS, NWS → NCQ	-0.79	>.05		-0.06	Not accept



#### 4. In Sum

The descriptive statistical characteristics of the variables investigated in current study have been explained. The assumptions of the path analysis were tested and the results were acceptable. The revised hypothesized model of NCQ showed the goodness-of-fit was in the acceptable range. Therefore, the model was useful to explain the factor influencing NCQ. All of the variables in the model explained 12% of the variance in the NCQ among registered nurses.



## **CHAPTER V**

### **DISCUSSION**

The purpose of this study was to examine factors influencing on NCQ as perceived by registered nurses in governmental hospitals and identify the direct and indirect relationships of nurse staffing, nurse work satisfaction, nurse burnout, and nurse practice environment on NCQ among registered nurses in governmental hospitals.

This chapter offers the discussion of the study findings, which is included a discussion of the characteristics on the study sample, hypothesis testing and modeling, conclusion, implications for nursing sciences, and recommendations for future research.

#### **1. Summary**

The descriptive cross-sectional survey study design for casual modeling intended to examine factors influencing on NCQ in government hospitals. The hypothesized model was established based on Aiken (2002) Nurse Work Environment, Nurse Staffing, and Outcome Model (NWE-NS-OM) in combination with practical evidence. The multi-stage random sampling method was performed to invite study participants. The data collection method conducted from the September 2016 to April 2017. The three hundred and ninety six participants were invited for the main study. Two hundred and forty participants were invited for instrument development of Cambodian Nursing Care Quality.

A number of research instruments of self-report questionnaires were used for data collection, including demographic data, nurse staffing measurement form, Index

of Work Satisfaction (IWS), Cambodian Nursing Care Quality Scale (CNNCQS), Practice Environment Scale of Nursing Work Index (PES-NWI), and Copenhagen Burnout Inventory (CBI). Each of the measurements had satisfactory validity and reliability. The assumptions of linearity, homoscedasticity, and multicollinearity did not violate the rules for analyzing SEM, except normality. A LISREL version 8.53 was used to test the hypothesized causal model.

A total of 375 from 396 questionnaires (94.69%) were returned and all of them were determined to be usable for analysis. The mean age of the participants was 36.82 years (SD = 11.27, range = 22-64 years). The majority of them were female (n= 235, 62.70%). These participants have worked as RNs about 14.13 years average (SD=12.26, and Ranged from 1 year – 39). The average of years as RN on the current unit was 11.42 (SD=11.01, Ranged from 1 years – 39 years). The majority of participants were associate degree in nursing (303 = 80.80%), and BSN was about 72 = 19.20%. The fulltime job has taken 369 = 98.40%. In order words, the family status illustrated that single was 139 (37.10%); marriage was 218 (58.10%); and devorce was about 18 (4.80%). The participants invited from as followings: surgical 118 (31.50%); medicine was 94 (25.10%); ICU was 61 (16.30%); maternity was 53 (14.10%); pediatric unit was 49 (13.10%). The last variable was nursing shift, it was 375 (100%) 24-hour-shift.

The results of SEM showed that the hypothesized model fit the empirical data and explained 0.01% of the variance in NCQ. The predictors were not significant directly influenced NCQ, including nurse burnout, nurse work environment, nurse work satisfaction, and nurse staffing. On the other hands, nurse staffing was not also significant indirectly influenced on NCQ through burnout and nurse work satisfaction.

## 2. Discussion

The study's objectives are shown in the following discussions.

### 1. To describe the levels of nurse staffing, nurse work environment, nurse work satisfaction, nurse burnout, nursing care quality in government hospitals:

#### 1.1 Nurse staffing (NS)

In this study, the total number that RNs that were taken care of patients in each shift was 16 or 17 (Mean = 16.20, SD = 7.83). In addition, nurses have been assigned to take patient ranged from 2 to 39 patients. Nevertheless, this figure was higher than the Ministry of Health of the Kingdom of Cambodia (2017) guidelines' suggestion. Because of lack of numbers of RNs was indicated, therefore RNs have taken many patients in each shift. The guideline suggested that the primary nurses should take care of eight or less than eight patients. In addition, this study ratio was higher than Thailand's was 10 (Nantsupawat, 2010).

A study conducted by Aiken et al. (2012) found that the average ratio of patients to nurses ranged from 5.4 in Norway, 13.0 in Germany, and 10.5 in Germany. Again, another study found that nurse to patient ration was lower than this study (1:6.3 – 1:8.7) (Martsolf et al., 2014). These strong empirical evidences were totally supported that the more patient to nurses, the more nursing care quality is poor.

The lesser nurse-to-patient ratio may be related to the limited number of nurses employed every year in order to control the nursing workforce cost in the clinical setting. Additionally, the aging population increased sharply in Cambodia, this may lead to admit more cases to government hospitals. Based on the statistics of nurse workforce had increased numbers of retired from 2010 to 2017 (MoH, 2017). Therefore, nurses must take care of more patients.

The finding of this study was not significantly effect on NCQ, which were opposite then previous studies. There are some reasons while this study finding were differently, the first possible reason was RNs have taken more patients, which average numbers were 17 patients per RN, therefore, they may not have willing to consider this question as important to improve nursing care quality. The second possible reason was, 80% of participants were associate degree in nursing, they have lowest nursing degree, and therefore, they may not conceptualize what is the meaning of NCQ, which led to answer those items without high concentrate. The last reason was they have long shift work; they did not focus on this questionnaire. It was similar to previous study found that emotional exhausted had direct effect on nurse-assess quality of care (Van Bogaert et al., 2013).

### **1.2 Nursing Care Quality (NCQ)**

In this study, nursing care quality was at moderate degree with the mean score of 3.11 (SD = 0.94). The result was not consistent with the previous study, which was that investigation studied about the perceptions of RNs on NCQ among 221 nurses in one Chinese tertiary general hospital. The results indicated that a mean score of total perceptions of RNs on NCQ was 4.25 (SD = 0.5) at the high level (Zhao, Akkadechanunt, & Xue, 2009). One possible reason may be related to the ordinary nurse services assessed in this scale was consider at the minimum level to deliver good nursing care. Furthermore, since the NCQ is the core management in clinical units, the regulations and rules to deliver the standard of nursing practice were delivered by each hospital. Moreover, under the national health strategic plan, which have to provide high quality to individual, family, and community, therefore, it also

required RNs to provide quality of nursing services to individual patients. Thus, the mean of the total score for NCQ was at the very moderate score of level.

The current study found that the dimension of information supportive care was highest mean score (Mean = 3.97, SD = 0.80). One of the reasons that RNs rated this dimension highly, because they agreed that the information was very important for nursing and midwifery professions. It was followed by emotional supportive care was (Mean = 3.36, SD = 0.92). One of possible reasons was, Bureau of Nursing and Midwifery apply holistic care, some of the main concepts of this model were mental support, social support and spiritual support, therefore, it can be driven RNs to provide this support stronger.

As part of this high level, there were some constructs were in moderate level such as environmental management (Mean = 3.16, SD = 1.07). The reasons why this construct was moderate level, it can be related to many governmental hospitals had build over 50 years. One possible reason may be related to the sharply increased aging population in Cambodia with limited number of hospitals for patients' admission. Many hospitals were build over hundred years before Pol Pot region, these build were kept without use over years during at that time. In several hospitals, in order for patients to be admitted on time, added beds were temporarily put on the corridor. However, there have been innovated in some hospitals, thus, RNs rated it in moderate level. Furthermore, professional commitment was moderate (Mean = 3.14, SD = 0.75), which could be explained by some reasons such nursing profession was low profession, the nursing image was not popular profession in Cambodian society. RNs have been regarded as assistant profession for other health profession. Another construct was moderate level (Mean = 3.00, SD = 0.70), this can be explained by RNs

do not have enough time to provide nursing care to patients as nurse-patient ratio was average 17 patients per nurse. The long shift hour can be another reason that they are so tired to deal with administrative work rather direct nursing care. Total care was moderate level (Mean = 2.97, SD = 0.88). Why the total care was moderate, it could be possible reasons such as long shift, more patients to take care, which included there more administrative work such collecting medications from pharmacy, sending and collecting specimens. The last construct of moderate level was quality-safety conscious care (Mean = 2.70, SD = 0.90). Because of RNs have multi-tasks, lack of numbers of professional nurses, workload were the reasons that they considered patients might not receive good care.

However, the dimension that had the lowest score in this study was patient satisfaction with a mean score of 2.31 (SD = 0.90). This result was inconsistent with previous studies (Xiuli et al., 2010). Nurse staffing and nursing workloads are essentially linked. When there are lack numbers of nurses, the workload of each nurse is increased. This means there was less time to attend to routine observations, hygiene, wound care, nourishment, patient teaching, administrative work, counseling, and taking rest and/or meal breaks (MacPhee, Dahinten, & Havaei, 2017). In another reason was insufficient staffing and overpowering workloads not only reduce RNs' ability to provide all necessary care, but also increased exhaustion and boosted the risk of errors. In considering the contribution of workload to outcomes of patient, it is essential to think not only of the work that RNs do that adds to outcomes of patients, but also the care they do not work, when rushing between too many patients prevents and they were delivering best nursing interventions (J. E. Ball, Murrells, Rafferty, Morrow, & Griffiths, 2013). Being forced to drop the tasks undone due to tremendous

workloads was a common feature of care settings, which RNs could reported the tasks undone on every shift, and 39.5% of nurses reported that they were unable to give even comfort or dialogue to their patients on their furthestmost recent shift (C. Duffield et al., 2011).

### **1.3 Nurse work satisfaction (NWS)**

In this study, the nurses' work satisfaction was classified as moderate level with a mean score of 2.85 (SD = 0.86). The dimension of professional status was highest than other dimensions (Mean = 3.46, SD = 0.89), followed by autonomy (Mean = 2.84, SD = 0.86), task requirement (Mean = 3.57, SD = 0.98), and interaction was (Mean = 3.55, SD = 0.94). However, the dimension of task requirement was lowest than other dimensions (Mean = 2.53, SD = 0.91).

This study result of overall mean score was (Mean = 2.85, SD = 0.86), which was similar with a study previous study (Mean = 2.95, SD = 0.75) by (J. Yang, Liu, Chen, & Pan, 2014). However, this result was lower than another study conducted in Hong Kong to investigate the perceptions of RNs on the level of nurse work satisfaction s (Mean = 3.66, SD = 0.53) (Cheung & Ching, 2014).

The demographics of the RN workforce have changed over the past half-hundred of years. A younger workforce with more periodic employment in the 2000s has developed a quickly aging RN workforce with various years of accumulated work experience. This can be led to dissatisfaction because of retirement benefits. They may not be happy because in terms of health care benefits while they are working as bedside nurses.

In order to improve the ardently love of nursing staff for their work, nurse managers could address the organizational commitment, with particular emphasis on



the recognition for the young nurses on organizational values, culture, social norms to help them develop practical career planning, which are essential for the formation of organizational commitment to improve NCQ (J. Yang et al., 2014).

This study was found that task requirement was lowest than other subconstruct (Mean = 2.53, SD = .91). There are many reasons that RNs and RMs perceived lowest as followings first reason, nurses' and midwives' position in society, generally was undervalued within the healthcare system, they do not have high position at every healthcare facilities. Second reason majority of this study was diploma nurses, therefore, they do not have high competent provide high nursing care quality to patients to compare with other healthcare personnel, especially their main tasks are required by the law. Third reason, nurses do not have enough voice to join in professional development or other patient problems solving or policy making in terms of nursing care quality and patient safety, therefore, they may think they are followers by other health professions, they are not required higher knowledge to fill proper job to meet patients' needs. The last, they feel nursing is not "profession". It is a service occupation, just like working at McDonalds. Nursing schools like to teach that nursing is a profession, but in reality it is just complying with standard of care and practice, and doctor's orders (J. Yang et al., 2014).

#### **1.4 Nurse practice environment (NPE)**

In this study, the nurse practice environment was classified as low with a mean score of 2.36 (SD = 0.59). The dimension of nurse participation in hospital affairs (Mean = 2.63, SD = 0.72), nurse foundations for quality care (Mean = 2.37, SD = 0.59), nurse manager ability, leadership and support of nurses (Mean = 2.37, SD = 0.53), collegial nurse-physician relations (Mean = 2.23, SD = 0.53), and dimension of

staffing and resource adequacy (Mean = 2.21, SD = 0.47). The overall mean score had more than 2.36. This result was lower to study conducted in Thailand (Mean = 2.84) (Nantsupawat et al., 2011), and other studies (AbuAlRub, El-Jardali, Jamal, & Al-Rub, 2016; Montalvo, 2015). These figures could explain that Cambodian nurses than their Thai counterparts and others perceive the nurse practice environment worse. In other way, this can be explained explicitly because RNs must follow medical order rather than they use practice based on standard of nursing practice. The trued example was that every medical round, it was a must, which was at least a RN to carry patient's file to follow medical doctor. Having very long experience to work at clinical settings, there was not good relationship between nurses and physicians, which was caused by social class division between these two professions. Over hundred years, nurses were called as medical assistance, which led to perceive lower scores.

The dimension of “nurse participation in hospital affairs” usually had one of the highest scores as well. It revealed that not only RNs have a lesser chance to join in hospital affairs, but also that RNs have the intention to contribute in hospital affairs. One potential reason for this may be related to a background of lesser level of RNs' education. Thus in the clinical setting, RNs had the role to only follow the medical prescription rather than nursing autonomy. Nevertheless, in order to make excellent RNs who can feel more self-accomplishment, nursing or hospital managers should offer possible opportunity for RNs to provide their voice, which were expressed their opinions in terms of nursing affairs. Throughout this practice, more RNs can be motivated to have good implementation for further to enhance the NCQ (Mainz, Baernholdt, Ramlau-Hansen, & Brink, 2015).

The above results reflect that the dimension of nurse managers' leadership and support of nurses received the moderate level in government hospitals. This reflects the real government hospital problem was the poor leadership and management, which supported to nurses in practice. The last dimension was staffing and resource adequacy was lowest score, it was logically reason because there were lack of numbers of nurse workforce to provide better care; lack of funds to support nursing activities at government hospitals. Above explanation, as RNs have low education so this can be called lack of human resources to fulfill the tasks properly.

### **1.5 Nurse burnout (NB)**

In this study, nurse burnout was at a moderate level with the total score of 2.86 (SD = 1.11). The result was consistent with previous studies that reported Chinese nurse burnout at a moderate level (Chou, Li, & Hu, 2014; A Nantsupawat et al., 2017).

The dimension of client-related burnout total score was 2.70 (SD = 1.13) at the moderate level of nurse burnout. There are some reasons to explain this issue as followings: (1) because of nurses have been assigned more patients, for examples, ICU the current study found that it ranged from 2 – 10 patients per nurses, in medicine ranged from 15 – 39 patients, therefore their workload could make them have less energy to work in the whole day. Sometime, RNs and RMs were faced with emotional exhausted. Another reason was the older nurses have higher burnout also. Similar to a study found that work related burnout were highest among nurses aged 31-40 years but regression analysis revealed weak negative correlation between Total Burnout scores and Age ( $r=0.14$ ,  $r^2= 0.02$ ,  $F \text{ stat} =5.97$ ,  $p<0.02$ ) (Divinakumar, Pookala, & Das, 2017).

The dimension of client-related burnout had the overall score of 3.05 (SD = 1.14). This result was inconsistent with (Chou et al., 2014) who reported that client-related burnout was less than 50%. One potential possible reason may be related to the implementation of the National Health Quality and Safety (MoH, 2017). Nurses are necessitated to deliver holistic nursing care to unique of individual patients. RNs have the accountability of making patients feel warmhearted and thoughtful when they are admitted. Additionally, the nature of nursing job is to save patients' lives. The guideline and regulation or standard of nursing practice provide high quality of nursing services, which are carried out by each hospital. RNs should follow these regulations and provide or standard of nursing practice as high quality of nursing services to patients. Thus, it may rationalize why this domain of client-related burnout received a high score in this study. Similarly, the emotional exhaustion was a significant predictor of ratings of fair/poor care quality in unadjusted models across all countries (Poghosyan et al., 2010).

The dimension of personal burnout was a mean score 2.84 (SD=1.06)

The dimension of work-related burnout had the total score of 2.70 (SD = 1.13). There are some reasons to explain RNs burnout in this study as followings, first, they have very long shift about 24-hours shift, and they were exhausted both physically and mentally. It was similarly to a study reported that around half of the participants (51%) had high burnout (Nantsupawat et al., 2017). RNs were as a group, which had the characteristics of youngest age, were mostly women (62.70%), were mostly engaged in shift work (74%), as well as had the highest percentage (27.9%) perceiving high strain (Chou et al., 2014). Second potential reason is based on experience moderate emotional exhaustion in the government hospitals may be related

to the shortage of nurses. RNs had a higher possible reason may be related to the patient to nurse connection. Thus, this causes the patients and nurses connection to be in a stressful condition. These things may make nurses feel exhausted by others and emotionally overextended.

## **2.2 Factors influencing on NCQ**

### **2.2.1 Nurse staffing**

Nurse staffing had a significant positive direct effect on nurse work satisfaction. However, nurse staffing had not significant direct effect on nursing care quality and nurse burnout. In addition, patient to nurse ratio had a significant negative indirect effect on nursing care quality. It was partially consistent with hypothesis 1.

Based on NWE-NS-OM, when RNs had experience overwork to take care more patients in a shift, RNs would have lesser work happiness, they feel more frustrated from work, and have worse implementations on their work. The result of this study was not consistent with Aiken (2002) model that explained nurse-to-patient ratio had a significant negative direct association with nursing care quality. This finding was a study, whereas insignificantly associated with NCQ (Rahman & Shamsudin, 2015). The current situation in Cambodia, RNs have taken care more patient more than international standard, for example, RN could take care of average 17 patients per nurse. The more they have more patients to take care, the more they are not satisfied with current job. Another potential reason may be related to the realistic that the nurse-to-patient ratio was pretty unlike in different shifts, different units and different hospitals. In Cambodia, during the night shift, nurses have taken care more patients because there were the same numbers of patients but there were only duty nurses who provided nursing care. Nevertheless, during the day shifts, one

RN would be assigned to be responsible for regular number of patients (around 17 patients); this needs them to perform more tasks, such as patient health teaching, patients' special physical examination or writing discharge plans for patients, and other particular task, which provides to meet patients needs. Furthermore, nurses worked in ICU may have littler patients to take care. Nonetheless, ICU patients have more critical conditions of illness, which may instigate RNs to have sense more frustrated. In this study, the variable of nurse staffing was assessed as "the average number of patients to be taken care per day in each shift", as reported by the RNs. It may hide certain critical nursing care services. Thus, it may instigate the insignificant result between nurse-to-patient ratio and nurses' work satisfaction.

