CHAPTER 4

FINDINGS AND DISCUSSION

The purposes of this study were to describe the nurses' work environment, nurse staffing levels, nurse outcomes including job satisfaction of nurses and nurse burnout, and patient outcome including quality of nursing care and to assess the predictive ability of the nurses' work environment and nurse staffing levels for nurse outcomes and patient outcome in public hospitals in Thailand. This chapter presents the findings of the study and their interpretation. The findings include characteristics of the sample followed by the findings of each of the research questions. Finally, a discussion is included in the last part of this chapter.

Findings

Characteristics of the Sample

The sample in this study were derived from the 2007 Thai Nurse dataset (Aungsuroch & Wanant, 2007). From that dataset, 39 hospitals was used in this study. The characteristics of sample hospitals are presented in Table 1. The majority of sample hospitals were general hospitals and sample hospitals were drawn equally from twelve public health regions.

The characteristics of sample nurses in this study are presented in Table 2. The average age of sample nurses was 34 years. Sample nurses had nearly 8 years of nursing experiences and 6 years of experiences in their current hospital position. The

majority of sample nurse were female. Almost 96% of the highest degree was baccalaureate degree or equivalent in nursing. Nearly seventy-four percent of the nurses had dependents or relatives living with them. Employment status was predominantly full-time (99%). Approximately half of the nurses worked in regional hospitals (57.71%), and the nurses were drawn equally from twelve public health regions.

Table 1

Characteristics of sample hospitals (n=39)

Characteristic	Frequency (%)
Type of hospitals	
Regional hospitals	13 (33.33)
General hospitals	26 (66.67)
Hospitals in each Public Health Regions	
Region 1	3 (7.69)
Region 2	4 (10.26)
Region 3	3 (7.69)
Region 4	4 (10.26)
Region 5	2 (5.13)
Region 6	3 (7.69)
Region 7	3 (7.69)
Region 8	3 (7.69)
Region 9	3 (7.69)
Region 10	3 (7.69)
Region 11	4 (10.26)
Region 12	4 (10.26)

Note. Provinces in each public health region was displayed in appendix A

Table 2

Characteristics of sample nurses (n=5,247)

Characteristic	Mean	SD	Range	Frequency (%)
Age (years)	33.57	6.51	22-58	
Years as RN	8.43	5.96	1-33	
Years as RN on current unit	6.12	4.69	1-29	
Gender				
Male				92 (1.75)
Female				5,141 (97.98)
The highest degree				
Bachelor's degree or equivalent in nursing				5,019 (95.65)
Master's degree in nursing				140 (2.67)
Master's degree in others fields				86 (1.64)
Dependent or relative live with				
Yes				3,866 (73.68)
No				1,360 (25.92)
Employment status				
Full-time				5,211 (99.31)
Part-time				36 (0.69)
Working hospitals				
Regional hospitals				3,028 (57.71)
General hospitals				2,219 (42.29)
Settings				
Region 1				459 (8.75)
Region 2				545 (10.39)
Region 3				508 (9.68)
Region 4				419 (7.99)
Region 5				311 (5.93)
Region 6				353 (6.73)
Region 7				484 (9.22)
Region 8				450 (8.58)
Region 9				335 (6.38)
Region 10				481 (9.17)
Region 11				477 (9.09)
Region 12				425 (8.10)

Note. Total may not equal 5,247 due to missing data. Provinces in each public health region was displayed in appendix A.

Findings of Research Questions

Research question 1. What are the levels of nurses' work environment, nurse staffing levels, job satisfaction of nurses, nurse burnout, and quality of nursing care in public hospitals in Thailand?

The mean, and standard deviation of nurses' work environment subscales and items in study hospitals are shown in Table 3. The nurses' work environment averaged 2.87 on a 4-point scale. Study hospitals demonstrated the highest mean score on collegial nurse-physician relationship subscale and lowest mean score on staffing and resource adequate subscale. The mean score of nurse participation in hospital affairs subscale, nurse foundation for quality of care subscale, nurse manager ability, leadership, and support of nurse subscale, staffing and resource adequacy subscale, and collegial nurse-physician relationship subscales were 2.81, 2.94, 2.80, 2.70, and 3.09, respectively. Study hospitals had highest means on "Staff nurses have the opportunity to serve on hospital/ organization and nursing committees" items and lowest means on "A chief nursing officer is equal in power and authority to other top level hospital/organization executives" items on the nurse participation in hospital affairs subscale. They had highest means on "High standards of nursing care are expected by the administration" items with lowest means on "Working with nurses who are clinically competent" items on the nurse foundation for quality of care subscale. They had highest means on "A supervisory staff that is supportive of nurses" items and lowest means on "A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician" items on the nurse manager ability, leadership, and support of nurse subscale. They had highest means

on “Enough time and opportunity to discuss patient care problems with other nurses” items and lowest means on “Enough registered nurses on staff to provide quality patient care” items on the Staffing and resource adequate subscale. Additionally, they had highest means on “Collaboration between nurses and physicians” items and lowest means on “A lot of teamwork between nurses and physicians” items on the Collegial Nurse-Physician Relationship subscale.

Table 3

Mean and standard deviation of nurses' work environment in study hospitals (n=39)

Nurses' work environment	Mean	SD
Nurse participation in hospital affairs subscale	**2.81**	**0.10**
Staff nurses have the opportunity to serve on hospital/ organization and nursing committees	3.23	0.14
A chief nursing officer who is highly visible and accessible to staff	3.12	0.13
Staff nurses are involved in the internal governance of the hospital/organization (e.g., practice and policy committees)	3.07	0.12
Nurse Managers consult with staff on daily problems and procedures	2.95	0.17
Career development/ clinical ladder opportunity	2.84	0.18
Administration that listens and responds to employee concerns	2.69	0.15
Opportunity for staff nurses to participate in policy decision	2.66	0.18
Opportunities for advancement	2.47	0.14
A chief nursing officer is equal in power and authority to other top level hospital/organization executives	2.34	0.17
Nursing foundation for quality of care	**2.94**	**0.11**
High standards of nursing care are expected by the administration	3.21	0.12
Written, up-to-date care plans for all patients	3.12	0.12
An active quality assurance program	3.05	0.18
A preceptor program for newly hired RNs	3.04	0.24
A clear philosophy of nursing that pervades the patient care environment	2.92	0.15
Active staff development or continuing education programs for nurses	2.89	0.21
Nursing care is based on a nursing rather than a medical model	2.80	0.18
Patient care assignments that foster continuity of care (i.e., the same nurse cares for the patient from one day to the next)	2.80	0.19
Working with nurses who are clinically competent	2.77	0.15
Nurse manager ability, leadership, and support of nurse	**2.80**	**0.11**
A supervisory staff that is supportive of nurses	3.09	0.13
Praise and recognition for a job well done	2.96	0.14
A nurse manager who is a good manager and leader	2.76	0.20