For additional finding, nurse staffing did not have a negative direct effect on nurse burnout. This result was not congruent with the NEW-NS-OM, which were conducted previously studies (Aiken et al., 2014; C. Duffield et al., 2011; J. You et al., 2013). All of referenced formerly studies stated that the odd ratio of burnout would be boosted with each further patient per RN. One potential reason would be related to most of participants in this study worked in 24-hour-shifts, as human being is impossible to work for 24 hours without sleep, however, most of them they did not want to work for 12-shift or 8-shift because they were slept during taking care patients. From this explanation, they had weekend free, unless they were on weekend duty one time monthly. Thus, it may be related to the conclusion that nurse-to-patient ratio had no significant effect on nurse burnout.

As opposed to what was hypothesized study, nurse-to-patient ratio had no significant indirect effect on nursing care quality. In contrast, while aforementioned findings, it may be related to nurse-to-patient ratio had a lesser level

of direct effect on NCQ, but not with nurse burnout. Another probable reason may be related to that nurse-to-patient ratio varied significantly from 2 to 39 patients to RNs. Another probable reason may be explained, as there was a single shift; therefore it was not variety of shift. These rationales may contribute the instrument of nurse staffing in Cambodian government hospitals, which result in this none-significant result.

### **2.2.2 Nurse work satisfaction**

*Nurse work satisfaction had significantly positive direct effect on nursing care quality. Nurse work satisfaction had a significant negative direct effect on nurse burnout. Nurse work satisfaction had a significant positive indirect effect on nursing care quality through nurse burnout. The results were fully consistent with hypothesis 2.*

The analysis presented that nurse work satisfaction had negative direct effect on nursing care quality. It was constant with findings from previous study (MacDavitt, 2008) revealed that when RNs graded little work satisfaction, nurse reported NCQ descent from excellent to good. Similarly, when nurses had work satisfaction, whom they reported better nursing care quality (Virya Koy, Yunibhand, Angsuroch, & Fisher, 2017). A reasonable explanation is that, the quality control of nursing care in government hospitals are performed by head nurses, nurse supervisors, and nurse division directors because there were 60 to 70% RNs. Additionally, Quality Control Committee (QCC) intended to encourage every nurse to participate in quality control of nursing care. These evidences presented that a variety of strategies have been applied to increase nurses' attention to NCQ. Furthermore, the committee regularly played spot-checks to make sure hospital quality was maintained. Another

probable reason may be associated to the national policy that needed high NCQ must be provided to uniqueness of patients. For instance, Ministry of Health of Kingdom of Cambodia (2017) specified that it is essential to continue to carry out the high nursing care quality and develop a good system to simplify and advance quality of nursing in each government hospitals. Therefore, although nurses had more or less work satisfaction, they must deliver good nursing care to patients as necessitated by hospital administrators and the government hospitals. This is because of hospitals could not pass the accredited procedure or get praise from the society; it can reduce their capability to contest in their region. This can further contribute hospital's income and then contribute nurse work satisfaction, which would result into a vicious circle.

As hypothesized, nurse work satisfaction had not a significant negative direct effect on nurse burnout. The finding indicated that nurse lower work satisfaction could be contributed to higher level of nurse burnout. A study found that a statistically significant association between the RN's respondents degree of burnout and their degree of work satisfaction, which may affect on the NCQ given to their patients (Khamisa et al., 2015; Rosales et al., 2013).

### **2.2.3 Nurse work environment**

*Hypothesis 3: Nurse practice environment had a significant positive direct effect on nursing care quality and nurse work satisfaction, had positive direct effect on nurse work satisfaction, and negative direct effect on nurse burnout. However, nurse practice environment had no significant indirect effect on nursing care quality.*

Based on NWE-NS-OM, when nurse practice environment inspired nursing practice, nurses would deliver good nursing care and feel satisfied with their



jobs. But in Cambodia was not congruent with the original model (Aiken, 2002). One probable reason is that, nurse practice environment was referred to as ‘a system that supports RNs control over the provision of nursing care and the environment in which care is provided, RNs may not feel about the system that nursing practice, this was supported by (Mudallal, Saleh, Al-Modallal, & Abdel-Rahman, 2017). Even though, a study showed that better unit work environments were associated with higher quality of care when controlling various hospital and unit covariates, which was correlated persisted among units of different types (Ma, Olds, & Dunton, 2015). However, this study can be explained logically that when RNs perceived low nurse practice environment would not be associated with satisfaction, burnout, and nursing care quality, this can be supported by another study (Velasco–Ferrer & Conde, 2015).

The result of nurse practice environment had not a significant positive direct effect on nurse work satisfaction was not supported by Aiken (2002) NEW-NS-OM as well. This finding was not congruent with earlier studies (Aiken et al., 2008; Liu et al., 2012; Rosales et al., 2013; Van Bogaert et al., 2013; L.-m. You et al., 2013). A probable reason is that, good nursing work environment is reflected as (1) having sufficient staffing and adequacy resources, (2) harmonious nurse and doctor relationship, (3) excellent leadership strategies and support nurses, (4) encourage higher standardized nursing care, and (5) participation in managing hospital affairs. All of those elements have been found as predictors of nurse work satisfaction. For example, both the hospital environment and nurse–physician associations were statistically significant predictors of NCQ. Path analysis showed that NCQ was affected by nurse–physician connections ( $P < 0.05$ ) (Shen, Chiu, Lee, Hu, & Chang, 2011). When RNs have a good connection with their teammates (nurse, physician,

supervisor), they are more pleased with their jobs (Farr-Wharton, Brunetto, & Shacklock, 2012); (Zangaro & Soeken, 2007). It has been informed by numerous researchers that leadership style significantly contributed to nurse work satisfaction (Andrews, Richard, Robinson, Celano, & Hallaron, 2012); (X. Wang, Chontawan, & Nantsupawat, 2012). Furthermore, when hospital administrations was paid attention to NCQ, these hospital administrators could formulate a policy to award nursing services (Kieft et al., 2014). The participatory management strategies were also found significantly associating nurse work satisfaction (Hosseinabadi, Karampourian, Beiranvand, & Pournia, 2013). Therefore, one potential reason is that when the nurse practice environment had sufficient resources, a harmonious work connectivity with doctors, excellent leadership knowledge and skills of nursing administrators, good nursing care inspiration, and nurse chance to participant in hospital affairs; these positive aspects could make nurses feel very please to work there and may boost their work gratification. However, RNs in Cambodia practically they would not involve with quality improvement much because they just followed medical doctors rather they used nursing models for own practice. Another possible reason was, this study was the first one in Cambodia; it can be hard for them to focus on it so they may answer without concentrate all items.

This study had not significant influence on nurse burnout. However, this factor was congruent with Aiken (2002) NWE-NS-OM; previous study discovered that nurse burnout increased 32.7% when nurse practice environment changed from good to poor (Liu et al., 2012); good environments have lower burnout level (Gasparino & de Brito Guirardello, 2016); a favorable work environments were

fewer likely to report high burnout, and more likely to indicate work satisfaction than their colleagues in self-reported "poor" work environments (Chen & Fang, 2016).

#### **2.2.4 Nurse burnout**

This study found that nurse burnout had not a significance direct effect on nursing care quality, which was not congruent by Aiken (2002) NWE-NS-OM, because there were not associations among nursing outcome variables were stated by Aiken's model. However, this factor was reliable with prior studies (MacDavitt, 2008); (Poghosyan et al., 2010). As prior studies indicated, when the burnout scores moved from moderate or high to low, nurses informed (1) quality was typical as excellent or good, (2) on the last worked shift as excellent or good quality, and (3) unchanged or improved quality over the past year were boosted. The potential reason is that when nurses feel more burned out; the elements of personal achievement would be shrunk. Thus, when nurse burnout is boosted, it would be related to the patient receiving poor NCQ. Furthermore, personal achievement was referred to as "feelings of competence and achievement in Cambodian RNs' work with people". Thus a higher nurse burnout would be related to the RNs' low competence in delivering nursing services.

Previous study found that when staff nurses were able to consider patients' status and clinical signs timely providing quality and patient safety that also resulted in acceptable workload perception. High and prolonged workloads were related to nurses' decreased adequacy and efficacy, complains of fatigue, headache and vulnerability for diseases as well as affects nurses' feelings of frustration, negativity and sadness (Baethge, Müller, & Rigotti, 2016). These feelings could affect not only the individual nurse but also the whole team. Therefore, nursing performance

under high workload revealed that certain mechanisms such as selection, optimization and compensation strategies support nurses' individual decision-making and ability to perform well, which led to low NCQ (Van Bogaert et al., 2017).

But, unexpectedly and despite a nurse burnout was not affected on NCQ, nurse burnout was not showing a prediction performance of the quality of nursing care. This may explain that burnout is a common problem in most Cambodian governmental hospitals and it may play a mediator role between nursing work environment and NCQ. Furthermore, further studies are needed to assess the burnout phenomenon and the mediator role of burnout and nurse characteristics in Cambodia.

## **2. Limitation**

The limitations of this study are presented as follows:

Although this study has some strength, however, there are still several limitations that need to be addressed. First, our participants were from tertiary hospitals; therefore, it is not possible to generalize the conclusions for across the whole of healthcare facilities' hospitals in Cambodia. Second limitation is possibly related to majority of participants whose hold Associate Degree in Nursing Sciences, therefore, their ideas would be underestimated the concept of NCQ.

Third, this study collected data from participants who did self-reports, which may underestimate or overestimate the values of study variables. For example, participants may overestimate the nursing care quality. Fourth, since Ph.D. students had inadequate budget and lack of time, it was incredible to collect data numerous times across the country in one this study, therefore, it would be better to collect more tryout data a second time to test the psychometric properties of instruments by using CFA. Last, but not least, although statistical examination technique of casual

modeling was able to examine the casual associations among independent variables and dependent variable, it collected data at the same time. Thus, it would be limited to reflect the nature of cause and effect of independent variables on dependent variable.

### **3. Implication for Nursing**

To improve nursing care quality, nurse educators, nurse administrators, nurse policy makers and nursing researchers should work together.

#### ***Implication for nurse educator***

The results of this study showed that the dimensions of total care, quality-safety conscious care, and patient satisfaction received the lowest scores for nursing care quality. It provides the evidence for nurse educators to teach nursing students how to assess patients' conditions based on holistic care, which was included nursing document, which approved by Minister of Health to use in clinical settings. NCQ would be integrated in BNS and ADN curriculum, as 3 credits' subject, who includes assessment, actions, recording all positive and negative patients' outcomes, and evaluation, is needed.

#### ***Implication for nurse administrator/policy makers***

Real differentiations in NCQ may be more closely correlated with the variation in the care environments of hospitals. Therefore, nurse leaders, nurses managers, and nurse policy makers should identify the possibility of NCQ's determinants, which lead to affect patient outcomes.

Learning the effects of NCQ may impact nursing administrators to establish evidence-based resource distribution and approaches and interventions (e.g. staffing enhancements or better workforce management policies), which is going along with the goal of improving patient outcomes (Aiken et al. 2001). A set of nursing care

quality measures and methods could serve as a gold standard for nursing care. In other words, the development of National Database of Nursing Quality Indicators is much important, which was developed based on standard of nursing practice that Minister of Health had approved for public and privates use. This may give further support for policy makers related to pay-for-performance reimbursement program.

Hospital organizations must foster care environments that incorporate individual and organizational behaviors, which seek to continuously diminish harm to patients that may produce from poor NCQ. For instance, when RNs are bathing patients they are essentially playing a number of cognitive skills, such as assessing skin color, which was probed that the evidence of poor oxygenation, evaluating skin breakdown, which was indicated as skin integrity, engaging patients in conversation to assess mental status, or teaching them about their disease and its management.

The ICN insists on the importance of investing in initial training that meets the requirements of nursing practice as well as in continuing education programs throughout a nurse's career (Barry & Ghebrehiwet, 2012).

In addition, the results of SEM showed that nurse work satisfaction had the highest direct impact on nursing care quality, which is followed by nurse staffing had direct effect on nurse work satisfaction. Therefore, nursing administrators can consider the enough nurse staffs and satisfied environment for professional while they used and lived in workplace as comfortably. Furthermore, nurse management level can promote nurse staff participations in any kinds of policy development, which is related to nursing practice. Currently, having 12-shift is very suitable for nurses so they can work within 40 hours, which has been required by government.

Given them to have enough time to take direct patients care rather than let them to work much longer time at administrative work. Nurse managers should negotiate with hospital administrative committee members to cut off the time for nurses to collect drugs from pharmacy, which wastes much time to give direct nursing care. In addition, nurse manager should have a permanent specimen collector in order to avoid nurse to go in and out at laboratory. Another possible implication for nurse managers is prepared a patient's file stand so medical doctors can collect it easily when they are doing medical rounds, because nurses spend much time on carrying patients' files to follow them.

Additionally, policy makers can apply hospital policies to support nursing practice based on this research's findings. It is fundamental for policy makers to discover from magnet hospitals' successful familiarity in western countries. Then, apply the policy to make a healthy work environment for nurses. Furthermore, the nurse staffing plan can be conceptualized underneath current hospital work environment and Cambodian healthcare system to confirm that nurses can work with realistic number of patients in each shift for example (*Table 35*), International Council of Nurses suggested as follows (Schwab, Meyer, Geffers, & Gastmeier, 2012):

Table 35 Minimum Nurse Staffing Levels RNs

Units	Nurse-to-patient ratio
Intensive/ critical care unit	1:2
Operating room	1:1
Labor and Delivery	1:2
Pediatrics	1:4
Emergency Room	1:4
Medical/Surgical	1:5
Psychiatric	1:6

Likewise, the result of this father study provided the certain findings, which was different from the existing Aiken's Nurse Work Environment, Nurse Staffing and Outcome model that explain nursing care quality can be only significantly associated by nurse staffing and nurse work satisfaction. The researcher could be considered that nurse burnout, and nurse work environment could be also influenced nursing care quality, which were strongly supported by previous studies. Therefore, other nurse investigators can test this model again to verify the significance of variables impact nursing care quality. Nurse administrators should transfer to a nurse workforce and identify best-fitted strategies to support, maintain and establish the current and future workforce.

In other word, nurses administrators design solid career pathways for RNs, and evaluate the content and structure of pre-and post-registration nurse education to include: core professional values; nurses' acting as caretakers of care quality and the patient experience, working as specialists, partners and leaders, clinical academic professions, new care pathways and boosted work in the government RNs roles.

The last implication was that government should increase recruitment of bachelor of nursing science and reduce associate degree at government hospitals, therefore these BSNs can fulfill the roles and responsibilities based on the standard of nursing practice, which has been required by Ministry of Health.

#### ***Implication for nurse clinicians***

The qualified RNs are needed to upgrade as high as possible in order to promote their competence. RNs must practice based on standard of nursing practice and Code of Ethics, which assist own intervention nursing care to best practice.



For the nursing professional, the occurrence of negative patients' outcomes can cause various problems, given the emotional stress, ethics precepts and legal punishments to which they are exposed to (Duarte, Stipp, Silva, & Oliveira, 2015; Smeds-Alenius, Tishelman, Lindqvist, Runesdotter, & McHugh, 2016). Therefore, investments in a culture of safety are important through the dissemination of negative patient outcomes' concept and record of adverse events. This record will help to know and understand the occurrence of poor nursing care quality, thus, it may also help informing and guiding nurses in care planning and decision-making, seeking negative patient outcomes' prevention strategies.

Professional nurses include registered nurses, and nurse practitioners to join continuing professional development program, which is the means by which members of nursing professional association sustain, enhance and broaden their knowledge, expertise, and establish the personal and professional qualities were mandatory through their career lives. All RNs must follow the Law on Regulation for Health Practitioners; it is required to respect criteria for licensing and renewal license accordingly.

#### **4. Conclusion**

This study was conducted to find out particular factors, which are influenced on NCQ as perceived by RNs who are given direct nursing care in Governmental hospitals. The findings indicated that nurse work satisfaction has direct effect on NCQ, and nurse staffing has direct effect on nurse work satisfaction. However, other interesting factors have not effect on the Cambodian context of NCQ. Even though, there have been strongly supported in other countries contexts.

In addition, the result can be possibly to provide valuable evidence for health policy makers to structure nurse staffing plan and adjust hospital policies to support nursing practice. This study would provide of best practice of RNs, who keep best of interest of patients'/clients. It also importance to promote and maintain the highest standards of NCQ in the nursing services should be foremost.

### **5. Recommendations for Future Research**

According to the findings of this study, the following advices are recommended for future studies:

1. Quality measurements have to be repeated continuously to guarantee the care quality over time, for instance in cases of organizational changes and financial restrictions. We also recommend the use of the scale index when measuring nursing care quality for comparison of care quality over time between different units and hospitals.

2 A replicate of existing studying model should be performed in a various settings and increased a larger sample size by probability sampling to boost generalizability of findings.

3. The effective interventions study to augment nursing care quality should be developed by considering to pick up the predicting factors that were determined in this study, including nurse burnout, nurse work satisfaction, nurse work environment, nurse staffing, and nursing care quality will be possible to carry out in order to find better solution of nursing care quality with a great deal.

4 The finding in current study reported that the model was accounted for 12% of the variance in nursing care quality. This recommended that for future study should include other significant factor in the model. The extension of this study should conduct in order to rerun the causal model whether all the factors are caused and affected on NCQ.

5 This study was conducted only the government hospitals, whether comparison with the private clinics will concern in order to increase generalization all the country.