Table 3 (continued)

Nurses' work environment	Mean	SD
A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	2.44	0.15
Staffing and resource adequacy	**2.70**	**0.14**
Enough time and opportunity to discuss patient care problems with other nurses	2.98	0.15
Adequate support services allow me to spend time with my patients	2.95	0.16
Enough staff to get the work done.	2.60	0.19
Enough registered nurses on staff to provide quality patient care	2.44	0.25
Collegial nurse-physician relationship	**3.09**	**0.11**
Collaboration between nurses and physicians	3.24	0.11
Physician and nurses have good working relationships	3.03	0.13
A lot of teamwork between nurses and physicians	3.02	0.13
Composite	**2.87**	**0.11**

Note. This table scoring varies from 1-4 with higher score indicate more agreement that the subscales items are present in the current job situation.

Mean and range of nurse staffing levels in study hospitals are shown in Table 4. The average of nurse staffing levels was 10 patients per nurse. The average range was between 7 and 13 patients per nurse.

Table 4

Mean and range of nurse staffing levels in study hospitals (n=39)

Nurse staffing levels	Mean	Range
Number of patient per nurse	10:1	7:1 -13:1

Frequency and percentage of each level of burnout subscales in study nurses are presented in Table 5. The majority of study nurses had emotional exhaustion score at high level (41.28%), depersonalization score at low level (68.76%), and personal accomplishment score at low level (39.17%).

Table 5

Frequency and percentage of each level of burnout subscales in study nurses (n=5,247)

Burnout subscales	Frequency	Percentage
Emotional Exhaustion		
High	2,166	41.28
Average	1,406	26.80
Low	1,675	31.92
Depersonalization		
High	702	13.38
Average	937	17.86
Low	3,608	68.76
Personal accomplishment		
High	1,619	30.86
Average	1,573	29.98
Low	2,055	39.17

Note. Published norms among health professional from Maslach, Jackson, and Leiter (1996) suggested mean scores ≥27 on the EE subscale, ≥10 on the DP subscale , and ≤ 33 on the PA subscale, demonstrate high burnout. Mean score 26-19 on the EE subscale, 9-6 on the DP subscale, and 34 -39 on the PA subscale demonstrate average burnout. Mean score ≤18 on the EE subscale, ≤ 5 on the DP subscale, and ≥40 on the PA subscale demonstrate low burnout.

Frequency and percentage of job satisfaction of nurses and quality of nursing care in study nurses are displayed in Table 6. The majority of study nurses were moderately satisfied with their job (63.46%) and rated quality of nursing care as good (70.84%).

Table 6

Frequency and percentage of job satisfaction of nurses and quality of nursing care in study nurses (n=5,247)

Variables	Frequency	Percentage
Job satisfaction		
Very satisfied	466	8.88
Moderately satisfied	3,330	63.46
A little unsatisfied	343	6.54
Very dissatisfied	1,108	21.12
Quality of nursing care		
Excellent	140	2.67
Good	3,709	70.84
Fair	1,356	25.90
Poor	32	0.59

Research question 2. To what extent can the variability in job satisfaction of nurses in Thai public hospitals be explained by nurses' work environment and nurse staffing levels?

Table 7 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment categories and nurse staffing levels on job satisfaction of nurses. In univariate model, the findings presented that there was no significant association between nurses' work environment categories and job satisfaction of nurses and between nurse staffing levels and job satisfaction of nurses. In multivariate model, after controlling for nurse characteristics there was also no significant association between nurses' work environment categories and nurse staffing levels with job satisfaction of nurses.

Table 7

Univariate and multivariate logistic regression analysis predicting nurses' work environment categories and nurse staffing levels on job satisfaction of nurses

Variables	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Unfavorable (as reference)	-	-	1	-	-	1
Mixed	0.27	0.25	1.32 (0.80-2.17)	0.22	0.24	1.25 (0.77-2.05)
Favorable	-0.27	0.21	0.76 (0.49-1.17)	-0.29	0.21	0.74 (0.48-1.13)
Nurse staffing levels	-0.01	0.01	0.99 (0.96-1.01)	-0.01	0.01	0.99 (0.96-1.02)

Note. hospitals above the median on all 4 subscales, on 1, 2, or 3 subscales, and on none of the subscales were classified as having "favorable" indicating the most supportive environment, "mixed" indicating moderate supportive environment, and "poor" indicating the least supportive environment. [a]Model was adjusted for nurse characteristics (age and years in unit). *p<.05; **p< .01; ***p< .001

Research question 3. To what extent can the variability in each of nurse burnout subscales in Thai public hospitals be explained by nurses' work environment categories and nurse staffing levels?

Table 8 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment categories and nurse staffing levels on high emotional exhaustion. In univariate model, the findings revealed that there was no significant association between nurses' work environment categories with high emotional exhaustion. However, nurse staffing levels was significantly associated with high emotional exhaustion. The addition of each patient to nurses'

workload was associated with 1.02 point increase of nurse reporting in high emotional exhaustion (OR, 1.02; 95%CI, 1.00-1.04; p<.01).

In multivariate model, after controlling for nurse characteristics there was no significant association between nurses' work environment categories with high emotional exhaustion. However, nurse staffing levels was significantly associated with high emotional exhaustion. The addition of each patient to nurses' workload was associated with 1.02 point increase of nurse reporting in high emotional exhaustion (OR, 1.02; 95%CI, 1.00-1.03; p<.05).

Table 8

Univariate and multivariate logistic regression analysis predicting nurses' work environment categories and nurse staffing levels on high emotional exhaustion

Variables	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Unfavorable (as reference)	-	-	1	-	-	1
Mixed	0.05	0.11	1.06 (0.84-1.34)	-0.01	0.13	0.99 (0.76-1.27)
Favorable	0.07	0.12	1.07 (0.84-1.37)	0.06	0.13	1.06 (0.81-1.38)
Nurse staffing levels	0.02	0.01	1.02** (1.00-1.04)	0.02	0.01	1.02* (1.00-1.03)

Note. hospitals above the median on all 4 subscales, on 1, 2, or 3 subscales, and on none of the subscales were classified as having "favorable" indicating the most supportive environment, "mixed" indicating moderate supportive environment, and "poor" indicating the least supportive environment. [a]Model was adjusted for nurse characteristics (age and years in unit). *p<.05; **p< .01; ***p< .001

Table 9 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment categories and nurse staffing levels on high depersonalization. In univariate model, the findings presented that there was no significant association between nurses' work environment categories with high depersonalization and nurse staffing levels with high depersonalization. In multivariate model, after controlling for nurse characteristics there was also no significant association between nurses' work environment categories with nurse staffing levels with high depersonalization.

Table 9

Univariate and multivariate logistic regression analysis predicting nurses' work environment categories and nurse staffing levels on high depersonalization

Variables	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Unfavorable (as reference)	-	-	1	-	-	1
Mixed	0.14	0.12	1.15 (0.90-1.48)	0.02	0.14	1.02 (0.77-1.35)
Favorable	-0.02	0.17	0.97 (0.69-1.36)	-0.08	0.18	0.91 (0.63-1.31)
Nurse staffing levels	0.01	0.01	1.01 (0.98-1.03)	0.01	0.01	1.00 (0.97-1.03)

Note. hospitals above the median on all 4 subscales, on 1, 2, or 3 subscales, and on none of the subscales were classified as having "favorable" indicating the most supportive environment, "mixed" indicating moderate supportive environment, and "poor" indicating the least supportive environment. [a]Model was adjusted for nurse characteristics (age and years in unit). **p*<.05; ***p*< .01; ****p*< .001

Table 10 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment categories and nurse staffing levels on low personal accomplishment. In univariate model, the findings presented that there was no significant association between nurses' work environment categories with low personal accomplishment and nurse staffing levels with low personal accomplishment. In multivariate model, after controlling for nurse characteristics there was also no significant association between nurses' work environment categories and nurse staffing levels with low personal accomplishment.

Table 10

Univariate and multivariate logistic regression analysis predicting nurses' work environment categories and nurse staffing levels on low personal accomplishment

Variables	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Unfavorable (as reference)	-	-	1	-	-	1
Mixed	-0.05	0.11	0.94 (0.75-1.18)	-0.04	0.10	0.95 (0.77-1.17)
Favorable	0.21	0.15	1.23 (0.90-1.68)	0.20	0.14	1.23 (0.92-1.64)
Nurse staffing levels	-0.01	0.01	0.99 (0.96-1.01)	-0.003	0.01	0.99 (0.97-1.02)

Note. hospitals above the median on all 4 subscales, on 1, 2, or 3 subscales, and on none of the subscales were classified as having "favorable" indicating the most supportive environment, "mixed" indicating moderate supportive environment, and "poor" indicating the least supportive environment. [a]Model was adjusted for nurse characteristics (age and years in unit). *p<.05; **p< .01; ***p< .001

Research question 4. To what extent can the variability in quality of nursing care in Thai public hospitals be explained by nurses' work environment and nurse staffing levels?

Table 11 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment categories and nurse staffing levels on high emotional exhaustion. In univariate model, the findings revealed that there was significant association between nurses' work environment categories and nurse staffing levels with quality of nursing care as fair/poor. Compared with nurses who reported unfavorable work environments, nurses who reported favorable work environment were 0.68 times less likely to report fair to poor care quality (OR, 0.68; 95%CI, 0.47-0.99; $p<.05$). The addition of each patient to nurses' workload was associated with 1.04 point increase of nurse reporting in quality of nursing care as fair/poor (OR, 1.04; 95%CI, 1.02-1.05; $p<.001$).

In multivariate model, after controlling for nurse characteristics there was significant association between nurses' work environment categories with nurse staffing levels with quality of nursing care as fair/poor. Compared with nurses who reported unfavorable work environments, nurses who reported favorable work environment were 0.69 times less likely to report fair to poor care quality (OR, 0.69; 95%CI, 0.48-0.98; $p<.05$). The addition of each patient to nurses' workload was associated with 1.04 point increase of nurse reporting in quality of nursing care as fair/poor (OR, 1.04; 95%CI, 1.02-1.05; $p<.001$).

Table 11

Univariate and multivariate logistic regression analysis predicting nurses' work environment and nurse staffing levels on quality of nursing care as fair/ poor

Variables	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Unfavorable (as reference)	-	-	1	-	-	1
Mixed	-0.15	0.18	0.85 (0.59-1.23)	-0.13	0.17	0.87 (0.61-1.22)
Favorable	-0.37	0.18	0.68* (0.47-0.99)	-0.36	0.17	0.69* (0.48-0.98)
Nurse staffing levels	0.04	0.01	1.04*** (1.02-1.05)	0.04	0.01	1.04*** (1.02-1.05)

Note. hospitals above the median on all 4 subscales, on 1, 2, or 3 subscales, and on none of the subscales were classified as having "favorable" indicating the most supportive environment, "mixed" indicating moderate supportive environment, and "poor" indicating the least supportive environment. [a]Model was adjusted for nurse characteristics (age and years in unit). *p<.05; **p< .01; ***p< .001

Additional Analyses

Additional analyses were performed to investigate how nurse and patient outcomes can be explained by nurses' work environment subscales and nurse staffing levels. These results are displayed in Table 13-17.

Table 12 shows the results for the univariate and multivariate logistic regression analysis between the nurses' work environment subscales and nurse staffing levels on job satisfaction of nurses. In univariate model, results revealed that there was no significant association between the nurses' work environment subscales with job satisfaction of nurses and nurse staffing levels with job satisfaction of nurses. At the multivariate model, after controlling for nurse characteristics, nursing foundation subscale and nurse manager subscale were significantly associated with job satisfaction of nurses. A 1-point increase in the average rating nurses gave to the nurse manager factor was significant associated with 107.81-fold (OR, 107.81; 95%CI, 2.90-3998.67; $p<.05$) increase in the odds of reporting in job satisfaction of nurses. A 1-point increase in the average rating nurses gave to nursing foundation factor was significantly associated with 0.02-fold (OR, 0.02; 95%CI, 0.00-0.39; $p<.01$) decrease in the odds of reporting in job satisfaction of nurses.