6 Other factors such as the level of RNs competency, Code of Ethics, and Standard of Nursing Practice, and leadership behaviors will include in the model of nursing care quality whether they are influenced on it. In addition, the effects of intervention of Code of Ethics, Standard of Nursing Practice on NCQ are interesting topics.

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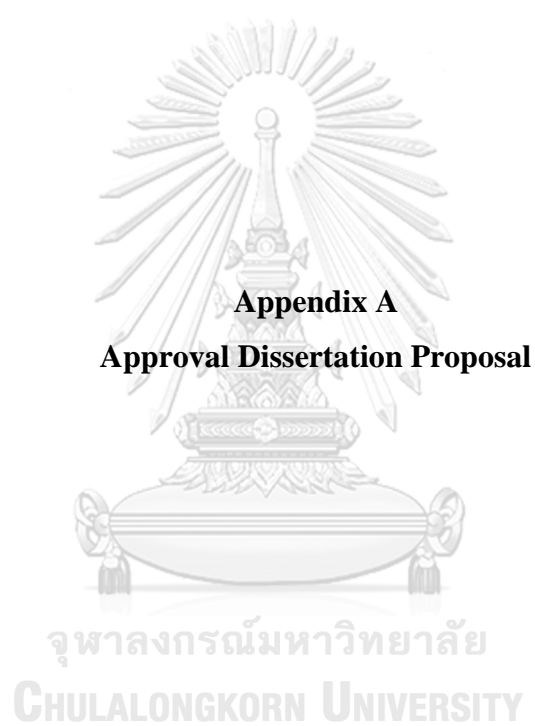
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**APPENDICES**

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY



**Appendix A**  
**Approval Dissertation Proposal**



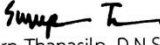
Announcement

Faculty of Nursing, Chulalongkorn University  
Proposal Approved Academic year 2015

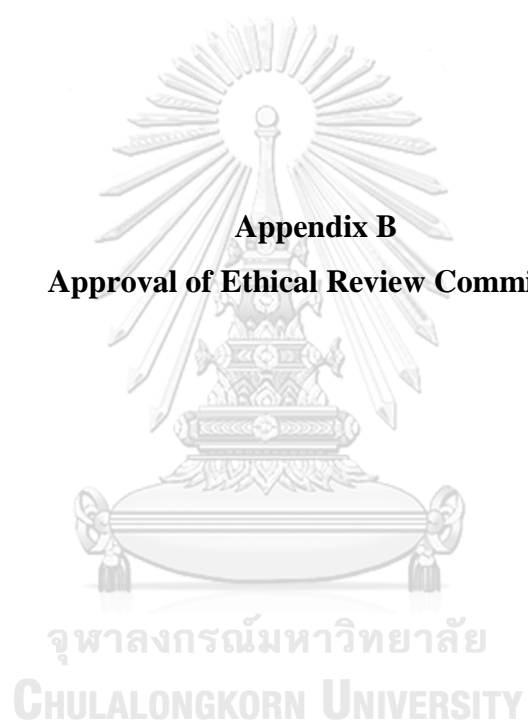
ID	5677404636
Name	Mr. Virya Koy
Academic Program	Doctor of Philosophy Program in Nursing Science
Chairperson	Assoc. Prof. Dr. Waraporn Chaipayawat
Major-advisor	Assoc. Prof. Dr. Jintana Yunibhand
Co-advisor	Assoc. Prof. Capt. Dr. Yupin Aunguroch
Examiner	Assoc. Prof. Dr. Ratsiri Thato
Examiner	Assoc. Prof. Dr. Rachanee Sujjantararat
External Examiner	Asst. Prof. Dr. Natakamol Chansatitporn
Title of Thesis	FACTORS INFLUENCING ON NURSING CARE QUALITY PERCEIVED BY PROFESSIONAL NURSES IN GOVERNMENT HOSPITALS, CAMBODIA
ID	5677406936
Name	Mrs. Haiyan Wang
Academic Program	Doctor of Philosophy Program in Nursing Science
Chairperson	Assoc. Prof. Capt. Dr. Yupin Aunguroch
Major-advisor	Assoc. Prof. Dr. Waraporn Chaipayawat
Co-advisor	Assoc. Prof. Dr. Jintana Yunibhand
Examiner	Assoc. Prof. Dr. Ratsiri Thato
External Examiner	Assoc. Prof. Dr. Punyarat Lapvongwattana
External Examiner	Asst. Prof. Dr. Achariya pathumwan
Title of Thesis	LIVING PROCESS OF CHINESE WOMEN AFTER LOSING THE ONLY-CHILD
ID	5677401736
Name	Mrs. Xuan Ha Thi Nhu
Academic Program	Doctor of Philosophy Program in Nursing Science
Chairperson	Prof. Dr. Somchit Hanucharunkul
Major-advisor	Assoc. Prof. Dr. Sureeporn Thanasilp
Co-advisor	Assoc. Prof. Dr. Ratsiri Thato
Examiner	Assoc. Prof. Capt. Dr. Yupin Aunguroch
Examiner	Asst. Prof. Dr. Sunida Preechawong
External Examiner	Asst. Prof. Dr. Natakamol Chansatitporn
Title of Thesis	THE EFFECT OF UNCERTAINTY MANAGEMENT PROGRAM ON QUALITY OF LIFE AMONG POST MASTECTOMY PATIENTS IN VIETNAM

Approval by Faculty Board No. 10/2016, July 26, 2016

(Announce date July 29, 2016)

  
 (Sureeporn Thanasilp, D.N.S., A.P.N.)  
 Associate Professor and Dean

**Appendix B**  
**Approval of Ethical Review Committee**





ក្រសួងសុខាភិបាល  
MINISTRY OF HEALTH  
គណៈកម្មាធិការជាតិរៀបចំការស្រាវជ្រាវ  
សំរាប់ការស្រាវជ្រាវសុខភាពដែលទាក់ទងនឹងមនុស្ស  
National Ethics Committee for Health Research

លេខ.....២១៩/NECHR.....

ព្រះរាជាណាចក្រកម្ពុជា  
KINGDOM OF CAMBODIA  
ជាតិ សាសនា ព្រះមហាក្សត្រ  
NATION RELIGION KING  
\*\*\*

រាជធានីភ្នំពេញ, ថ្ងៃទី ២៦ ខែ ០៩ ឆ្នាំ ២០១៦

Mr. Virya Koy

**Project:** Factors Influencing on Nursing Care Quality Perceived by Professional Nurses in government Hospitals, Cambodia. Version N° 01, dated July 28<sup>th</sup>, 2016

**Reference:** 26<sup>th</sup> August 2016 NECHR meeting minutes

Dear Mr. Virya Koy,

I am pleased to notify you that your study protocol entitled “Factors Influencing on Nursing Care Quality Perceived by Professional Nurses in government Hospitals, Cambodia. Version N° 01, dated 28<sup>th</sup> July 2016” has been approved by National Ethics Committee for Health Research (NECHR) in the meeting on 26<sup>th</sup> August 2016. This approval is valid for twelve months after the approval date.

The Principal Investigator of the project shall submit following document to the committee’s secretariat at the National Institute of Public Health at #80 Samdach Penn Nouth Blvd, Sangkat Boeungkok2, Khan Tuol Kork, Phnom Penh. (Tel: 855-23-880345, Fax: 855-23-881949):

- Annual progress report
- Final scientific report
- Patient/participant feedback (if any)
- Analyzing serious adverse events report (if applicable)

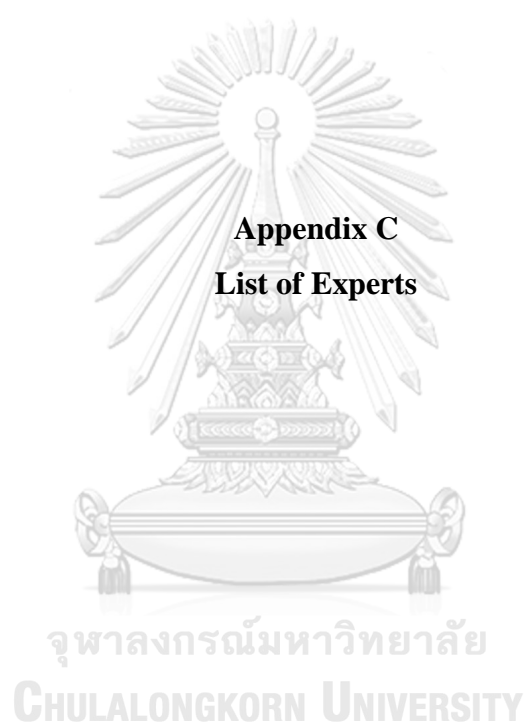
The Principal Investigator should be aware that there might be site monitoring visits at any time from NECHR team during the project implementation and should provide full cooperation to the team

Regards,

Chairman

Prof. ENG HUOT





### List of Experts

<b>Name</b>	<b>Educational Background</b>	<b>Position</b>	<b>Work Experience (years)/Publication</b>
Prak Manila	Master of Nursing Science in the field of nursing administration. Bachelor of Nursing Science, and Associate degree in nursing.	Director of External Project. Chief Unit of Education and Quality Improvement of Cambodian Council of Nurses.	- 10 year in clinical setting - 5 years nursing educator's coordinator - 5 years quality improvement assessment - 2 publications - 1 Chapter of text book
York Sottha	Bachelor of Nursing Science	Director of nursing, Director of Regional Nursing Committee, and Chief of Regional Board of Nursing.	- 10 years: Quality control - Clinical nursing practice for 10 years - Teaching: quality management
Seang Sothea	Bachelor of Nursing Science	Director of Nursing Executive General of Cambodian Council of Nurses	- 10 years as nurses anesthetist - 5 years: Surgical quality improvement - 5 years for patient safety in hospital and infection control
Heur Sethyl	Bachelor of Nursing Sciences	Director of Nursing, Deputy hospital director, Chief of regional nursing committee, and Chief Stung Treng Regional Board of Nursing	- In charge infection control - Hospital quality improvement committee - Teaching: quality management subject
Pak Sopheak	Bachelor of Nursing Sciences	Vice Director of Nursing	- Teaching: Nursing management - In Charge patient safety and infection control - Hospital Quality Improvement Committee member



### Participant Consent Form

Address.....

Date.....

Code number.....

I agree to participate in the study entitled “Factors influence on nursing care quality perceived by professional nurses at government hospitals, Cambodia”.

Researcher’s name: Virya Koy Phone number: +66806151276 (Thailand)

Phone number: +85577616196 (Cambodia) Email: virya2403koy@gmail.com

Faculty of Nursing, Chulalongkorn University, Bangkok, Thailand.

I clearly understand and am satisfied after reading the objective and the reasons for the study, what will I be involved with, and the details and benefits of this study.

I agree and have willing to participate in this study and consent to respond to 5 sets of questionnaires used to describe the factors influence on nursing care quality. I have learned that there are total of 5 sets of questionnaires and each of them will take about 20 minutes.

I have the right to withdraw from this study at any time without any given reasons. My withdrawal from the study will have no any negative impact on me.

Researcher has guaranteed that procedures acted upon me would be exactly the same as indicated in the information. My personal information will be kept confidentiality. Results of the study will be reported in overall form. Personal information that could identify me will not appear in the report of this study.

I will be treated as indicated in the information sheet, if not I can report to the Ethics Review Committee of Cambodian Ministry of Health, #2, St.289, Boeung Kok 2 Commune, Toul Kork District, Phnom Penh, Cambodia. Tel/Fax: 023 724 137. Email: PR@online.com.kh or moh\_cabinet@online.com.kh. Website: www.moh.gov.kh.

I also have received a copy of the information sheet and consent form.

Sign.....

Sign.....

Sign.....

(.....)

(.....)

(.....)

Researcher

Participants

Witness

**Title of the study:** Factors Influencing on Nursing Care Quality in Government Hospitals, Cambodia

**Investigator:** **Student's name: Virya Koy, ID: 5677404636**

**Program of study:** Doctor of Philosophy Program in Nursing Science

**Number of credits:** 48 units

**Advisor's name:**

Major advisor, Associate Professor Jintana Yunibhand, PhD., APN., RN.

Co-advisor, Associate Professor Police Captain Yupin Aungsuroch, PhD., RN.

Welcome:

- Thanks for agreeing to be part of the interview. I appreciate your willingness to participate.

Purpose:

- To examine the path analysis on nursing care quality amount professional nurses at government's hospitals in Cambodia.

Instruments:

1. Demographic data + Nurse Staffing
2. Cambodian Nursing Care Quality Scale
3. Index of Work Satisfaction
4. Practice Environment Scale of Nursing Work Index
5. Copenhagen Burnout Inventory

**Supplies for interview:**

- Sign-in sheet (consent form)
- Consent forms (one copy for participants, one copy for the team)
- Pencils for each participant
- A gift

**Explanation of procedures:**

- If you agree to participate in this study, you will be asked to complete 5 questionnaires and return the questionnaires to the researcher.
- It will take 60 minutes to complete the questionnaires.

**Risk and discomforts:**

- There is no harm of your participation in this study.
- The possible inconvenience for you will be the minimal time (60 minutes) needed to complete the questionnaires.

**Benefits:**

- There is no personal benefit from your agreement to participate in this study;
- It will be benefited for providing valuable information to administrators in government hospitals in Cambodia for improving the nursing care quality in terms of patient's outcomes.

**Confidentiality:**

- Data will be kept confidentially as permitted by law.
- Your information will be used only for the purpose of the study.
- Your data will be coded anonymously.
- All data and forms will be indented by number instead of your name
- It will not be possible to match any information provided on the questionnaires with your consent form.
- Your completed questionnaires will be returned to the researcher or data collectors directly.
- The result of the study will be presented in the groups of subjects, not as an individual.
- The Faculty of Nursing, Chulalongkorn University, Institutional Review Board for Human Use may review the research records for auditing purposes.

Thank you so much for your spending your valuable time

**Appendix E**  
**Research Instruments**



### Appendix E1: Cambodian Nursing Care Quality Scale

**Instructions:** Please circle the number that most closely indicates how you feel about each statement. The *left* set of numbers indicates degrees of *agreement*. The *right* set of numbers indicates degrees of *agreement*. For example, if you strongly agree with the first item, circle 5 strongly agree; if you agree with this item, 4 is agree, circle 3 neutral; if you circle 2 is disagree, and 1 is strongly disagree.

Items	Scale				
	1	2	3	4	5
1. Patients receives the correct medication (time, dose, patient, drug, and route)	1	2	3	4	5
2. Pressure ulcers frequently occur	1	2	3	4	5
3. There are patient falls	1	2	3	4	5
4. There are nosocomial infection after admission	1	2	3	4	5
5. There are patient complaints	1	2	3	4	5
6. Patients are satisfied with the nursing care	1	2	3	4	5
7. Nurses protect patients from physical injury	1	2	3	4	5
8. Patients receive safety care	1	2	3	4	5
9. Patients have comfortable conditions	1	2	3	4	5
10. Length of stay less than 7 days	1	2	3	4	5
11. Pain is treated appropriately	1	2	3	4	5
12. Nurses guide patients to do self-care	1	2	3	4	5
13. Nurses provide individualized care	1	2	3	4	5
14. Nurses provide good basic nursing care	1	2	3	4	5
15. Nurses explain information to patients clearly	1	2	3	4	5
16. Nurses provide patients with knowledge of disease/condition and care requirements	1	2	3	4	5
17. Nurses have enough time for patients as needed	1	2	3	4	5
18. Nurses are able to reduce patients' anxiety	1	2	3	4	5
19. Nurses are able to relieve patient worry about illness	1	2	3	4	5
20. Patients are satisfied with nurses' teaching	1	2	3	4	5



Items	Scale				
	1	2	3	4	5
21. Patients are happy with the information being taught	1	2	3	4	5
22. Patients are dissatisfied with waiting time	1	2	3	4	5
23. Patients are satisfied with discharge planning	1	2	3	4	5
24. Patients are satisfied with symptom management (pain, nausea)	1	2	3	4	5
25. Nurses are kind to patients	1	2	3	4	5
26. Nurses are polite and pleasant to patients	1	2	3	4	5
27. Nurses observe patients' sign and symptom carefully	1	2	3	4	5
28. Rooms are clean	1	2	3	4	5
29. Rooms have good ventilation	1	2	3	4	5
30. Rooms are quiet	1	2	3	4	5
31. Nurses continue to develop their own competencies	1	2	3	4	5
32. Nurses' knowledge is Up-to-date	1	2	3	4	5
33. Holistic client care is provided	1	2	3	4	5
34. Nurses develop nursing care plans for patients	1	2	3	4	5
35. Patients receive help as needed	1	2	3	4	5
36. Patients received high quality care	1	2	3	4	5
37. Nurses practices with caring behavior	1	2	3	4	5
38. Nurses protect safety and patients' rights	1	2	3	4	5
39. Nurses provide fair nursing care	1	2	3	4	5
40. Nurses participate in resolving moral issues	1	2	3	4	5
41. Nurses are determined for the appropriate delegation of tasks	1	2	3	4	5
42. Nurses are responsible for maintain their own competence	1	2	3	4	5
43. Nurses are responsible for nursing professional development	1	2	3	4	5

### Appendix E3: The Practice Environment Scale of the Nursing Work Index

N	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	Adequate support services allow me to spend time with my patients.	1	2	3	4	5
2	Physicians and nurses have good working relationships	1	2	3	4	5
3	A supervisory staff that is supportive of the nurses.	1	2	3	4	5
4	Active staff development or continuing education programs for nurses.	1	2	3	4	5
5	Career development/clinical ladder opportunity.	1	2	3	4	5
6	Opportunity for staff nurses to participate in policy decisions.	1	2	3	4	5
7	Supervisors use mistakes as learning opportunities, not criticism.	1	2	3	4	5
8	Enough time and opportunity to discuss patient care problems with other nurses	1	2	3	4	5
9	Enough registered nurses to provide quality patient care.	1	2	3	4	5
10	A nurse manager who is a good manager and leader.	1	2	3	4	5
11	A chief nursing officer who is highly visible and accessible to staff	1	2	3	4	5
12	Enough staff to get the work done	1	2	3	4	5
13	Praise and recognition for a job well done.	1	2	3	4	5
14	High standards of nursing care are expected by the administration	1	2	3	4	5
15	A chief nursing officer equal in power and authority to other top-level hospital executives	1	2	3	4	5
16	A lot of team work between nurses and physicians.	1	2	3	4	5
17	Opportunities for advancement.	1	2	3	4	5
18	A clear philosophy of nursing that pervades the patient care environment.	1	2	3	4	5

N	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
19	Working with nurses who are clinically competent.	1	2	3	4	5
20	A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician.	1	2	3	4	5
21	Administration that listens and responds to employee concerns.	1	2	3	4	5
22	An active quality assurance program.	1	2	3	4	5
23	Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).	1	2	3	4	5
24	Collaboration (joint practice) between nurses and physicians.	1	2	3	4	5
25	A preceptor program for newly hired RNs	1	2	3	4	5
26	Nursing care is based on a nursing, rather than a medical, model.	1	2	3	4	5
27	Staff nurses have the opportunity to serve on hospital and nursing committees.	1	2	3	4	5
28	Nursing administrators consult with staff on daily problems and procedures	1	2	3	4	5
29	Written, up-to-date nursing care plans for all patients.	1	2	3	4	5
30	Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next.	1	2	3	4	5
31	Use of nursing diagnoses.	1	2	3	4	5



**Appendix E5: Index of Work Satisfaction**

**Instructions:** Please circle the number that most closely indicates how you feel about each statement. 1) Strongly disagree, 2) disagree, 3) moderately disagree, 4) neutral, 5) moderately agree, 6) agree, and 7) strongly agree.