Table 12

Univariate and multivariate logistic regression predicting nurses' work environment subscales and nurse staffing levels on job satisfaction of nurses

Variables	Job satisfaction of nurses					
	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Nurse participation	0.09	1.18	1.09 (0.10-11.10)	-0.93	1.78	0.39 (0.01-12.87)
Nursing foundation	-1.16	0.72	0.31 (0.07-1.30)	-3.68	1.40	0.02** (0.00-0.39)
Nurse manager	0.46	1.07	1.58 (0.19-12.93)	4.68	1.84	107.81* (2.90-3998.67)
N-MD relation	-1.28	1.05	0.27 (0.03-2.19)	-0.13	1.49	0.87 (0.04-16.33)
Nurse staffing levels	-0.01	0.01	0.99 (0.96-1.01)	-0.01	0.01	0.99 (0.96-1.02)

Note. [a]Model was adjusted for nurse characteristics (age and years in unit).

*p<.05; **p< .01; ***p< .001

Table 13 shows the results for the univariate and multivariate logistic regression analysis between the nurses' work environment subscales and nurse staffing levels on high emotional exhaustion. In univariate model, there was no significant association between the nurses' work environment subscales with high emotional exhaustion. However, nurse staffing levels was significantly associated with high emotional exhaustion, the addition of each patient to nurses' workload was associated with 1.02 point increase of nurse reporting in high emotional exhaustion (OR, 1.02; 95%CI, 1.00-1.04; $p<.05$).

In multivariate model, after controlling for nurse characteristics there was no significant association between nurses' work environment subscales with high emotional exhaustion. However, nurse staffing levels was significantly associated with high emotional exhaustion, the addition of each patient to nurses' workload was associated with 1.02 point increase of nurse reporting in high emotional exhaustion (OR, 1.02; 95%CI, 1.00-1.04; $p<.05$).

Table 13

Univariate and multivariate logistic regression predicting nurses' work environment subscales and nurse staffing levels on high emotional exhaustion

Variables	High emotional exhaustion					
	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Nurse participation	0.54	0.43	1.72 (0.73-4.07)	-1.25	1.14	0.28 (0.03-2.71)
Nursing foundation	0.64	0.33	1.90 (0.99-3.67)	1.35	0.71	3.88 (0.95-15.75)
Nurse manager	0.61	0.39	1.85 (0.86-4.00)	0.49	1.12	1.64 (0.18-14.94)
N-MD relation	0.32	0.40	1.37 (0.62-3.05)	-0.36	0.61	0.69 (0.20-2.31)
Nurse staffing levels	0.02	0.01	1.02** (1.00-1.04)	0.02	0.01	1.02* (1.00-1.04)

Note. [a]Model was adjusted for nurse characteristics (age and years in unit)

*p<.05; **p< .01; ***p< .001

Table 14 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment subscales and nurse staffing levels on high depersonalization. In univariate model, results revealed that there was no significant association between nurses' work environment subscales with high depersonalization and nurse staffing levels with high depersonalization. In multivariate model, after controlling for nurse characteristics there was no significant association between nurses' work environment subscales with nurse staffing levels on high depersonalization.

Table 14

Univariate and multivariate logistic regression predicting nurses' work environment subscales and nurse staffing levels on high depersonalization

Variables	High depersonalization					
	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Nurse participation	0.05	0.59	1.05 (0.32-3.39)	1.76	1.37	5.83 (0.39-86.09)
Nursing foundation	-0.37	0.59	0.68 (0.21-2.17)	-0.48	1.09	0.61 (0.07-5.22)
Nurse manager	-0.24	0.52	0.78 (0.28-2.18)	-1.21	1.08	0.29 (0.03-2.45)
N-MD relation	-0.64	0.62	0.52 (0.15-1.79)	-0.66	0.72	0.51 (0.12-2.14)
Nurse staffing levels	0.01	0.01	1.01 (0.98-1.03)	0.01	0.01	1.00 (0.97-1.03)

Note. [a]Model was adjusted for nurse characteristics (age and years in unit)

*p<.05; **p< .01; ***p< .001

Table 15 shows the results for the univariate and multivariate logistic regression analysis between nurses' work environment subscales and nurse staffing levels on low personal accomplishment. In univariate model, results revealed that there was no significant association between nurses' work environment subscales with low personal accomplishment and nurse staffing levels with low personal accomplishment. In multivariate model, after controlling for nurse characteristics there was no significant association between nurses' work environment subscales with nurse staffing levels on low personal accomplishment.

Table 15

Univariate and multivariate logistic regression predicting nurses' work environment subscales and nurse staffing levels on low personal accomplishment

Variables	Low personal accomplishment					
	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Nurse participation	0.67	0.62	1.96 (0.57-6.69)	1.24	1.33	3.48 (0.25-47.65)
Nursing foundation	0.77	0.55	2.16 (0.73-6.41)	1.62	0.85	5.08 (0.94-27.34)
Nurse manager	0.34	0.59	1.40 (0.43-4.52)	-1.77	1.26	0.16 (0.01-2.03)
N-MD relation	0.38	0.55	1.46 (0.49-4.36)	-0.61	0.68	0.53 (0.14-2.06)
Nurse staffing levels	-0.01	0.01	0.99 (0.96-1.01)	-0.003	0.01	0.99 (0.97-1.02)

Note. [a]Model was adjusted for nurse characteristics (age and years in unit)

*p<.05; **p< .01; ***p< .001

Table 16 shows the results for the univariate and multivariate logistic regression analysis between the nurses' work environment subscales and nurse staffing levels on quality of nursing care as fair/poor. In univariate models, the findings revealed that nursing foundation subscale were significantly associated with quality of nursing care as fair/poor. A 1-point increase in the average rating nurses gave to the nursing foundation factor was significant associated with 0.12-fold (OR, 0.12; 95%CI, 0.03-0.51; p<.01) decrease in the odds of reporting in quality of nursing care as fair/poor. Moreover, nurse staffing levels was significantly associated with quality of nursing care as fair/poor. The addition of each patient to nurses' workload

was associated with 1.02 point increase of nurse reporting in quality of nursing care as poor (OR, 1.02; 95%CI, 0.99-1.04; p<.05).