Items	Scales				
	1	2	3	4	5
<b>Professional status</b>					
1. Most people do not sufficiently appreciate the importance of nursing care to hospital patients.	1	2	3	4	5
2. There is no doubt whatever in my mind that what I do on my job is really important.	1	2	3	4	5
3. Nursing is a long way from being recognized as profession	1	2	3	4	5
4. What I do on my job does not add up to anything really significant.	1	2	3	4	5
5. It makes me proud to talk to other people about what I do on my job.	1	2	3	4	5
6. If I had the decision to make all over again, I would still go into nursing.	1	2	3	4	5
7. My particular job really doesn't require much skill or "know-how".	1	2	3	4	5
<b>Task requirements</b>					
8. There is too much clerical and "paperwork" required of nursing personnel in this hospital.	1	2	3	4	5
9. I think I could do a better job if I did not have so much to do all the time.	1	2	3	4	5
10. I am satisfied with the types of activities that I do on my job.	1	2	3	4	5
11. I have plenty of time and opportunity to discuss patient care problems with other nursing service personnel.	1	2	3	4	5
12. I have sufficient time for direct patient care.	1	2	3	4	5
13. I could deliver much better care if I had more time with each patient.	1	2	3	4	5
<b>Interaction</b>					
<b><i>Physician-nurse subcomponent</i></b>					
14 Physicians in general cooperate with nursing staff on my unit.	1	2	3	4	5
15 There is a lot of teamwork between nurses and doctors on my own unit.	1	2	3	4	5
16 I wish the physicians here would show more respect for the skill and knowledge of the nursing staff.	1	2	3	4	5
17. Physicians at this hospital generally understand and appreciate what the nursing staff does.	1	2	3	4	5
18. The physicians at this hospital look down too much on the nursing staff.	1	2	3	4	5
<b><i>Nurse-nurse Interaction</i></b>					
19. The nursing personnel on my service don't hesitate pitch in and help one another out when things get in a rush.	1	2	3	4	5

Items	Scales				
	1	2	3	4	5
20. New employees are not quickly made to “feel at home” on my unit	1	2	3	4	5
21. The nursing personnel on my service are not as friendly and outgoing as I would like	1	2	3	4	5
22. There is a lot of “rank consciousness” on my unit, with nursing personnel seldom mingling with others of lower	1	2	3	4	5
23. There is a good deal of teamwork and cooperation between various levels of nursing personnel on my service.	1	2	3	4	5
<b>Organizational policies</b>					
24. The nursing staff has sufficient control over scheduling their own work shifts in my hospital.	1	2	3	4	5
25. There is a great gap between the administration of this hospital and the daily problems of the nursing service.	1	2	3	4	5
26. There are not enough opportunities for advancement of nursing personnel at this hospital.	1	2	3	4	5
27. There is ample opportunity for nursing staff to participate in the administrative decision-making process.	1	2	3	4	5
28. Administrative decisions at this hospital interfere too much with patient care.	1	2	3	4	5
29. I have all the voice in planning policies and procedures for this hospital and my unit that I want	1	2	3	4	5
30. The nursing administrators generally consult with the staff on daily problems and procedures.	1	2	3	4	5
<b>Autonomy</b>					
31. I feel that I am supervised more closely than is necessary.	1	2	3	4	5
32. I feel I have sufficient input into the program of care for each of my patients.	1	2	3	4	5
33. I have too much responsibility and not enough authority	1	2	3	4	5
34. On my service, my supervisors make all the decisions. I have little direct control over my own work.	1	2	3	4	5
35. A great deal of independence is permitted, if not required, of me.	1	2	3	4	5
36. I am sometimes frustrated because all of my activities seem programmed for me.	1	2	3	4	5
37. I am sometimes required to do things on my job that are against my better professional nursing judgment.	1	2	3	4	5
38. I have the freedom in my work to make important decisions as I see fit, and can count on my supervisors to	1	2	3	4	5

### Appendix E6: Copenhagen Burnout Inventory

Please circle the number that most closely indicates how you feel about each statement. 1) Never/almost never, 2) Seldom, 3) Sometimes, 4) Often, 5) Always

No	Items	Scales				
	<b><i>Personal burnout</i></b>	1	2	3	4	5
1	I feel tired	1	2	3	4	5
2	Physical exhausted	1	2	3	4	5
3	Emotionally exhausted	1	2	3	4	5
4	I can't take it any more	1	2	3	4	5
5	Feel worn out	1	2	3	4	5
6	Feel weak and susceptible to illness	1	2	3	4	5
	<b><i>Work burnout</i></b>					
7	Work emotionally exhausting?	1	2	3	4	5
8	Feel burnt out because of your work	1	2	3	4	5
9	Work frustrate you	1	2	3	4	5
10	Feel worn out at the end of the working day	1	2	3	4	5
11	Exhausted in the morning at the thought of another day at work	1	2	3	4	5
12	Every working hour is tiring for you	1	2	3	4	5
13	Have enough energy for family and friends during leisure time	1	2	3	4	5
	<b><i>Client burnout</i></b>					
14	Hard to work with clients	1	2	3	4	5
15	Frustrating to work with clients	1	2	3	4	5
16	Drain your energy to work with clients	1	2	3	4	5

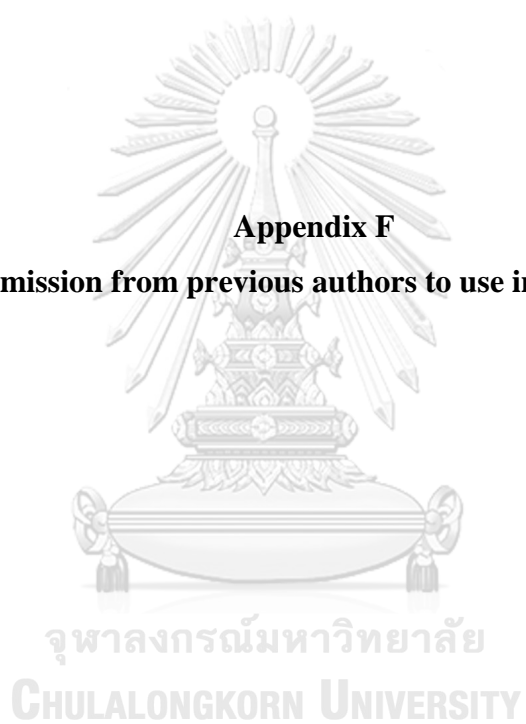
No	Items	Scales				
	<i>Personal burnout</i>	1	2	3	4	5
17	Feel give more than you get back when work with clients	1	2	3	4	5
18	Tired of working with clients	1	2	3	4	5
19	Wonder how long you will be able to continue working with clients	1	2	3	4	5





**Appendix F**

**Permission from previous authors to use instruments**



## Permission from previous authors to use instruments

### 1. Nursing care quality as Patient outcomes: Hello,

I've attached the survey items we use and how we create our analytic variables. The attached paper describes the overall design. We aggregate the responses of individual nurses to the hospital level and use our results as a hospital level variable. This requires the study to have a large number of hospitals, probably close to 15-20. You could increase the N by measuring at individual nurses and having multiple units per hospital. We have validated that nurse reported measures are a good reflection of objective clinical data (see the McHugh paper attached). Good luck. Linda

Linda H. Aiken, Ph.D.

The Claire M. Fagin Leadership Professor of Nursing  
 Professor of Sociology  
 Director, Center for Health Outcomes and Policy Research  
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 Website: <http://nursing.upenn.edu/CHOPR>  
 Twitter: @LindaAiken\_Penn

### 2. Nurses Practice Environment

Sure thing Virya. My administrative coordinator, Ms. Andrea Barol, copied here, will mail you everything. take care, Professor Lake  
 Andrea please note that this is a request from Cambodia

Dear Mr. Koy Virya:

Thank you for your email to Dr. Lake. Enclosed, please find the instrument, scoring instructions, an article containing PES-NWI scores for ANCC Magnet hospitals from 1998 in Table 1, and a Warshawsky & Haven article you may find useful. These materials are sent to everyone who makes the request.

Dr. Lake's permission is not needed as the instrument is in the public domain due to its endorsement by the National Quality Forum in 2004 and re-endorsement in 2009: <http://www.qualityforum.org/QPS/QPSTool.aspx?m=1129&e=3>. However, if you prefer to have Dr. Lake's permission, this email serves as her permission.

Please direct any reply to Dr. Eileen Lake at [elake@nursing.upenn.edu](mailto:elake@nursing.upenn.edu). If you need anything else, feel free to write to us again.

Best Regards,  
 Ericka Brown  
 Administrative Coordinator  
 Center for Health Outcomes and Policy Research  
 University of Pennsylvania School of Nursing

418 Curie Boulevard, Room 378  
Philadelphia, PA 19104

### 3. Copenhagen Burnout Inventory

Dear Virya.

Thank you for your interest in the Copenhagen Burnout Inventory – I am pleased to let you know that the CBI is free for use.

The original scale (English version) can be found here:  
<http://www.arbejdsmiljoforskning.dk/upload/CBI-scales.pdf>  
I wish you good luck with your dissertation.

Best regards

Marianne Borritz

Consultant, PhD, Specialist in Occupational Medicine

Bispebjerg University Hospital

Dep. Occupational and Environmental Medicine

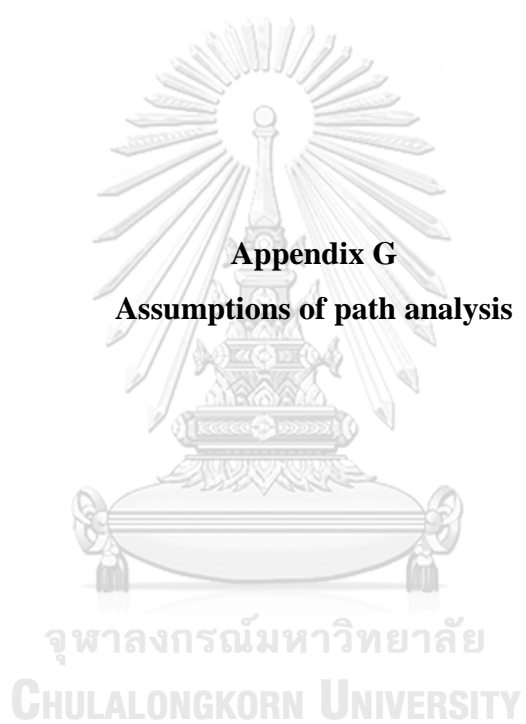
Bispebjerg Bakke 23\_20F

DK-2400 Copenhagen NV

Email: [Marianne.Borritz@regionh.dk](mailto:Marianne.Borritz@regionh.dk)

Tel. (+45) 3531 6060

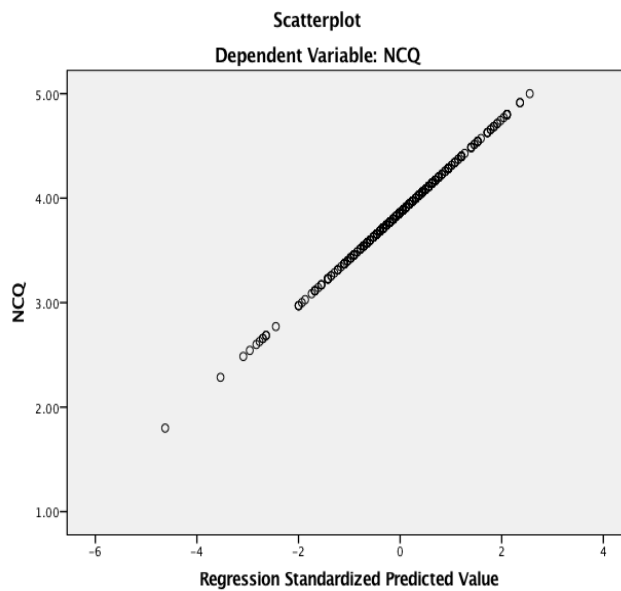
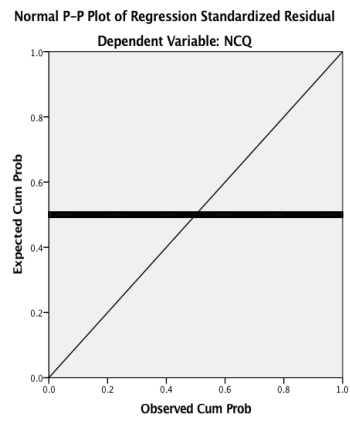
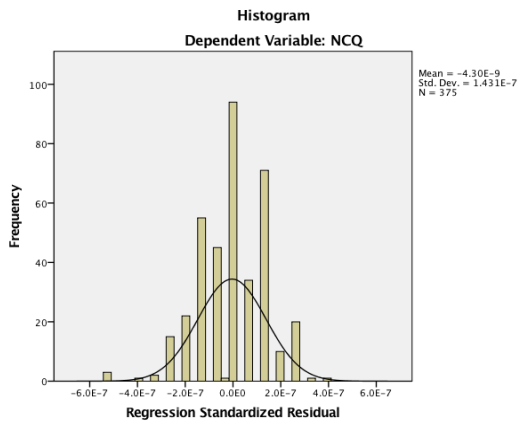




**Appendix G**  
**Assumptions of path analysis**

## Appendix G1

### Normality, Linearity, Homoscedasticity, and Multicollinearity

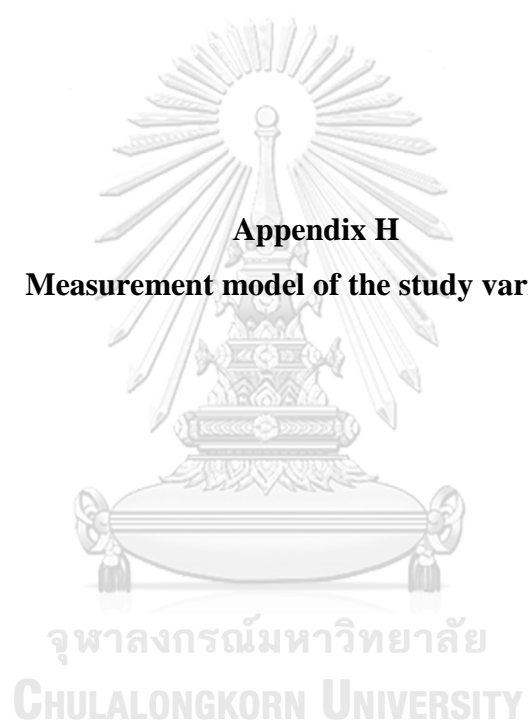


## Appendix G 2

Table 36 Test of Univariate Normality and Multivariate Normality of the observed variables (N = 375)

Observable variables	Skewness and Kurtosis	
	Chi-Square	P-Value
<b>Univariates normality testing</b>		
Patient outcomes	39.51	0.00
Physical environment	22.13	0.00
Ethic-oriented activity	61.75	0.00
Nurses' characteristics	73.83	0.00
Nurses' task requirement	16.42	0.00
Progress of Nursing Process	21.14	0.00
Nurse Participation in Hospital Affairs	28.11	0.00
Nursing Foundations for Quality of Care	44.92	0.00
Organization and Policy	11.30	0.004
Nurse Manager Ability, Leadership, and Support of Nurse	21.11	0.000
Professional status	39.55	0.000
Task requirement	32.15	0.00
Interaction	37.49	0.00
Autonomy	25.85	0.00
Collegial Nurse-Physician Relations	13.17	0.00
Staffing and Resource Adequacy	50.18	0.00
Personal burnout	8.27	0.01
Work-related burnout	7.22	0.24
Client-related burnout	2.78	0.24
Nurse-Patient Ratio	18.25	0.00
<b>Multivariate normality testing</b>		
Set of study variables	575.13	0.016