In multivariate model, after controlling for nurse characteristics A 1-point increase in the average rating nurses gave to the nursing foundation factor was significant associated with 0.02-fold (OR, 0.02; 95%CI, 0.00-0.32; p<.01) decrease in the odds of reporting in quality of nursing care as fair/poor. The addition of each patient to nurses' workload was associated with 1.02 point increase of nurse reporting in quality of nursing care as fair/poor (OR, 1.02; 95%CI, 0.99-1.05; p<.05).

Table 16

Univariate and multivariate logistic regression predicting nurses' work environment subscales and nurse staffing levels on quality of nursing care as fair/ poor

Variables	Quality of nursing care as fair/poor					
	Univariate models			Multivariate model[a]		
	β	SE	OR(95%CI)	β	SE	OR(95%CI)
Nurses' work environment						
Nurse participation	-1.16	0.92	0.31 (0.05-1.91)	3.35	1.86	28.66 (0.73-1115.76)
Nursing foundation	-2.05	0.71	0.12** (0.03-0.51)	-3.52	1.22	0.02** (0.00-0.32)
Nurse manager	-1.41	0.93	0.24 (0.03-1.52)	-0.96	1.41	0.38 (0.02-6.17)
N-MD relation	-1.61	0.83	0.19 (0.03-1.01)	-0.13	1.05	0.87 (0.11-6.84)
Nurse staffing levels	0.02	0.01	1.02* (0.99-1.04)	0.02	0.01	1.02* (0.99-1.05)

Note. [a]Model was adjusted for nurse characteristics (age and years in unit)
*p<.05; **p< .01; ***p< .001

Discussion

This section presents the discussion of the findings corresponding to the research questions.

The Levels of Nurses' Work Environment, Nurse Staffing Levels, Job Satisfaction of Nurses, Nurse Burnout, and Quality of Nursing Care in Public Hospitals in Thailand

The levels of nurses' work environment. This is the first study to examine nurses' work environment using the PES-NWI (Lake, 2002) in Thai hospitals; therefore, this finding will serve as the baseline information of nurses' work environment in Thai context. The mean scores and standard deviation of nurses' work environment subscales including nurse participation in hospital affairs, nursing foundation for quality of care, nurse manager ability, leadership, and support of nurse, staffing and resource adequate, and collegial nurse-physician relationship of study hospitals were 2.81 (0.10), 2.94 (0.11), 2.80 (0.11), 2.70 (0.14), and 3.09 (0.11) respectively. Compared with international studies, the mean scores of five subscales from this study were higher than those of the university-affiliated hospital in Quebec, Canada which there were 2.43 (0.63), 2.69 (0.56), 2.49 (0.74), 2.03 (0.73), 2.79 (0.70) (McCusker et al., 2004), in U.S. based Army Medical Department (AMEDD) hospitals which there were 2.52 (0.62), 2.85 (0.54), 2.57 (0.88), 2.61 (0.74), 2.99 (0.70) (Patrician et al., 2010), in acute care hospitals in Canada which there were 2.38 (0.54), 2.71 (0.49), 2.46 (0.78), 2.32 (0.69), 2.82 (0.65) (Laschinger & Leiter, 2006), in oncology unit in non-the American Nurses Credentialing Center (ANCC) hospitals which there were 2.60 (0.62), 2.63 (0.82), 2.31 (0.78), 3.07 (0.59) (except nursing

foundation for quality of care subscale which it was 3.03) (Friese, 2005). The mean scores of the second, the third, and the fifth subscales from this study were higher than those of Pennsylvania hospitals which there were 2.2 (0.3), 2.4 (0.2), and 2.8 (0.2) (Aiken et al., 2008).

However, the first to the forth subscales of nurses' work environment in these study hospitals were lower than those of oncology units in ANCC hospitals which were 2.90 (0.56), 3.26 (0.47), 2.86 (0.82), 2.88 (0.70) but the fifth subscale was higher than those of oncology units in ANCC hospitals which was 3.09 (0.62) (Friese, 2005). The difference of results between this study and other countries could be explained by the diversity of organizational system among countries or hospitals, demographic of study nurses and time in which data were collected.

This study findings showed that study nurses rated the highest score of nurses' work environment on collegial nurse-physician relationship subscale and the lowest score on staffing and resource adequacy subscale. Compared with international studies, this study was consistent with previous studies showing this subscale was the highest mean in oncology unit in ANCC hospitals and non-ANCC hospitals in U.S. (Friese, 2005), in U.S. based Army Medical Department (AMEDD) hospitals (Patrician et al., 2010), in university-affiliated hospital in Quebec, Canada (McCusker et al., 2004), and in hospitals in Pennsylvania (Aiken et al., 2008). Moreover, the result was similar to that of the oncology unit in non-ANCC hospitals (Friese, 2005) and university-affiliated hospital in Quebec, Canada (McCusker et al., 2004) where the lowest score was on staffing and resource adequacy subscale. This findings imply that work environment in study hospitals was similar to that of those hospitals in that nurse-physician relationships were less problematic than other

subscales of nurses' work environment while staffing and resource adequacy was still the issue. Furthermore, the study finding can reflect culture of Thai people that is cooperative behavior which expected to maintain group harmony among Thai People (Mortlock, 1989 cited in Kunaviktikul, 1994). Thai people are to project a picture of smooth, kind, pleasant, no-conflict interpersonal interaction that based on Buddhist religion (Komin, 1990). The study of Kunaviktikul (1994) suggested that accommodation was the most preferred style of managing conflict for nurses in government-operated regional university hospitals in Thailand. Another possible reason is that study hospitals were general and regional hospitals from twelve public health regions located outside capital city which may possible that physician and nurses who worked in those hospitals did not tied by time as those who worked in the city. They may have time after work for getting or talking together which supported a good relationship among them. Additionally, results from this study showed that high workload and resource inadequacy was critical issues of work environment in study hospitals.