**Appendix H**  
**Measurement model of the study variables**



**H1: Loading factors of Cambodian Nursing Care Quality Scale (CNCQS)**

Items	F 1 MC	F 2 PC	F 3 EM	F 4 QSCC	F 5 TC	F 6 ESC	F 7 ISC	F 8 PS	CITC	Alpha
<b>Factor 1: Moral Commitment</b>									<b>.51</b>	<b>.89</b>
Item 26	.65								.59	.89
Item 27	.64								.58	.89
Item 39	.62	.37							.48	.89
Item 25	.59								.48	.89
Item 38	.55				.39				.47	.89
Item 40	.54	.43							.51	.89
<b>Factor 2 Professional commitment</b>									<b>.52</b>	<b>.89</b>
Item 42	.32	.71							.57	.89
Item 43		.66							.46	.89
Item 31		.66							.53	.89
Item 41		.53							.54	.89
Item 32		.51	.39		.37				.51	.89
Item 34		.33			.31				.51	.89
<b>Factor 3 Environment management</b>									<b>.51</b>	<b>.89</b>
Item 28			.81						.49	.89
Item 29			.76						.52	.89
Item 30			.70						.53	.89
<b>Factor 4 Quality-safety conscious care</b>									<b>.50</b>	<b>.89</b>
Item 8				.74					.41	.89
Item 9				.67					.48	.89
Item 14				.53					.54	.89
Item 36			.48	.37					.64	.88
Item 11				.47					.48	.89
Item 7				.44					.42	.89
Item 37			.33	.40					.55	.89
<b>Factor 5 Total care</b>									<b>.50</b>	<b>.89</b>
Item 35					.64				.51	.89
Item 33					.56				.54	.89
Item 18	.35				.56		.36		.46	.89
Item 19	.48				.54	.32			.50	.89
<b>Factor 6 Emotional supportive care</b>									<b>.48</b>	<b>.89</b>
Item 20						.81			.50	.89
Item 21						.79			.50	.89
Item 17						.56	.35		.46	.89
<b>Factor 7 Information supportive care</b>									<b>.44</b>	<b>.89</b>
Item 16							.75		.38	.89
Item 15							.65		.50	.89
<b>Factor 8: Patient satisfaction</b>									<b>.45</b>	<b>.89</b>
Item 24								.72	.43	.89
Item 23								.71	.47	.89
Item 22								.69	.47	.89



**H7: Final Version Index of Work Satisfaction-Cambodian Version**

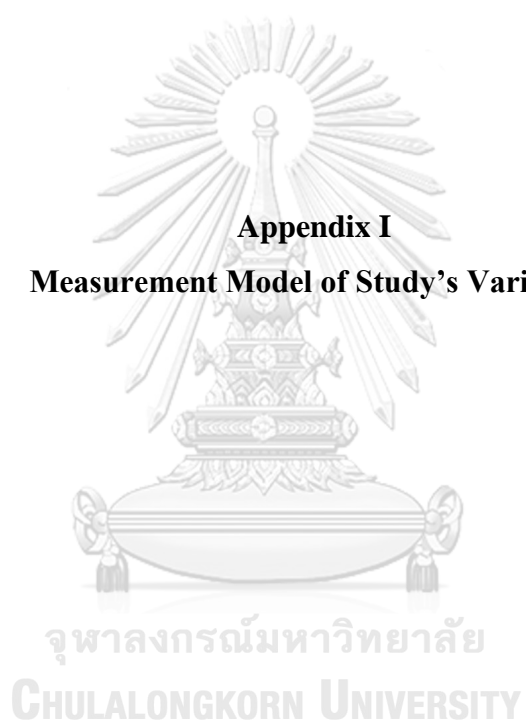
<b>Index of Work Satisfaction-Cambodian Version</b>	<b>Mean</b>	<b>Item-total correlation</b>
1. There is no doubt in my mind what I do for my work that is very important	3.98	.33
2. Nursing needs time to be recognized as a profession.	4.05	.35
3. It is so proud for me to speak with others about what I do for my work.	3.98	.33
4. If I had to make a decision again, I would still choose nursing profession.	3.85	.30
5. My actual work does not require skill or know-how	2.57	.33
6. There is a lot of clerical and paperwork required for nursing staff in this hospital to complete	3.58	.30
7. I think I can work better if I don't have so many works to do all the time.	3.67	.31
8. I am satisfied with all kinds of activities that I work on my job.	3.91	.39
9. I have enough time and opportunity to discuss about problem of patient care with other nursing staff.	3.21	.49
10. I have enough time for direct patient care.	3.35	.44
11. I could provide a better nursing care if I had more time to spend with each patient.	3.96	.38
12. In general, physicians collaborate with nurses in my unit.	4.03	.35
13. There are a lot of teamwork between nurses and physicians in my unit.	3.76	.38
14. I want physicians here to show a respect for skills and knowledge of nursing staff.	4.19	.39
15. In general, physicians in this hospital understand and appreciate in what nursing staff do.	3.66	.38
16. New staffs are not made faster to feel as home in my unit.	3.04	.41
17. Nurse staffs in my unit are not friendly and sociable, as I prefer.	2.60	.34
18. Nurse staffs in my unit have minded about their own position and have not been friendly to other staff who has lower position.	3.58	.30
19. There is a good teamwork and collaboration between different level of staff nurses in my unit.	3.77	.41
20. Nursing staff has a control over the schedule of their own working shift in my unit.	3.89	.30
21. There is not enough opportunity for nursing staff to be promoted in this hospital.	3.07	.34
22. There is enough opportunity for nursing staff to participate in administration decision making process.	3.01	.46
23. The decision making of administration in this hospital is restricted with patient care very much.	2.70	.33

<b>Index of Work Satisfaction-Cambodian Version</b>	<b>Mean</b>	<b>Item-total correlation</b>
24. I have all voice in planning policies and protocols in this hospital and my unit that I wish.	3.01	.45
25. In general, the nursing manager discuss with staff nurses about daily problems and procedures.	3.57	.40
26. I feel that I have enough contribution in nursing program for each of my patients.	3.19	.43
27. I have too much responsibility and do not have enough power.	3.25	.36
28. In my unit, my manager makes all the decisions and I have little direct control on my work.	3.08	.35
29. I am able to practice independently.	3.23	.45
30. Sometimes, I am disturbed because all activities are scheduled for me.	2.88	.32
31. I have freedom in my work in order to make important decision, which I deserve to do and can be count for my manager to complete for me.	3.38	.35

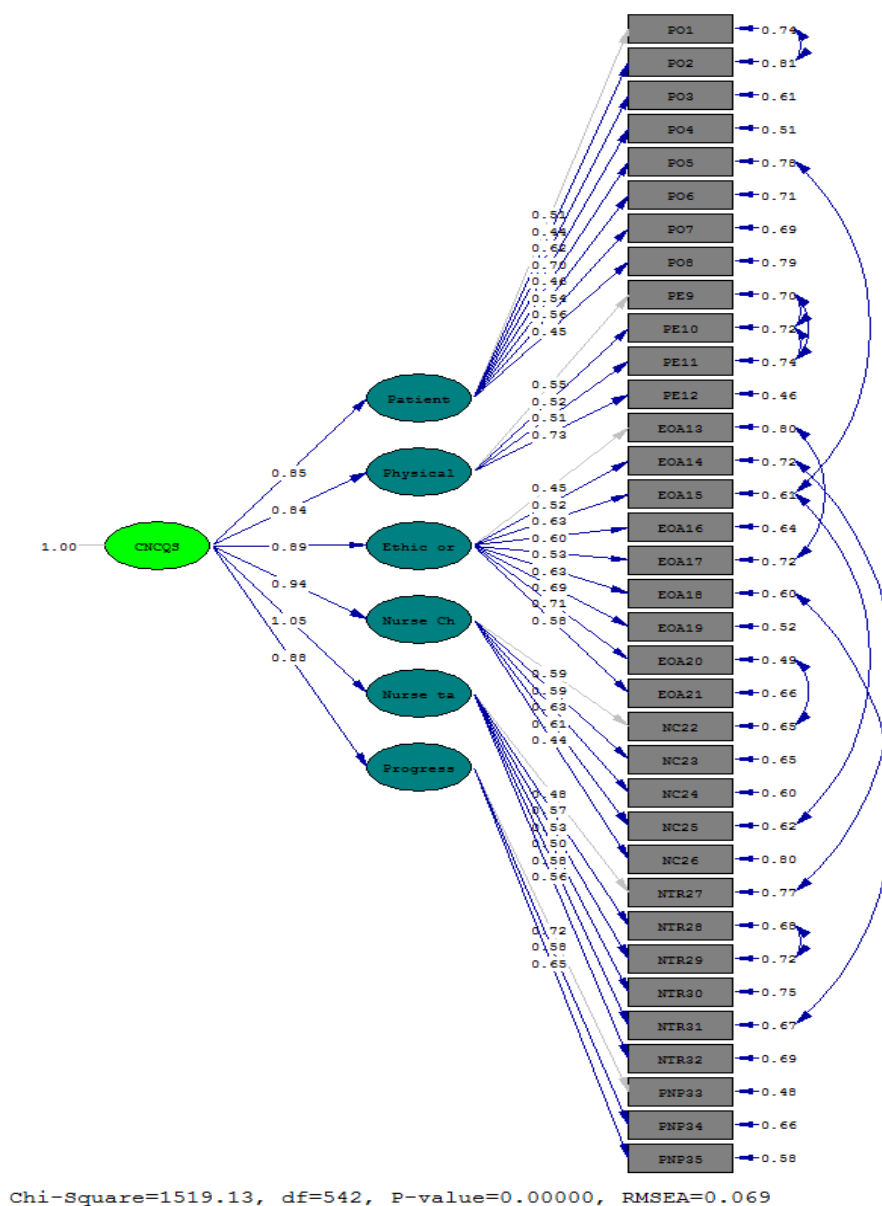
**H8: Mean and Item-total correlation of Copenhagen Burnout Inventory-  
Cambodian Version**

Items	Mean	Item-total correlation
<b><i>Professional Burnout</i></b>		
1. I feel tired	3.35	.49
2. Physically tiredness	3.34	.56
3. Psychological tiredness	3.19	.55
4. I cannot do it anymore	1.18	.51
5. I extremely tired	2.26	.59
6. I feel weak and susceptible of sickness	2.50	.68
<b>Work-related burnout</b>		
7. Having work psychological tiredness	2.86	.69
8. Feel mental exhausted because of your work	2.69	.65
9. Work make me feel tension	2.75	.63
10. Feel tired at the end of the day	2.28	.58
11. Extremely tired in the morning at thought of previous work day	2.37	.63
12. Every working hour made you feel tiredness	2.81	.60
13. Have enough energy for family and friends during free time	<u>3.14</u>	<u>.21</u>
<b>Client-related burnout</b>		
14. Having difficulty in working with client	3.01	.50
15. Having tension when working with client	2.97	.67
16. Losing your energy to work with client	3.22	.59
17. Feel give more than you get back when working with client	3.35	.50
18. Work tiredness with client	3.31	.62
19. Wonder how long you will continue to work with client	2.96	.54

**Appendix I**  
**Measurement Model of Study's Variables**

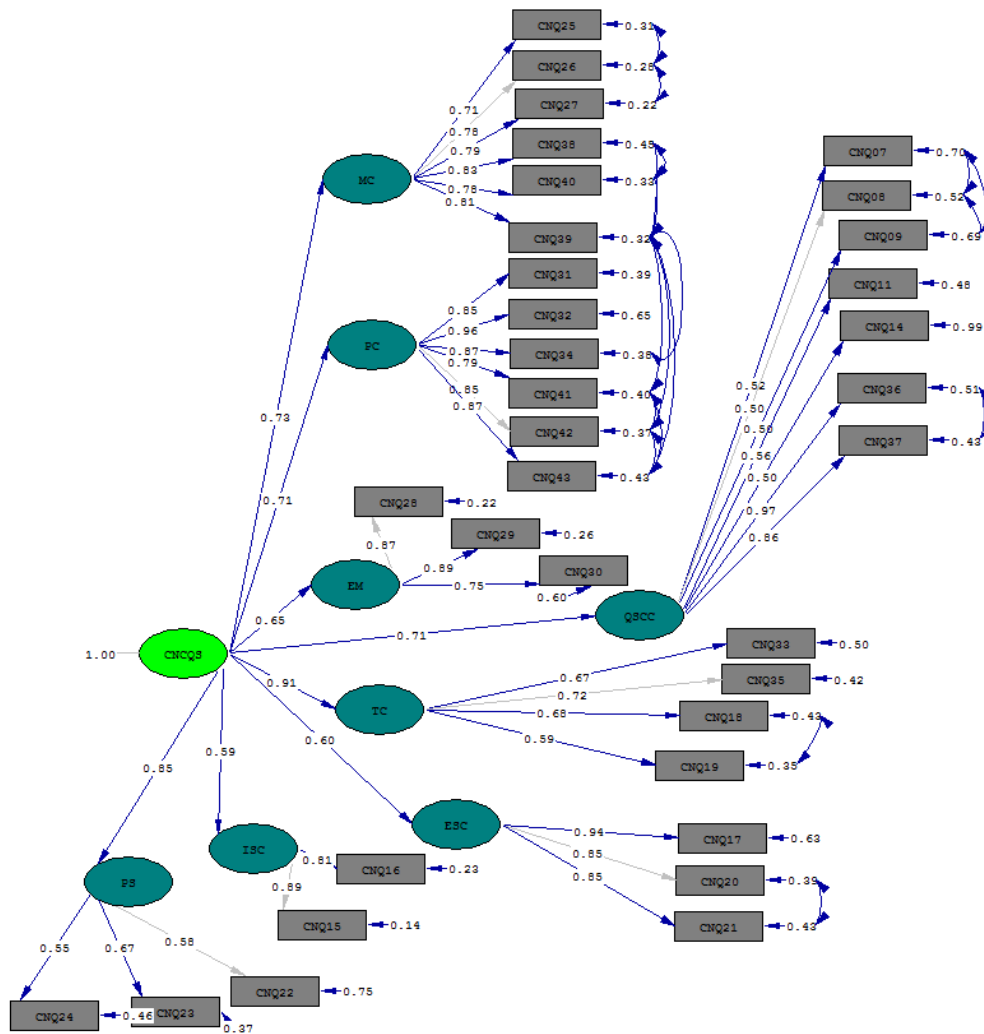


### Measurement of Model Testing of Cambodian Nursing Care Quality Scale



( $\chi^2 = 1411.73$ ,  $df = 542$ ;  $\chi^2/df = 2.60$ ;  $p\text{-value} = .00$ ,  $GFI = 0.81$ ,  $AGFI = 0.78$ ,  $RMSEA = .069$ , and  $CFI = 0.95$ ;  $NFI = 0.93$ ,  $SRNSR = 0.06$ )

Figure 10 the measurement model of CNCQS as initial output

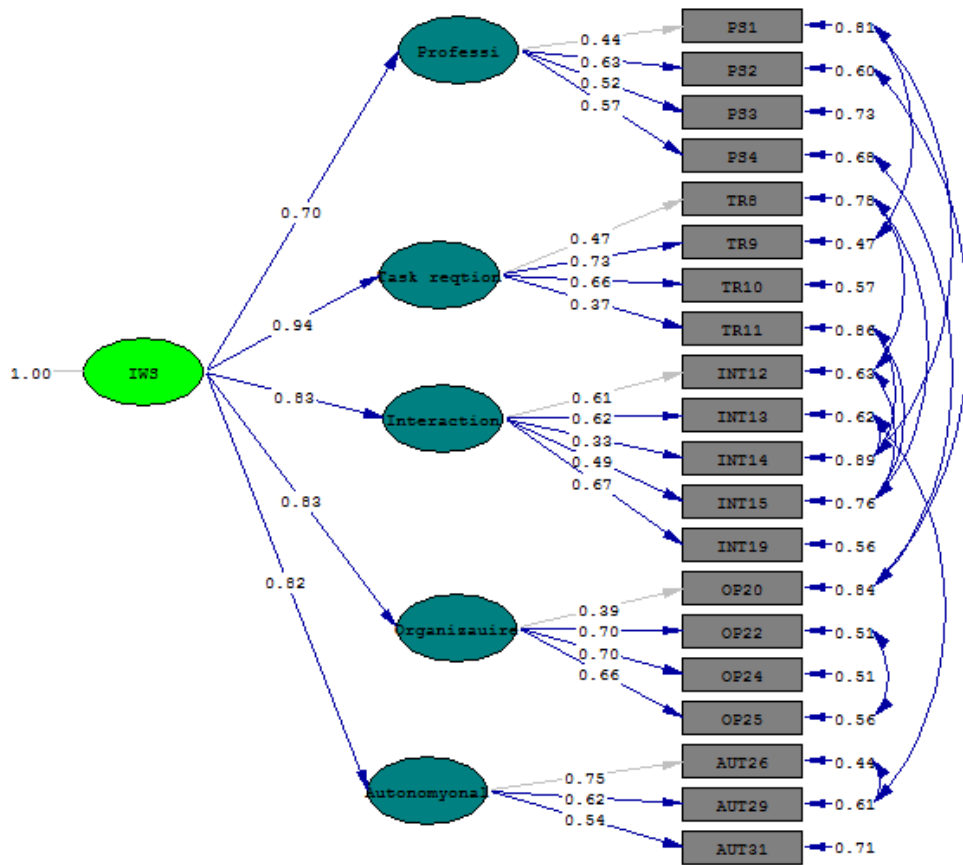


Chi-Square=1213.03, df=499, P-value=0.00000, RMSEA=0.062

$\chi^2 = 1213.03$ ,  $df = 499$ ;  $\chi^2/df = 2.43$ ;  $p\text{-value} = .00$ ,  $GFI = 0.84$ ,  $AGFI = 0.81$ ,  
 $RMSEA = .062$ ,  $SRMRS = 0.04$ , and  $CFI = 0.98$ ;  $NFI = 0.96$

Figure 11 the measurement model of CNCQS, revised model

Measurement of Model Testing of Index Work Satisfaction



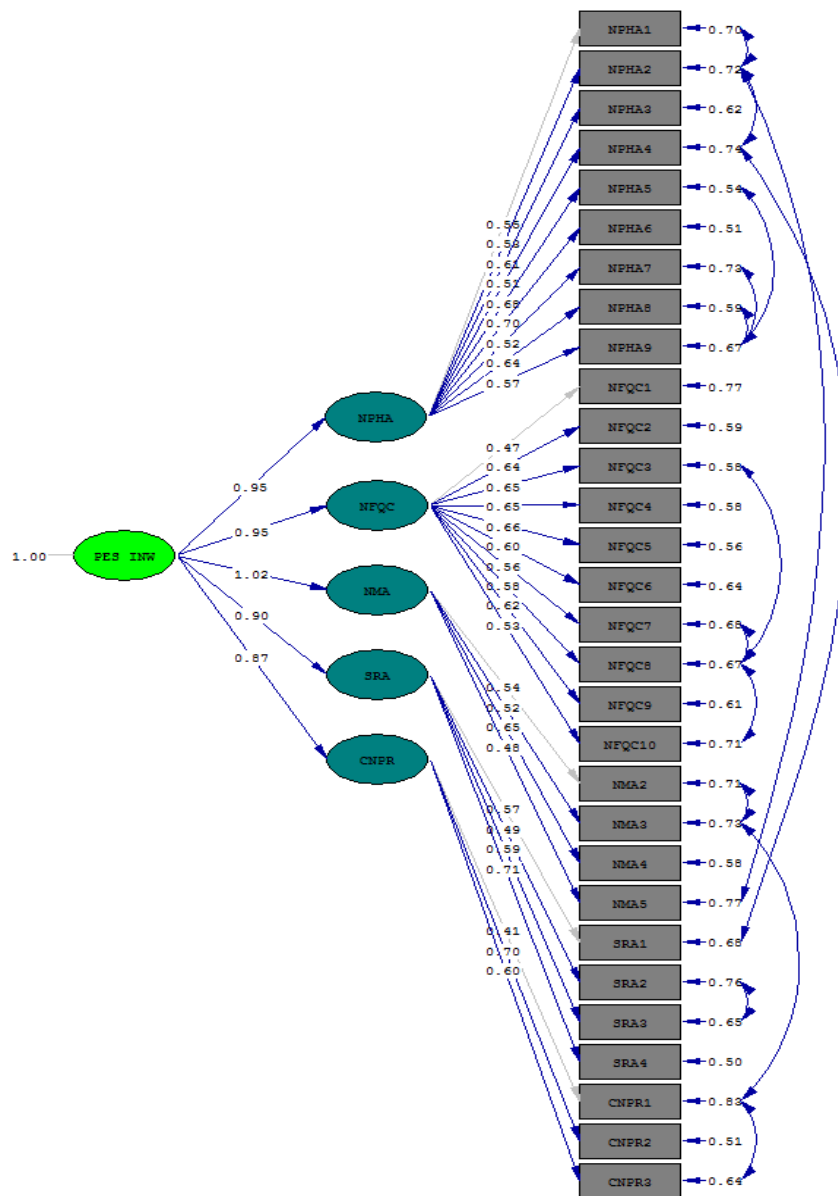
Chi-Square=446.75, df=152, P-value=0.00000, RMSEA=0.065

$\chi^2 = 446.75$ ,  $df = 152$ ;  $\chi^2/df = 2.93$ ;  $p\text{-value} = .00$ ,  $GFI = 0.91$ ,  $AGFI = 0.88$ ,  $RMSEA = .065$ ,  $SRMR = 0.06$ , and  $CFI = 0.95$ ;  $NFI = 0.93$

Figure 12 the measurement model of IWS-Cambodian Version: revised model

Measurement of Model Testing of Practice Environment Scale of Nursing Work

Index



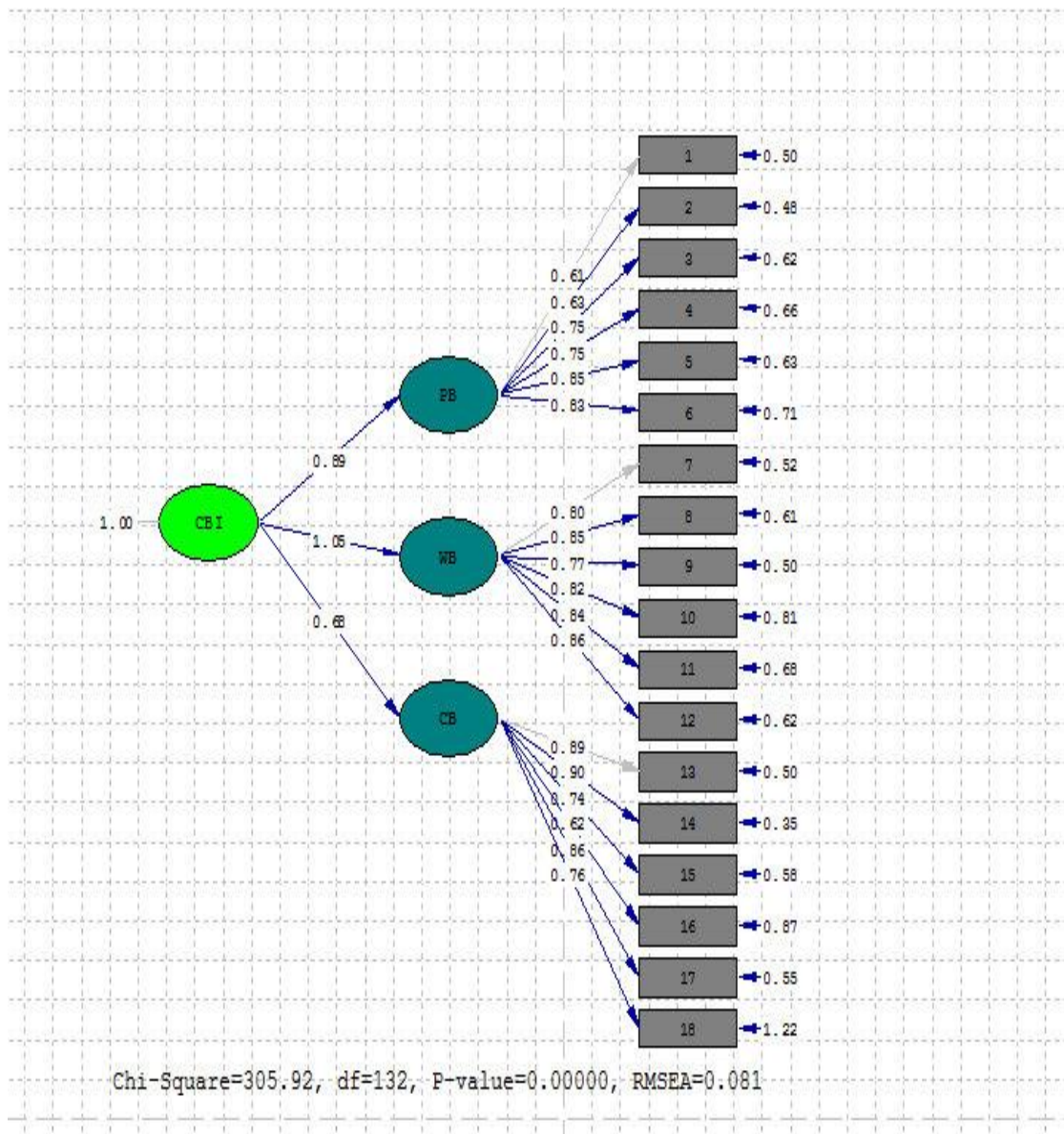
Chi-Square=849.51, df=386, P-value=0.00000, RMSEA=0.050

$\chi^2 = 874.97$ ,  $df = 386$ ;  $\chi^2/df = 2.26$ ;  $p\text{-value} = .00$ ,  $GFI = 0.89$ ,  $AGFI = 0.87$ ,  $RMSEA = .065$ ,  $SRMRS = 0.04$ , and  $CFI = 0.98$ ;  $NFI = 0.96$

Figure 13 the measurement model of PES-NWI-Cambodian version: revised model



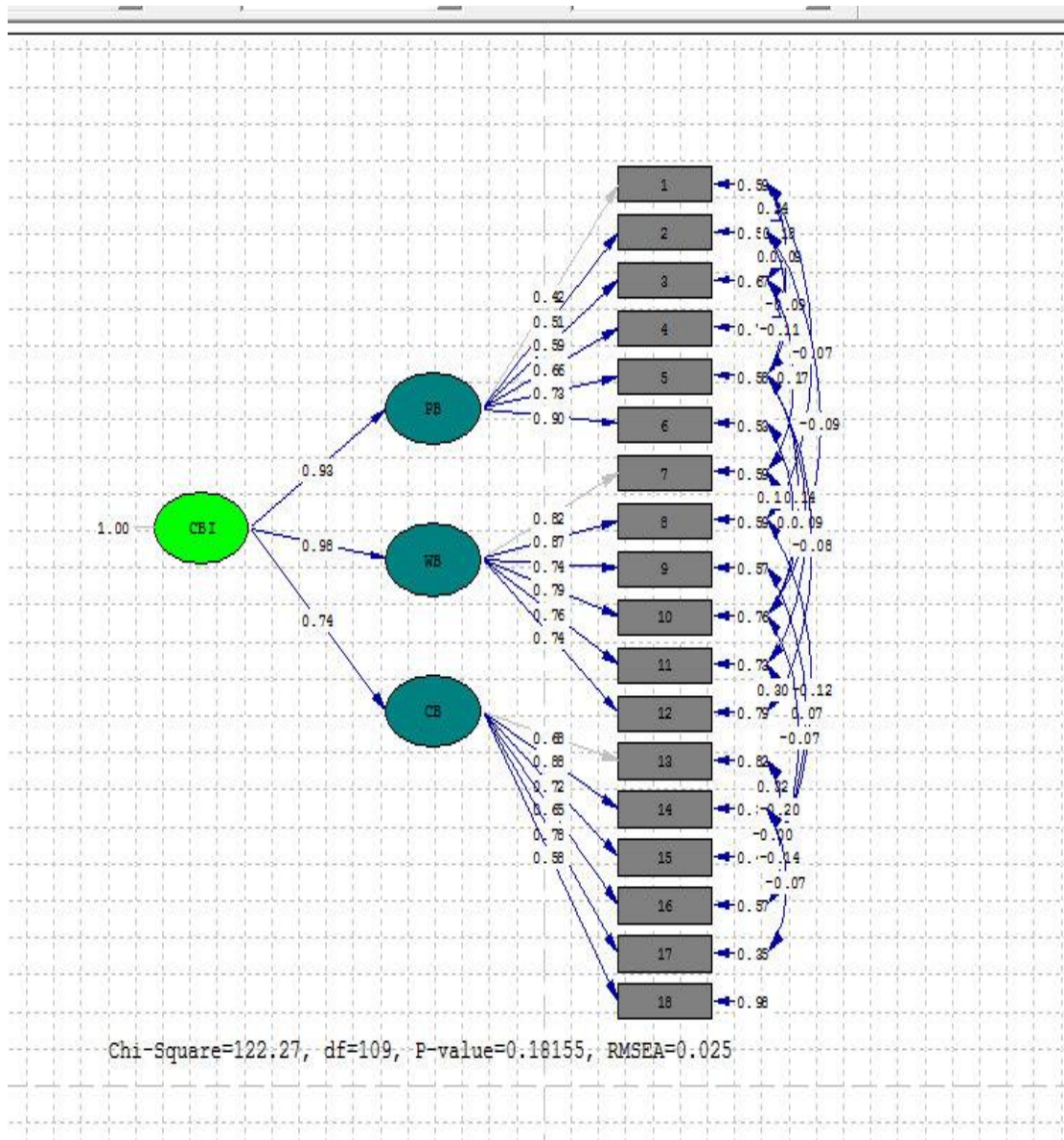
### Measurement of Model Testing of Copenhagen Burnout Inventory



$\chi^2 = 305.92$ ,  $df = 132$ ;  $\chi^2/df = 2.31$ ;  $p\text{-value} = .000$ ,  $GFI = 0.93$ ,  $AGFI = 0.81$ ,

$RMSEA = .081$ ,  $SRMR = 0.05$ , and  $CFI = 0.97$ ;  $NFI = 0.94$

Figure 14 the measurement model of CBI: initial model



$\chi^2 = 122,38$ ,  $df = 109$ ;  $\chi^2/df = 1.12$ ;  $p\text{-value} = .18$ ,  $GFI = 0.93$ ,  $AGFI = 0.90$ ,  $RMSEA = .024$ ,  $SRMRS = 0.05$ , and  $CFI = 0.99$ ;  $NFI = 0.97$

Figure 15 the measurement model of CBI: revised model



**Appendix J**

**LISREL printout for model testing of the structural equation model**

จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

DATE: 8/10/2017

TIME: 23:10

L I S R E L 8.53

BY

Karl G. Jöreskog &amp; Dag Sörbom

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TI XX

## Covariance Matrix

	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
PB1_6	23.34					
WRB7_13	21.49	31.28				
CRB14_19	12.07	15.92	26.44			
PRS1_7	1.04	0.49	0.44	12.51		
TR8_13	-0.18	-1.48	0.05	7.82	21.58	
INT14_23	1.44	0.49	1.22	5.26	8.39	10.25
OP24_30	0.69	0.10	-0.59	3.16	4.86	5.20
AUT31_38	1.12	0.88	0.95	8.81	9.26	8.02
MC	0.07	-0.68	-0.95	-2.44	-5.21	-1.48
PC	1.04	0.23	-0.06	-2.56	-5.23	-1.11
EM	1.14	1.04	0.28	-1.04	-1.97	-0.99
QSCC	0.90	0.62	0.44	-2.72	-4.57	-1.18
TC	0.64	-0.08	-0.89	-2.06	-3.45	-1.26
ESC	0.42	0.33	0.03	-1.26	-1.46	-0.70
ISC	0.00	-0.15	-0.18	-0.64	-1.20	-0.41
PS	0.57	0.32	-0.59	-0.76	-1.23	-0.56
NPHA1_9	1.30	1.67	-2.27	0.67	0.63	-1.11
NFQC10_1	2.19	1.94	-0.39	3.30	3.36	-0.01
NMA21_24	-0.06	0.02	-1.67	0.11	-0.04	-0.59
CNPR29_3	0.37	0.33	-0.26	0.36	0.06	-0.33
SRA25_28	-0.14	0.33	-0.82	0.41	-0.06	-0.49
NPR	0.03	-1.98	0.08	3.25	11.83	1.55

## Covariance Matrix

	OP24_30	AUT31_38	MC	PC	EM	QSCC
OP24_30	7.43					
AUT31_38	6.05	23.42				
MC	-1.22	-3.16	15.88			
PC	-0.94	-2.87	13.84	18.09		
EM	-0.55	-0.48	5.23	6.27	6.67	
QSCC	-0.51	-1.90	10.94	11.55	5.69	16.19
TC	-0.83	-1.76	8.35	8.91	4.01	7.44
ESC	-0.26	-0.62	5.34	5.33	2.77	4.47
ISC	-0.27	-0.41	3.30	3.31	1.69	3.23

PS	-0.67	-0.98	4.75	4.91	2.84	4.90
NPHA1_9	1.30	1.59	-0.89	-1.12	-0.27	-0.47
NFQC10_1	1.58	4.65	-2.44	-1.68	-0.45	-1.64
NMA21_24	0.60	1.02	-0.05	-0.11	0.24	-0.29
CNPR29_3	0.24	-0.19	-0.79	-0.70	-0.09	-0.25
SRA25_28	0.43	0.49	-0.31	-0.57	-0.30	-0.24
NPR	1.58	6.68	-4.38	-4.61	-0.31	-4.17

## Covariance Matrix

	TC	ESC	ISC	PS	NPHA1_9	NFQC10_1
TC	8.44					
ESC	4.17	6.02				
ISC	2.45	1.88	2.16			
PS	4.07	2.97	1.78	5.22		
NPHA1_9	-0.58	-0.25	-0.75	-0.84	35.13	
NFQC10_1	-1.56	-0.56	-1.09	-1.27	29.21	8.62
NMA21_24	0.00	-0.04	-0.23	-0.46	11.95	11.20
CNPR29_3	-0.55	-0.46	-0.24	-0.40	6.65	7.81
SRA25_28	-0.52	-0.45	-0.19	-0.78	10.38	10.20
NPR	-1.41	0.04	-0.24	-0.49	0.86	4.32

## Covariance Matrix

	NMA21_24	CNPR29_3	SRA25_28	NPR
NMA21_24	7.65			
CNPR29_3	2.87	3.74		
SRA25_28	4.77	3.21	7.77	
NPR	0.73	0.69	0.23	76.14

TI XX

Number of Iterations =202

LISREL Estimates (Maximum Likelihood)

## LAMBDA-Y

	IWS	CBI	CNCQS
PB1_6	- -	0.84	- -
WRB7_13	- -	0.10	- -
		(0.50)	
		0.20	
CRB14_19	- -	0.06	- -
		(0.28)	
		0.20	
PRS1_7	0.63	- -	- -
TR8_13	1.02	- -	- -
	(0.11)		
	9.67		
INT14_23	0.73	- -	- -
	(0.09)		
	8.26		
OP24_30	0.43	- -	- -
	(0.06)		
	6.74		
AUT31_38	0.89	- -	- -
	(0.10)		
	9.38		
MC	- -	- -	0.87

PC	--	--	0.91 (0.04) 25.10
EM	--	--	0.45 (0.03) 13.15
QSCC	--	--	0.87 (0.05) 17.45
TC	--	--	0.67 (0.03) 19.34
ESC	--	--	0.44 (0.03) 14.22
ISC	--	--	0.27 (0.02) 14.57
PS	--	--	0.42 (0.03) 14.74
LAMBDA-X			
	PES	NS	
NPHA1_9	5.54 (0.25) 22.52	--	
NFQC10_1	5.31 (0.27) 19.88	--	
NMA21_24	2.12 (0.12) 17.28	--	
CNPR29_3	1.43 (0.09) 15.95	--	
SRA25_28	2.27 (0.13) 16.90	--	
NPR	--	8.48 (0.33) 25.69	
BETA			
	IWS	CBI	CNCQS
	-----	-----	-----
IWS	--	--	--
CBI	0.11 (0.08) 1.32	--	--
CNCQS	-0.29 (0.07) -3.93	0.01 (0.03) 0.19	--
GAMMA			
	PES	NS	
	-----	-----	
IWS	0.02 (0.19) 0.10	0.75 (0.21) 3.56	

CBI	0.08	0.10
	(0.20)	(0.21)
	0.42	0.46
CNCQS	-0.26	-0.11
	(0.20)	(0.21)
	-1.30	-0.54

## Covariance Matrix of ETA and KSI

	IWS	CBI	CNCQS	PES	NS
IWS	11.21				
CBI	1.31	249.37			
CNCQS	-3.38	1.06	14.26		
PES	0.04	0.09	-0.27	1.00	
NS	0.75	0.18	-0.34	0.03	1.00

## PHI

	PES	NS
PES	1.00	
NS	0.03	1.00
	(0.05)	
	0.60	

## PSI

Note: This matrix is diagonal.