Nurse staffing levels. This study found that in study hospitals, a nurse cared for approximately 10 patients in thier most recent shift which was higher than that of other settings such as in U.S. chronic hemodialysis centers that had patient to nurse ratio about 9.6:1 (Fynn et al., 2009). This study result was higher than that of in acute care hospitals in Pennsylvania which patient to nurse ratio was 6.3:1, in Ontario which patient to nurse ratio was 7.1:1, in British Columbia which patient to nurse ratio was 7.0:1, in England which patient to nurse ratio was 9.9:1, and in Scotland which patient to nurse ratio was 9.7:1 (Aiken et al., 2001). Also, it was higher than that of hospitals in Scottish hospitals which patient to nurse ratio was 9.4:1(Sheward et al.,

2005). The study result was equal to that of hospitals in English hospitals which patient to nurse ratio was 10:1 (Sheward et al., 2005). Findings from this study imply that nurses in study hospitals had higher workload than those of the above mentioned hospitals. The different results could be due to the differences in health care system among each countries which created variety of organizational staffing policies, structure and philosophy of the nursing services department, organizational support systems, changed in services. The other variables such as state licensing standards and consumer expectations can support the minimum number of professional nurses required on unit at a given time or to the amount of minimum staffing. Moreover, acuity level of patient in each setting is important factor considered. Sicker patients receive higher classification scores indicating that more nursing resources are required to provide patient care. Thus, above mentioned reasons can affect the different results of nurse staffing levels.

Additionally, because studies of patient to nurse ratio in public hospitals in Thailand were rarely investigated, the number of patient per nurse for comparing with this study was absent. However, some studies can support this study results that high workload and nurse staffing levels have been significant issue of work in Thai public hospitals. For instance, a study of Boonthong (2000) presented that problems in working for nurses from all levels of Thai public hospitals were high work load. The study of Sawangdee (2008) reported that the average workload for staff nurses in public hospitals was more than the general standard (22 days or shifts) by nearly 10 days (shifts). Moreover, the study results reflect that the number of patient per nurse in public hospitals was higher than the recommended ratio from TNC (2005) that patient to nurse ratios should be 4:1 to 6:1, 4:1, and 2:1 in in-patient department,

psychiatric and special-department, and adult and child intensive care units respectively and for second care hospitals and were 4:1 to 6:1, 4:1, 2:1, and 1.5:1 in in-patient departments, psychiatric and special-departments, adult intensive care units, and child intensive care units, respectively for tertiary hospitals. This can be explained that study hospitals, general and regional hospitals, were supported by the national health security and universal health care coverage policies. These policies promoted accessing of the number of clients in health care services while the number of new nurses coming into health care system were limited and nurse turnover rate in public hospitals was rising. This may be the reason why patient to nurse ratio in study hospitals was high.

The levels of job satisfaction. The study finding found that of the total samples, study nurses were moderately satisfied with their job (63.46%), very dissatisfied with their job (21.12%), very satisfied (8.88%), and a little unsatisfied (6.54%), respectively. Compared with previous studies, study nurses in this study had satisfied and dissatisfied with their job about 72 and 28 percent, respectively. This findings differ from other countries where nurses who were satisfied and dissatisfied with their job were around 84 and 16 percent in U.S. based Army Medical Department hospitals (Patrician et al., 2010), 59 and 41 percent in adult acute care hospitals in Pennsylvania (Aiken et al., 2001); 40 and 60 percent in acute hospitals in Japan (Kanai-Pak et al., 2008), 63.6 and 36.4 percent in English acute trusts (Rafferty et al., 2007), 67.1 and 32.9 percent in acute care in Canada, 63.9 and 36.1 percent in acute care in England, 62.3 and 37.7 percent in Scotland (Aiken et al., 2001), 91.5 and 8.5 percent in high-technology hospitals in Belgium (Bogaert et al., 2009a), 87.1 and 12.9 percent Belgian hospitals (Bogaert et al., 2009b), 82.1 and 17.9 percent at

Landspitali University Hospital, Iceland (Gunnarsdottir et al., 2009), and 82.6 and 17.4 percent in Germany (Aiken et al., 2001). The results from this study imply that nurses in this study and above mentioned studies had more satisfied in their job than dissatisfied except nurses in acute hospitals in Japan (Kanai-Pak et al., 2008). Interestingly, previous studies presented that around 1 to 4 out of 10 of nurses dissatisfy in their current job. This may imply that nurses' dissatisfaction in their job was not only happen in other international countries but also in Thailand.

According to studies in Thailand, the findings were consistent with prior studies which presented that job satisfaction of nurses were at moderate level (Detkasem, 2002; Kaewnak, 1998; Nontapet, 1999; Panuwatsuk, 2003; Sabmee, 1999; Sasomsap, 2004; Silaphan, 2005; Sngawong, 2002). However, the finding is inconsistent with prior studies which revealed that job satisfaction of nurses was at a high level (Banthet, 1999; Kulkrissada, 1996; Luevanich, 1996). The variety of findings could be explained by differences in work environment, demographic characteristics of study nurses, and time in which data were collected.

This study finding can be explained that study hospitals, general and regional hospitals, were hospitals providing health services to people in all localities with good accessibility and coverage. Those hospitals provided health services including heath promotion, disease prevention, management of acute and chronic health, and health rehabilitation. They controlled and developed nursing service quality, explored new strategies for service effectiveness, and worked as leading entrepreneur hospitals to improve the health service system and health care team. Therefore, nurses in those hospitals not only provided various treatments and care to patients who had more complicated symptom but also did work responding

organizational policy such as hospital accreditation, quality management, and infection control of patients in hospitals. Thus, these situation may create some dissatisfy of nurses' job.

In terms of demographic characteristics, Bedeian, Ferris, and Kacmar (1992) suggested that prestige and confidence were likely to increase with age and that older employees were likely to report higher levels of job satisfaction. Younger employees were not likely to have fully established their worth to the organization, they generally did not hold position authority. Age or more generally work life experiences shaped occupational aspirations and concerns. Younger employees were generally more likely to be mobile and to have lower psychological investment in the organization. Middle-aged employees generally engaged in behaviors to encourage stabilization and older employees. The older employees more commonly engaged in maintenance behaviors. Similar to age, tenure increased within an organization, so the employees' potential for both formal benefits such as promotions and informal benefits such as status among the younger, less experienced coworkers (Hellman, 1997). Therefore, employees with more age and tenure should be more satisfaction in their job than those with less age and tenure. In this study, nurses were 34 years old on average which can be considered on the beginning of middle-aged. They had nearly 8 years of nursing experiences and 6 years of experiences in their current hospital position which was 1 out of 3 of the average working life span of professional nurses in Thailand (22.55 years). Therefore, young age and less years of experiences of study nurses could be reasons why nurses in study hospitals had job satisfaction at a moderate level.