IWS	CBI	CNCQS
10.64	249.20	13.15
(2.14)	(1222.57)	(1.41)
4.97	0.20	9.34

## Squared Multiple Correlations for Structural Equations

IWS	CBI	CNCQS
0.08	0.06	0.12

## Squared Multiple Correlations for Reduced Form

IWS	CBI	CNCQS
0.07	0.05	0.10

## Reduced Form

	PES	NS
IWS	0.02	0.75
	(0.19)	(0.21)
	0.10	3.56
CBI	0.09	0.18
	(0.20)	(0.22)
	0.43	0.84
CNCQS	-0.26	-0.33
	(0.20)	(0.21)
	-1.30	-1.60

## THETA-EPS

	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
PB1_6	-152.62					
	(862.69)					
	-0.18					
WRB7_13	- -	28.65				
		(13.02)				
		2.20				
CRB14_19	- -	14.49	25.61			

					(7.39)	(4.46)			
					1.96	5.75			
PRS1_7	- -	- -	- -	- -	8.08				
					(0.81)				
					10.04				
TR8_13	- -	- -	- -	- -	0.76	9.81			
					(0.71)	(1.22)			
					1.07	8.07			
INT14_23	- -	- -	- -	- -	- -	4.22		(0.58)	
								7.24	
OP24_30	- -	- -	- -	- -	0.08	- -	1.58		
							(0.37)	(0.41)	
							0.22	3.84	
AUT31_38	- -	- -	- -	- -	2.58	- -	- -		
							(0.77)		
							3.37		

THETA-EPS		OP24_30	AUT31_38	MC	PC	EM	QSCC
		-----	-----	-----	-----	-----	-----
OP24_30		5.29					
		(0.48)					
		10.91					
AUT31_38		1.47	14.48				
		(0.53)	(1.32)				
		2.77	11.00				
MC		- -	- -	5.14			
				(0.47)			
				10.84			
PC		- -	- -	2.57	6.20		
				(0.42)	(0.55)		
				6.08	11.29		
EM		- -	- -	-0.50	- -	3.80	
				(0.22)		(0.30)	
				-2.28		12.84	
QSCC		- -	- -	- -	- -	- -	5.40
							(0.55)
							9.82
TC		- -	- -	- -	- -	- -	-0.83
							(0.27)
							-3.08
ESC		- -	- -	- -	- -	- -	-1.06
							(0.27)
							-3.88
ISC		- -	- -	- -	- -	- -	- -
PS		- -	- -	- -	- -	- -	- -

THETA-EPS		TC	ESC	ISC	PS
		-----	-----	-----	-----
TC		2.13			
		(0.23)			
		9.14			
ESC		- -	3.21		
			(0.26)		
			12.38		
ISC		- -	- -	1.15	
				(0.09)	
				12.79	
PS		- -	- -	- -	2.73



(0.21)  
12.75

Squared Multiple Correlations for Y - Variables

PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
7.54	0.08	0.03	0.35	0.55	0.59

Squared Multiple Correlations for Y - Variables

OP24_30	AUT31_38	MC	PC	EM	QSCC
0.28	0.38	0.68	0.66	0.43	0.67

Squared Multiple Correlations for Y - Variables

TC	ESC	ISC	PS
0.75	0.47	0.47	0.48

THETA-DELTA

	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
NPHA1_9	4.29 (1.03) 4.16					
NFQC10_1	- -	10.45 (1.10) 9.46				
NMA21_24	- -	- -	3.17 (0.25) 12.57			
CNPR29_3	-1.30 (0.29) -4.56	- -	- -	1.69 (0.15) 11.41		
SRA25_28	-2.31 (0.53) -4.32	-1.93 (0.51)	- -	- -	2.62 (0.35)	
NPR	- -	- -	- -	- -	7.56	4.22 (0.58) 7.24

Squared Multiple Correlations for X - Variables

NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
0.88	0.73	0.59	0.55	0.66	0.94

Goodness of Fit Statistics

Degrees of Freedom = 187

Minimum Fit Function Chi-Square = 267.98 (P = 0.00)

Normal Theory Weighted Least Squares Chi-Square = 266.78 (P=0.00011)

Estimated Non-centrality Parameter (NCP) = 79.78

90 Percent Confidence Interval for NCP = (40.44 ; 127.14)

Minimum Fit Function Value = 0.72

Population Discrepancy Function Value (F0) = 0.21

90 Percent Confidence Interval for F0 = (0.11 ; 0.34)

Root Mean Square Error of Approximation (RMSEA) = 0.034

90 Percent Confidence Interval for RMSEA = (0.024; 0.043)

P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00

Expected Cross-Validation Index (ECVI) = 1.07

90 Percent Confidence Interval for ECVI = (0.96 ; 1.19)

ECVI for Saturated Model = 1.35

ECVI for Independence Model = 18.22  
 Chi-Square for Independence Model with 231 Degrees of Freedom=6770.69  
 Independence AIC = 6814.69  
 Model AIC = 398.78  
 Saturated AIC = 506.00  
 Independence CAIC = 6923.08  
 Model CAIC = 723.96  
 Saturated CAIC = 1752.51  
 Normed Fit Index (NFI) = 0.96  
 Non-Normed Fit Index (NNFI) = 0.98  
 Parsimony Normed Fit Index (PNFI) = 0.78  
 Comparative Fit Index (CFI) = 0.99  
 Incremental Fit Index (IFI) = 0.99  
 Relative Fit Index (RFI) = 0.95  
 Critical N (CN) = 328.84  
 Root Mean Square Residual (RMR) = 0.85  
 Standardized RMR = 0.042  
 Goodness of Fit Index (GFI) = 0.94  
 Adjusted Goodness of Fit Index (AGFI) = 0.92  
 Parsimony Goodness of Fit Index (PGFI) = 0.69

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Modification Indices and Expected Change

Modification Indices for LAMBDA-Y			
	IWS	CBI	CNCQS
	-----	-----	-----
PB1_6	0.00	- -	0.01
WRB7_13	0.54	- -	0.28
CRB14_19	1.07	- -	0.50
PRS1_7	- -	0.26	1.99
TR8_13	- -	0.60	8.05
INT14_23	- -	0.78	6.73
OP24_30	- -	0.18	0.00
AUT31_38	- -	1.25	1.41
MC	1.75	0.30	- -
PC	0.06	0.53	- -
EM	0.01	0.06	- -
QSCC	0.01	0.39	- -
TC	0.68	1.20	- -
ESC	1.19	0.74	- -
ISC	0.31	0.58	- -
PS	1.80	0.04	- -

Expected Change for LAMBDA-Y			
	IWS	CBI	CNCQS
	-----	-----	-----
PB1_6	0.05	- -	-0.06
WRB7_13	-0.07	- -	0.04
CRB14_19	0.08	- -	-0.04
PRS1_7	- -	0.00	-0.06
TR8_13	- -	0.00	-0.16
INT14_23	- -	0.00	0.09
OP24_30	- -	0.00	0.00
AUT31_38	- -	0.00	0.07
MC	-0.05	0.00	- -
PC	0.01	0.00	- -
EM	0.00	0.00	- -

QSCC	0.00	0.00	- -
TC	-0.03	0.00	- -
ESC	0.04	0.00	- -
ISC	0.01	0.00	- -
PS	0.04	0.00	- -

## Standardized Expected Change for LAMBDA-Y

	IWS	CBI	CNCQS
PB1_6	0.15	- -	-0.25
WRB7_13	-0.22	- -	0.14
CRB14_19	0.26	- -	-0.16
PRS1_7	- -	0.02	-0.23
TR8_13	- -	-0.04	-0.62
INT14_23	- -	0.03	0.36
OP24_30	- -	0.01	0.01
AUT31_38	- -	-0.05	0.26
MC	-0.17	-0.01	- -
PC	0.03	0.02	- -
EM	0.01	0.01	- -
QSCC	0.01	-0.02	- -
TC	-0.09	0.02	- -
ESC	0.13	-0.02	- -
ISC	0.04	-0.01	- -
PS	0.14	0.00	- -

## Completely Standardized Expected Change for LAMBDA-Y

	IWS	CBI	CNCQS
PB1_6	0.03	- -	-0.05
WRB7_13	-0.04	- -	0.02
CRB14_19	0.05	- -	-0.03
PRS1_7	- -	0.01	-0.06
TR8_13	- -	-0.01	-0.13
INT14_23	- -	0.01	0.11
OP24_30	- -	0.00	0.00
AUT31_38	- -	-0.01	0.05
MC	-0.04	0.00	- -
PC	0.01	0.00	- -
EM	0.00	0.00	- -
QSCC	0.00	-0.01	- -
TC	-0.03	0.01	- -
ESC	0.05	-0.01	- -
ISC	0.03	-0.01	- -
PS	0.06	0.00	- -

## Modification Indices for LAMBDA-X

	PES	NS
NPHA1_9	- -	2.31
NFQC10_1	- -	3.90
NMA21_24	- -	0.04
CNPR29_3	- -	0.00
SRA25_28	- -	0.41
NPR	- -	- -

## Expected Change for LAMBDA-X

	PES	NS
NPHA1_9	- -	-0.27
NFQC10_1	- -	0.37
NMA21_24	- -	0.02

CNPR29_3	--	0.00
SRA25_28	--	-0.07
NPR	--	--

## Standardized Expected Change for LAMBDA-X

	PES	NS
NPHA1_9	--	-0.27
NFQC10_1	--	0.37
NMA21_24	--	0.02
CNPR29_3	--	0.00
SRA25_28	--	-0.07
NPR	--	--

## Completely Standardized Expected Change for LAMBDA-X

	PES	NS
NPHA1_9	--	-0.05
NFQC10_1	--	0.06
NMA21_24	--	0.01
CNPR29_3	--	0.00
SRA25_28	--	-0.02
NPR	--	--

## Modification Indices for THETA-EPS

	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
PB1_6	--	--	--	--	--	--
WRB7_13	--	--	--	--	--	--
CRB14_19	--	--	--	--	--	--
PRS1_7	0.23	0.04	0.28	--	--	--
TR8_13	0.39	0.57	0.05	--	--	--
INT14_23	0.63	0.56	3.68	0.22	0.08	--
OP24_30	0.21	0.15	5.57	--	0.00	--
AUT31_38	1.41	1.31	0.21	--	20.42	23.72
MC	0.19	0.08	0.26	1.53	1.18	0.18
PC	0.46	0.20	0.56	0.00	1.76	3.31
EM	0.02	0.63	0.01	0.15	0.08	2.08
QSCC	0.45	0.13	1.74	2.68	0.78	0.40
TC	1.32	0.44	2.01	0.95	0.43	0.01
ESC	0.83	0.55	0.48	2.06	2.47	1.03
ISC	0.51	0.00	0.09	0.03	0.00	0.04
PS	0.03	0.43	2.08	0.85	3.85	0.01

## Modification Indices for THETA-EPS

	OP24_30	AUT31_38	MC	PC	EM	QSCC
OP24_30	--	--	--	--	--	--
AUT31_38	--	--	--	--	--	--
MC	0.36	1.26	--	--	--	--
PC	0.01	0.31	--	--	--	--
EM	0.09	1.76	--	4.12	--	--
QSCC	2.44	0.94	0.16	0.34	0.01	--
TC	0.01	0.18	0.05	3.65	5.31	--
ESC	1.05	1.05	0.02	3.35	0.16	--
ISC	0.05	0.63	0.41	2.03	0.01	0.25
PS	2.95	0.45	1.46	3.42	0.98	1.04

## Expected Change for THETA-EPS

	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
PB1_6	- -					
WRB7_13	- -	- -				
CRB14_19	- -	- -	- -			
PRS1_7	0.20	0.09	-0.33	- -		
TR8_13	-0.36	-0.46	0.18	- -	- -	
INT14_23	0.28	-0.29	0.95	-0.49	-0.36	- -
OP24_30	0.15	0.14	-1.11	- -	0.07	- -
AUT31_38	-0.68	0.72	0.38	- -	-7.72	5.59
MC	-0.14	-0.10	-0.23	0.37	-0.42	0.10
PC	0.23	-0.17	0.37	0.01	-0.55	0.47
EM	0.04	0.26	-0.04	0.11	0.10	-0.33
QSCC	-0.27	0.16	0.76	-0.63	-0.43	0.19
TC	0.30	-0.19	-0.54	-0.24	-0.21	-0.02
ESC	-0.26	0.23	0.29	-0.39	0.54	-0.22
ISC	-0.12	0.00	0.07	0.03	0.00	-0.03
PS	0.04	0.19	-0.54	0.23	0.62	0.02

## Expected Change for THETA-EPS

	OP24_30	AUT31_38	MC	PC	EM	QSCC
OP24_30	- -					
AUT31_38	- -	- -				
MC	-0.14	-0.46	- -			
PC	0.03	-0.25	- -	- -		
EM	-0.07	0.52	- -	0.60	- -	
QSCC	0.45	0.50	0.13	0.21	0.03	- -
TC	0.02	0.14	-0.05	0.44	-0.47	- -
ESC	0.21	0.38	0.03	-0.42	-0.08	- -
ISC	-0.03	0.17	0.08	-0.19	-0.01	-0.09
PS	-0.32	-0.22	-0.23	-0.38	0.18	-0.27

## Completely Standardized Expected Change for THETA-EPS

	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
PB1_6	- -					
WRB7_13	- -	- -				
CRB14_19	- -	- -	- -			
PRS1_7	0.01	0.00	-0.02	- -		
TR8_13	-0.02	-0.02	0.01	- -	- -	
INT14_23	0.02	-0.02	0.06	-0.04	-0.02	- -
OP24_30	0.01	0.01	-0.08	- -	0.01	- -
AUT31_38	-0.03	0.03	0.02	- -	-0.34	0.36
MC	-0.01	0.00	-0.01	0.03	-0.02	0.01
PC	0.01	-0.01	0.02	0.00	-0.03	0.03
EM	0.00	0.02	0.00	0.01	0.01	-0.04
QSCC	-0.01	0.01	0.04	-0.04	-0.02	0.02
TC	0.02	-0.01	-0.04	-0.02	-0.02	0.00
ESC	-0.02	0.02	0.02	-0.05	0.05	-0.03
ISC	-0.02	0.00	0.01	0.01	0.00	-0.01
PS	0.00	0.01	-0.05	0.03	0.06	0.00

## Completely Standardized Expected Change for THETA-EPS

	OP24_30	AUT31_38	MC	PC	EM	QSCC
OP24_30	- -					
AUT31_38	- -	- -				
MC	-0.01	-0.02	- -			

PC	0.00	-0.01	- -	- -		
EM	-0.01	0.04	- -	0.05	- -	
QSCC	0.04	0.03	0.01	0.01	0.00	- -
TC	0.00	0.01	0.00	0.04	-0.06	- -
ESC	0.03	0.03	0.00	-0.04	-0.01	- -
ISC	-0.01	0.02	0.01	-0.03	0.00	-0.01
PS	-0.05	-0.02	-0.03	-0.04	0.03	-0.03
Modification Indices for THETA-DELTA-EPS						
	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
	-----	-----	-----	-----	-----	-----
NPHA1_9	0.33	0.02	1.72	1.23	0.04	0.05
NFQC10_1	0.16	0.09	1.89	3.40	2.15	0.77
NMA21_24	0.19	0.30	3.46	1.51	0.25	0.67
CNPR29_3	0.67	0.42	0.06	0.87	0.12	0.01
SRA25_28	2.94	1.64	0.01	0.22	0.30	0.00
NPR	0.68	0.86	0.15	1.59	22.84	15.20
Modification Indices for THETA-DELTA-EPS						
	OP24_30	AUT31_38	MC	PC	EM	QSCC
	-----	-----	-----	-----	-----	-----
NPHA1_9	1.53	1.41	0.59	1.55	0.80	0.83
NFQC10_1	1.14	5.39	2.90	2.94	0.14	0.21
NMA21_24	0.81	2.96	0.46	0.02	2.16	2.11
CNPR29_3	0.33	8.15	1.11	0.05	0.58	1.40
SRA25_28	0.02	0.03	2.14	0.16	0.83	0.42
NPR	0.05	0.92	0.70	1.48	1.02	1.81
Modification Indices for THETA-DELTA-EPS						
	TC	ESC	ISC	PS		
	-----	-----	-----	-----		
NPHA1_9	0.42	0.03	0.46	0.19		
NFQC10_1	0.41	1.48	0.45	0.10		
NMA21_24	1.07	0.00	0.19	0.83		
CNPR29_3	0.54	1.47	0.05	0.35		
SRA25_28	0.19	0.36	1.29	3.44		
NPR	0.55	1.65	1.25	0.66		
Expected Change for THETA-DELTA-EPS						
	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
	-----	-----	-----	-----	-----	-----
NPHA1_9	0.28	0.08	-0.91	-0.51	-0.12	-0.08
NFQC10_1	0.21	-0.17	1.05	0.94	0.94	-0.35
NMA21_24	-0.12	0.16	-0.73	-0.32	-0.17	-0.17
CNPR29_3	0.17	-0.15	0.07	0.19	-0.09	-0.02
SRA25_28	-0.51	0.42	0.04	0.13	-0.20	-0.02
NPR	15.76	-1.84	0.72	-1.60	8.10	-4.19
Expected Change for THETA-DELTA-EPS						
	OP24_30	AUT31_38	MC	PC	EM	QSCC
	-----	-----	-----	-----	-----	-----
NPHA1_9	0.43	-0.73	0.26	-0.46	-0.29	0.39
NFQC10_1	-0.41	1.58	-0.64	0.69	0.13	-0.21
NMA21_24	0.18	0.60	0.13	0.03	0.27	-0.35
CNPR29_3	0.09	-0.77	-0.16	-0.04	0.11	0.22
SRA25_28	0.03	0.06	0.31	-0.09	-0.18	0.17
NPR	-0.22	1.64	-0.77	-1.22	0.89	-1.60
Expected Change for THETA-DELTA-EPS						
	TC	ESC	ISC	PS		
	-----	-----	-----	-----		
NPHA1_9	0.18	0.05	-0.12	0.12		
NFQC10_1	-0.20	0.41	-0.13	0.10		
NMA21_24	0.16	0.01	-0.04	-0.14		

CNPR29_3	-0.09	-0.16	0.02	0.07		
SRA25_28	-0.08	-0.11	0.13	-0.32		
NPR	0.57	1.07	0.55	0.61		
Completely Standardized Expected Change for THETA-DELTA-EPS						
	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
	-----	-----	-----	-----	-----	-----
NPHA1_9	0.01	0.00	-0.03	-0.02	0.00	0.00
NFQC10_1	0.01	0.00	0.03	0.04	0.03	-0.02
NMA21_24	-0.01	0.01	-0.05	-0.03	-0.01	-0.02
CNPR29_3	0.02	-0.01	0.01	0.03	-0.01	0.00
SRA25_28	-0.04	0.03	0.00	0.01	-0.02	0.00
NPR	0.37	-0.04	0.02	-0.05	0.20	-0.15
Completely Standardized Expected Change for THETA-DELTA-EPS						
	OP24_30	AUT31_38	MC	PC	EM	QSCC
	-----	-----	-----	-----	-----	-----
NPHA1_9	0.03	-0.03	0.01	-0.02	-0.02	0.02
NFQC10_1	-0.02	0.05	-0.03	0.03	0.01	-0.01
NMA21_24	0.02	0.05	0.01	0.00	0.04	-0.03
CNPR29_3	0.02	-0.08	-0.02	0.00	0.02	0.03
SRA25_28	0.00	0.00	0.03	-0.01	-0.03	0.02
NPR	-0.01	0.04	-0.02	-0.03	0.04	-0.05
Completely Standardized Expected Change for THETA-DELTA-EPS						
	TC	ESC	ISC	PS		
	-----	-----	-----	-----		
NPHA1_9	0.01	0.00	-0.01	0.01		
NFQC10_1	-0.01	0.03	-0.01	0.01		
NMA21_24	0.02	0.00	-0.01	-0.02		
CNPR29_3	-0.02	-0.03	0.01	0.02		
SRA25_28	-0.01	-0.02	0.03	-0.05		
NPR	0.02	0.05	0.04	0.03		
Modification Indices for THETA-DELTA						
	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
	-----	-----	-----	-----	-----	-----
NPHA1_9	- -	- -	- -	- -	- -	- -
NFQC10_1	2.77	- -	- -	- -	- -	- -
NMA21_24	3.31	0.04	- -	- -	- -	- -
CNPR29_3	- -	1.98	2.83	- -	- -	- -
SRA25_28	- -	- -	0.02	0.00	- -	- -
NPR	1.30	1.45	0.14	0.07	0.30	- -
Expected Change for THETA-DELTA						
	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
	-----	-----	-----	-----	-----	-----
NPHA1_9	- -	- -	- -	- -	- -	- -
NFQC10_1	-2.88	- -	- -	- -	- -	- -
NMA21_24	1.25	-0.14	- -	- -	- -	- -
CNPR29_3	- -	0.55	-0.30	- -	- -	- -
SRA25_28	- -	- -	0.05	-0.01	- -	- -
NPR	-1.66	1.86	0.30	0.16	-0.49	- -
Completely Standardized Expected Change for THETA-DELTA						
	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
	-----	-----	-----	-----	-----	-----
NPHA1_9	- -	- -	- -	- -	- -	- -
NFQC10_1	-0.08	- -	- -	- -	- -	- -
NMA21_24	0.08	-0.01	- -	- -	- -	- -
CNPR29_3	- -	0.05	-0.06	- -	- -	- -
SRA25_28	- -	- -	0.01	0.00	- -	- -
NPR	-0.03	0.03	0.01	0.01	-0.02	- -

TI XX

Covariances

	Y - ETA					
	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
	-----	-----	-----	-----	-----	-----
IWS	1.10	0.13	0.08	7.06	11.49	8.22
CBI	209.47	25.58	14.37	0.83	1.35	0.96
CNCQS	0.89	0.11	0.06	-2.13	-3.47	-2.48
	Y - ETA					
	OP24_30	AUT31_38	MC	PC	EM	QSCC
	-----	-----	-----	-----	-----	-----
IWS	4.84	10.02	-2.94	-3.09	-1.52	-2.95
CBI	0.57	1.17	0.92	0.97	0.47	0.92
CNCQS	-1.46	-3.02	12.40	13.02	6.39	12.41
	Y - ETA					
	TC	ESC	ISC	PS		
	-----	-----	-----	-----		
IWS	-2.25	-1.50	-0.90	-1.41		
CBI	0.70	0.47	0.28	0.44		
CNCQS	9.48	6.33	3.80	5.95		
	Y - KSI					
	PB1_6	WRB7_13	CRB14_19	PRS1_7	TR8_13	INT14_23
	-----	-----	-----	-----	-----	-----
PES	0.08	0.01	0.01	0.03	0.04	0.03
NS	0.15	0.02	0.01	0.47	0.77	0.55
	Y - KSI					
	OP24_30	AUT31_38	MC	PC	EM	QSCC
	-----	-----	-----	-----	-----	-----
PES	0.02	0.04	-0.24	-0.25	-0.12	-0.24
NS	0.32	0.67	-0.30	-0.31	-0.15	-0.30
	Y - KSI					
	TC	ESC	ISC	PS		
	-----	-----	-----	-----		
PES	-0.18	-0.12	-0.07	-0.11		
NS	-0.23	-0.15	-0.09	-0.14		
	X - ETA					
	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
	-----	-----	-----	-----	-----	-----
IWS	0.24	0.23	0.09	0.06	0.10	6.38
CBI	0.51	0.49	0.19	0.13	0.21	1.55
CNCQS	-1.51	-1.45	-0.58	-0.39	-0.62	-2.89
	X - KSI					
	NPHA1_9	NFQC10_1	NMA21_24	CNPR29_3	SRA25_28	NPR
	-----	-----	-----	-----	-----	-----
PES	5.54	5.31	2.12	1.43	2.27	0.27
NS	0.18	0.17	0.07	0.05	0.07	8.48

TI XX

Standardized Solution

	LAMBDA-Y		
	IWS	CBI	CNCQS
	-----	-----	-----
PB1_6	- -	13.26	- -
WRB7_13	- -	1.62	- -
CRB14_19	- -	0.91	- -
PRS1_7	2.11	- -	- -
TR8_13	3.43	- -	- -
INT14_23	2.45	- -	- -
OP24_30	1.45	- -	- -



AUT31_38	2.99	- -	- -
MC	- -	- -	3.28
PC	- -	- -	3.45
EM	- -	- -	1.69
QSCC	- -	- -	3.29
TC	- -	- -	2.51
ESC	- -	- -	1.68
ISC	- -	- -	1.01
PS	- -	- -	1.58

## LAMBDA-X

PES	NS
-----	----

NPHA1_9	5.54	- -
NFQC10_1	5.31	- -
NMA21_24	2.12	- -
CNPR29_3	1.43	- -
SRA25_28	2.27	- -
NPR	- -	8.48

## BETA

IWS	CBI	CNCQS
-----	-----	-------

IWS	- -	- -	- -
CBI	0.02	- -	- -
CNCQS	-0.26	0.02	- -

## GAMMA

PES	NS
-----	----

IWS	0.01	0.22
CBI	0.01	0.01
CNCQS	-0.07	-0.03

## Correlation Matrix of ETA and KSI

IWS	CBI	CNCQS	PES	NS
-----	-----	-------	-----	----

IWS	1.00				
CBI	0.02	1.00			
CNCQS	-0.27	0.02	1.00		
PES	0.01	0.01	-0.07	1.00	
NS	0.22	0.01	-0.09	0.03	1.00

## PSI

Note: This matrix is diagonal.

IWS	CBI	CNCQS
-----	-----	-------

0.95	1.00	0.92
------	------	------

## Regression Matrix ETA on KSI (Standardized)

PES	NS
-----	----

IWS	0.01	0.22
CBI	0.01	0.01
CNCQS	-0.07	-0.09

## TI XX

Completely Standardized Solution

## LAMBDA-Y

IWS	CBI	CNCQS
-----	-----	-------

PB1_6	- -	2.75	- -
WRB7_13	- -	0.29	- -
CRB14_19	- -	0.18	- -
PRS1_7	0.60	- -	- -

TR8_13	0.74	--	--
INT14_23	0.77	--	--
OP24_30	0.53	--	--
AUT31_38	0.62	--	--
MC	--	--	0.82
PC	--	--	0.81
EM	--	--	0.66
QSCC	--	--	0.82
TC	--	--	0.86
ESC	--	--	0.68
ISC	--	--	0.68
PS	--	--	0.69

## LAMBDA-X

PES NS

NPHA1_9	0.94	--
NFQC10_1	0.85	--
NMA21_24	0.77	--
CNPR29_3	0.74	--
SRA25_28	0.81	--
NPR	--	0.97

## BETA

IWS CBI CNCQS

IWS	--	--	--
CBI	0.02	--	--
CNCQS	-0.26	0.02	--

## GAMMA

PES NS

IWS	0.01	0.22
CBI	0.01	0.01
CNCQS	-0.07	-0.03

## Correlation Matrix of ETA and KSI

IWS CBI CNCQS PES NS

IWS	1.00				
CBI	0.02	1.00			
CNCQS	-0.27	0.02	1.00		
PES	0.01	0.01	-0.07	1.00	
NS	0.22	0.01	-0.09	0.03	1.00

## PSI

Note: This matrix is diagonal.

IWS CBI CNCQS

0.95 1.00 0.92

## Regression Matrix ETA on KSI (Standardized)

PES NS

IWS	0.01	0.22
CBI	0.01	0.01
CNCQS	-0.07	-0.09

## TI XX

Total and Indirect Effects

Total Effects of KSI on ETA

PES NS

IWS	0.02	0.75
-----	------	------

	(0.19)	(0.21)	
	0.10	3.56	
CBI	0.09	0.18	
	(0.20)	(0.22)	
	0.43	0.84	
CNCQS	-0.26	-0.33	
	(0.20)	(0.21)	
	-1.30	-1.60	
Indirect Effects of KSI on ETA			
	PES	NS	
	-----	-----	
IWS	- -	- -	
CBI	0.00	0.08	
	(0.02)	(0.07)	
	0.10	1.25	
CNCQS	-0.01	-0.22	
	(0.06)	(0.08)	
	-0.09	-2.79	
Total Effects of ETA on ETA			
	IWS	CBI	CNCQS
	-----	-----	-----
IWS	- -	- -	- -
CBI	0.11	- -	- -
	(0.08)		
	1.32		
CNCQS	-0.29	0.01	- -
	(0.07)	(0.03)	
	-3.93	0.19	
Largest Eigenvalue of B*B' (Stability Index) is 0.099			
Indirect Effects of ETA on ETA			
	IWS	CBI	CNCQS
	-----	-----	-----
IWS	- -	- -	- -
CBI	- -	- -	- -
CNCQS	0.00	- -	- -
	(0.00)		
	0.17		
Total Effects of ETA on Y			
	IWS	CBI	CNCQS
	-----	-----	-----
PB1_6	0.09	0.84	- -
	(0.07)		
	1.32		
WRB7_13	0.01	0.10	- -
	(0.06)	(0.50)	
	0.19	0.20	
CRB14_19	0.01	0.06	- -
	(0.03)	(0.28)	
	0.19	0.20	
PRS1_7	0.63	- -	- -
TR8_13	1.02	- -	- -
	(0.11)		
	9.67		
INT14_23	0.73	- -	- -
	(0.09)		
	8.26		
OP24_30	0.43	- -	- -
	(0.06)		

	6.74		
AUT31_38	0.89	--	--
	(0.10)		
	9.38		
MC	-0.26	0.01	0.87
	(0.06)	(0.03)	
	-3.93	0.19	
PC	-0.27	0.01	0.91
	(0.07)	(0.03)	(0.04)
	-3.92	0.19	25.10
EM	-0.13	0.00	0.45
	(0.03)	(0.01)	(0.03)
	-3.86	0.19	13.15
QSCC	-0.26	0.01	0.87
	(0.07)	(0.03)	(0.05)
	-3.92	0.19	17.45
TC	-0.20	0.00	0.67
	(0.05)	(0.02)	(0.03)
	-3.94	0.19	19.34
ESC	-0.13	0.00	0.44
(0.03)	(0.01)	(0.03)	
	-3.87	0.19	14.22
ISC	-0.08	0.00	0.27
	(0.02)	(0.01)	(0.02)
	-3.87	0.19	14.57
PS	-0.12	0.00	0.42
	(0.03)	(0.01)	(0.03)
	-3.88	0.19	14.74
Indirect Effects of ETA on Y			
	IWS	CBI	CNCQS
	-----	-----	-----
PB1_6	0.09		
	(0.07)		
	1.32		
WRB7_13	0.01		
	(0.06)		
	0.19		
CRB14_19	0.01	--	--
	(0.03)		
	0.19		
PRS1_7	--	--	--
TR8_13	--	--	--
INT14_23	--	--	--
OP24_30	--	--	--
AUT31_38	--	--	--
MC	-0.26	0.01	--
	(0.06)	(0.03)	
	-3.93	0.19	
PC	-0.27	0.01	--
	(0.07)	(0.03)	
	-3.92	0.19	
EM	-0.13	0.00	--
	(0.03)	(0.01)	
	-3.86	0.19	
QSCC	-0.26	0.01	--
	(0.07)	(0.03)	
	-3.92	0.19	
TC	-0.20	0.00	--

	(0.05)	(0.02)		
	-3.94	0.19		
ESC	-0.13	0.00	-	-
	(0.03)	(0.01)		
	-3.87	0.19		
ISC	-0.08	0.00	-	-
	(0.02)	(0.01)		
	-3.87	0.19		
PS	-0.12	0.00	-	-
	(0.03)	(0.01)		
	-3.88	0.19		
Total Effects of KSI on Y				
	PES	NS		
	-----	-----		
PB1_6	0.07	0.15		
	(0.17)	(0.18)		
	0.43	0.84		
WRB7_13	0.01	0.02		
	(0.05)	(0.10)		
	0.17	0.18		
CRB14_19	0.00	0.01		
	(0.03)	(0.06)		
	0.17	0.18		
PRS1_7	0.01	0.47		
	(0.12)	(0.13)		
	0.10	3.56		
TR8_13	0.02	0.77		
	(0.20)	(0.21)		
	0.10	3.67		
INT14_23	0.01	0.55		
	(0.14)	(0.15)		
	0.10	3.69		
OP24_30	0.01	0.32		
	(0.08)	(0.09)		
	0.10	3.50		
AUT31_38	0.02	0.67		
	(0.17)	(0.19)		
	0.10	3.62		
MC	-0.23	-0.29		
	(0.18)	(0.18)		
	-1.30	-1.60		
PC	-0.24	-0.30		
	(0.18)	(0.19)		
	-1.30	-1.60		
EM	-0.12	-0.15		
	(0.09)	(0.09)		
	-1.29	-1.60		
QSCC	-0.23	-0.29		
	(0.18)	(0.18)		
	-1.30	-1.60		
TC	-0.17	-0.22		
	(0.13)	(0.14)		
	-1.30	-1.60		
ESC	-0.12	-0.15		
	(0.09)	(0.09)		
	-1.29	-1.60		
ISC	-0.07	-0.09		
	(0.05)	(0.06)		

	-1.29	-1.60
PS	-0.11	-0.14
	(0.08)	(0.09)
	-1.29	-1.60

TI XX

## Standardized Total and Indirect Effects

## Standardized Total Effects of KSI on ETA

	PES	NS
IWS	0.01	0.22
CBI	0.01	0.01
CNCQS	-0.07	-0.09

## Standardized Indirect Effects of KSI on ETA

	PES	NS
IWS	- -	- -
CBI	0.00	0.01
CNCQS	0.00	-0.06

## Standardized Total Effects of ETA on ETA

	IWS	CBI	CNCQS
IWS	- -	- -	- -
CBI	0.02	- -	- -
CNCQS	-0.26	0.02	- -

## Standardized Indirect Effects of ETA on ETA

	IWS	CBI	CNCQS
IWS	- -	- -	- -
CBI	- -	- -	- -
CNCQS	0.00	- -	- -

Time used: 1.156 Seconds

## VITA

Virya Koy is the Chief Bureau of Nursing and Midwifery, Ministry of Health, and also Vice President of Chenla University. Mr. Koy is a nurse anesthetist. He graduated Master of Nursing Administration in 2011. Virya had done for second Master of Health Professions Education in University of Philippines, Manila. He is currently working on his PhD candidate in Chulalongkorn University in Bangkok, Thailand. Mr. Koy lead the development of the Cambodian Council of Nurses, which was approved by the King of the Kingdom of Cambodia in 2007. Mr. Koy led the group to develop the Code of Ethics, which was approved by the Prime Ministry in 2014. Virya also led the working group to develop Scope of Practice and Standard of Care for Cambodian Nurses; anticipated approval is the middle of 2015. Mr Koy Virya was worked with Ms. Kyoko Koto a senior advisor in nursing management from JICA to develop nursing regulation, worked with Ms. Alyson Smith is under USAID-ASISST Project to strengthen health professional councils regulation and registration system amount five councils (medical, dental, midwifery, nursing, and pharmaceutical council)

Mr Koy has been nominated by Minister of Health to be representative of Cambodian nurses and midwives for ASEAN Join Coordinating Committee on Nursing in 2010. He has been nominated by WHO Regional Director Mr. Shing Young-Soo, MD, PhD, as Cambodian Chief Nursing Officers or Nursing Focal Persons, or Human Resources for Health Focal Persons. Virya has been invited to be speaker national and international events. Mr. Koy is a Asia Pacific Emergency Disaster Network Members (The WHO Collaborating Centre for Nursing and Midwifery Education and Research Capacity Building in the School of Nursing, Midwifery and Nutrition at James Cook University, Australia).