The levels of nurse burnout. This study showed that majority of study nurses (41.28%) had high emotional exhaustion score according to norms. Compared with studies in Thailand, percent with scores in high emotional exhaustion range according to norms of study nurses was higher than that of study nurses in psychiatric hospital Department of Mental Health (10.7%) (Jariyapayuklert, 2007), Maharaj Nakorn Chiang Mai Hospital, university hospital (31.4%) (Sirakamon, 1997), Psychiatric hospital of Mental Health Institute (12.90%) (Kitsumban, 1995), Ramathibodi hospital, university hospital (25.8%) (Khwanmuang, 1998). Compared with international studies, this results was higher than that of nurses in Oncology unit in ANCC hospitals (20%) (Friese, 2005), adult acute care hospitals in Canada (36%) (Aiken et al., 2001), adult acute care hospitals in England (36.2%) (Aiken et al., 2001), adult acute care hospitals in Scotland (29.1%) (Aiken et al., 2001), adult acute care hospitals in Germany (15.2%) (Aiken et al., 2001), in Scotland (27%) and England (34%) (Sheward et al., 2005), and in the U.S. based Army Medical Department hospitals (30%) (Patrician et al., 2010). However, the findings was lower than that of nurses in nonfederal adult general hospital in Pennsylvania (43.2%) (Aiken et al., 2002), acute hospitals in Japan (56%) (Kanai-Pak et al., 2008), adult acute care hospitals in U.S. (43.2%) (Aiken et al., 2001).

Based on depersonalization subscale, the study finding presents that majority of study nurses (68.76%) had low depersonalization score according to norms. This result was consistent with previous studies in Thailand reported that majority of study nurses in Community hospitals northern region, Psychiatric hospital department of mental health, Psychiatric hospital of mental health institute, and

Maharaj Nakorn Chiang Mai Hospital had low score in depersonalization subscale (Jariyapayuklert, 2007; Kitsumban, 1995; Namakankham, 1999; Sirikamon, 1997).

According to personal accomplishment subscale, the study finding presents that majority of study nurses (39.17%) had high personal accomplishment score. This result was inconsistent with previous studies in Thailand that reported majority of study nurses in Community hospitals in northern region, Psychiatric hospital Department of Mental Health, Psychiatric hospital of mental health institute, and Maharaj Nakorn Chiang Mai Hospital had personal accomplishment score at low level (Jariyapayuklert, 2007; Kitsumban, 1995; Namakankham, 1999; Sirikamon, 1997).

Based on study results, it is implied that emotional exhaustion, depersonalization, and personal accomplishment have been issues in several countries including hospitals in Thailand. The different findings between this study and previous studies could be due to dissimilarity of system, demographic characteristics of study sample, and time in which data were collected. It is not surprising to see that the majority of study nurses had emotional exhaustion score at high level and personal accomplishment score at low level. The possible reasons are that situation and trends in health problems were more complex in health care system in Thailand due to the rapid changes in population, society, politics, economics, and environment. The national health system reform and health decentralization were implemented for public hospitals in Thailand. National Health security and universal health care coverage were implemented for Thai people which increase client's equal to access to health services. Moreover, nurses in study hospitals, general and regional hospitals, had to work with advance technology and greater emphasis on cost

effectiveness, decreased length of patient stay in hospitals. At the same time, the acuity of patient increased as those patient remaining in hospitals were those too medically complex to be care for. These situations can increase not only workload but also the feeling of being emotionally exhausted because of the work burden and feeling of unbelief of competence and successful achievement in work.

Another possible reason is age of study nurses. Literature review presented that age was consistently related to burnout, especially emotional exhaustion. Younger and less experienced individuals may be more susceptible to emotional exhaustion because they have yet to learn effective means of coping with work demands (Maslach, 1982 as cited in Lee & Ashforth, 1993). The study nurses were 34 years old on average which they were on the beginning of middle-age. It may be possible that they did not learn to much about coping with their work and feeling of work burden.

The study findings present that the majority of study nurses had depersonalization score at low level. The possible reason is that around 73.68 percent of study nurses had dependent or relative live with and this reflect the natural culture of Thai people that were extended family. Therefore, even though there were several factors contributing increasing of the feeling of negative, cynical, overly detached and impersonal attitudes and feelings towards the patients, study nurses may be supported their mental health from their family member and their relatives. Thus, they had good attitude for themselves, colleagues, and their job. Consequently, they had less display a detached, emotional callousness, and cynical to their coworker, patients, and organization. Additionally, approximately 95.65 percent of study nurses earned bachelor degree in nursing which the curriculum contained course work teaching

about morality, ethic in nursing professional, emotional quotient. It is possible that study nurses could apply those principals in their job and they feel less depersonalization.

Interestingly, the study found that the score of nurse burnout measured by emotional exhaustion subscale, depersonalization subscale, and personal accomplishment subscale were high , low , and low level, respectively. This results could not interpret following the analyses of the MBI-HSS scores that is a high degree of burnout is reflected in high score on the EE and DP subscales and in low score on the PA subscale (Maslach et al., 1996). This result may be noticed that the way to interpret burnout in study nurses may differ from that of in the western countries.

Levels of quality of nursing care. The majority of study nurses rated it as a good level (70.84%) following by fair (25.90%), excellent (2.67%), and poor levels (0.59%). Compared with previous studies, study nurses in this study rated quality of nursing care as excellent and good, and fair and poor were around 74 and 26 percent, respectively. This findings differ from other countries where nurses rated quality of nursing care as excellent and good, and fair and poor were 63 and 37 percent in university-affiliated hospital in Quebac, Canada (McCurker et al., 2004), 41 and 59 percent in Japan (Kanai-Pak et al., 2008), 71 and 29 percent in Belgian (Bogaert et al., 2009b), 80 and 20 percent in acute care hospitals in Pennsylvania (Sochalski, 2004), 78 and 22 percent in high-technology hospitals in Belgium (Bogaert et al., 2009a), 84 and 16 percent in U.S. based Army Medical Department hospitals (Patrician et al., 2010), 95 and 5 percent in University hospital, Reykjavik, Iceland (Gunnarsdottir et al., 2009), 84 and 16 percent in English acute trusts (Rafferty et al., 2007). The different findings could be explained by the differences of health care system and

work environment in each setting, demographic data of study nurses, and time in which data were collected.

In Thailand, this study firstly presented overall of quality of nursing care by perception of nurses meanwhile most of previous studies in Thailand showed quality of nursing care from patient and nurse perspectives which results were moderate to good level (Chalortham, 2001; Kobpungton, 1997; Nampoonsak, 2005; Soisangwon, 2007). Therefore, information to compare this result was absented. However, there were some studies indicating quality of nursing care in Thai hospitals. For instance, Kessomboon, Panarunothai, and Chongsuwiwatwong (2003) studied reliability of chart reviews for detecting adverse events in hospitalized patients in Thailand and found that the incidence of adverse events was 9.1 percent. 71.4 percent of adverse events occurred were considered preventable. The study of Padungsak (2007) presented that the incidence of adverse events in northern regional hospitals in the 2007 fiscal year were missing patient identification, patient fall, medication error, pressure sore in stage 2 to stage 4, communication error on care plan, and urinary tract infection.

Moreover, Kunaratanapluk (2007) stated that in 2006 there were around 200,000 patients who had nosocomial infection. General and regional hospitals were the second and the third places of source of infection. Recently, Nantsupawat, Akkadechanunt, Ketlertnapa, & Padungsak (2010) studied patients' safety culture and nursing outcomes in hospitals of northern region and found that the incident of adverse outcomes in the hospitals of the northern region in the year 2007 were more/higher than the expected levels were the mistakes in patients' identification, patients' fall, medication error, pressure ulcer grade 2-4, miscommunication in

medical treatment, and urinary tract infection. Therefore, this study findings imply that even though almost study nurses rated quality of nursing care as good and excellent, around 3 out of 10 of study nurses rated quality of nursing care as poor and fair. The issues of undesirable poor quality of care occurred in public hospitals in Thailand suggest that patient may be of significant risk of preventable adverse outcomes.

Factors Predicting Job Satisfaction of Nurses in Thai Public Hospitals

After controlling for nurse characteristics and nurse staffing levels, nurses' work environment subscale including nurse manager ability and nursing foundation were significantly associated with job satisfaction of nurses. Nurses in study hospitals supporting nurse manager ability factor was significantly associated with increasing of reporting job satisfaction. This study is consistent with previous studies in Thailand that found the management styles of head nurses as perceived by staff nurses had high positive correlation with job satisfaction and staff nurses ($r= .72$, $p < .001$) (Kaewnak, 1998). The study of Banthet (1999) presented that there was positive relationship between nursing director supervision and job satisfaction ($r = .42$, $p < .01$). The study of Panuwatsuk (2003) revealed that participative leadership of the head nurse was positively and significantly related to job satisfaction of staff nurses ($r = .49$, $p < .05$).

Similarly, the study of Friese (2005) reported that oncology nurses with favorable nurse manager ability were less likely to have low job dissatisfaction (OR=0.44, 95%CI=-1.34, -0.28), p<.01). This results could be explained that manager play a key role in providing the direction and infrastructure to empower nurse to be engaged in their practice professionally, thereby ensuring safe patient care.

Furthermore, nurse manager was the main person who supported job morale, encouraged nurses to cooperate and achieve the purpose of hospitals that patients received the high quality of nursing care. Therefore, it is possible that when study nurses perceived better nurse manager ability in their hospitals they received supporting and facilitating from nurse manager to provide effective nursing care to patients. Consequently, they were likely to feel satisfaction in their job.

Moreover, nurses in study hospitals supporting nursing foundation factor was significantly associated with decreasing of reporting job satisfaction. This finding may imply that nursing foundation such as nursing philosophy, a nursing model of care, and nurses' clinical competence, continuing education was in general not common practice in study hospitals. Therefore, while nurses in Thai public hospitals encountered nursing shortage and over workload and study nurses had obtained nurse and resource inadequacy issue, they may think that nursing foundation may create more workload or unexpected jobs for them contributing decreasing of job satisfaction.

The finding found that nurses' work environment and nurse staffing levels were not significantly associated with job satisfaction of nurses. This was inconsistent with previous studies which found that nurses who work in hospitals support nurses' work environment were more satisfied in their job than ones in poor supportive work environments (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert, et al., 2009b; Fynn, 2007; Laschinger et al., 2001; Manojlovich, 2005; Patrician et al., 2010) and nurse in hospitals with high nurse staffing levels were less likely to experience job satisfaction (Aiken, Clarke, & Sloane, 2002; Aiken, et al., 2008; Aiken, Clarke, Sloane, Sochaski, et al., 2002; Fynn, et al., 2009; Rafferty et al., 2007; Sheward et al.,

2005). This result can imply that supporting nurses' work environment and nurse staffing levels was necessary conditions for study hospitals but they may not be sufficient in affecting job satisfaction of study nurses.

Factors Predicting Nurse Burnout in Thai Public Hospitals

After controlling for nurse characteristics and nurses' work environment, there was evident that nurse staffing levels were significantly positively associated with high emotional exhaustion. The addition of each patient to nurses' workload was associated with increasing of nurse reporting in high emotional exhaustion. This study result is consistent with prior studies which suggested that emotional exhaustion was related to workload. Aiken et al. (2008) reported that in fully adjusted models the odds of nurses reporting high emotional exhaustion increased by roughly one-fifth with each increase of 1 patient per nurse in mean workloads in their hospitals. Aiken, Clarke, Sloane, Sochaski, et al. (2002) revealed that after adjusting for nurse and hospital characteristics, each additional patient per nurse was associated with a 23% (OR, 1.23; 95% CI, 1.13-1.34) increase in the odds of burnout (emotional exhaustion). Rafferty et al. (2007) presented that the fully adjusted models, taking into account nurse and patient characteristics were nurses in hospitals with the highest patient to nurse ratios were approximately twice as likely to show high burnout levels (OR=1.78, 95%CI 1.35-2.37), $p<0.001$. Sheward et al. (2005) after controlling for nurse and hospital variables, the odds ratios for burnout increased from 0.57 to 0.67 to 0.80 to 1.00 ($p<0.05$) as the number of patients a nurse was responsible for increased from 0-4 to 5-8 to 9-12 to 13 or greater. It could be implied that nurses are mainly health care provider and constitute an around the clock surveillance system in

hospitals. They were persons who early detect and provide intervention when patients' conditions deteriorate. Definitely, the effectiveness of nurse surveillance was affected by the number of nurses available to assess patient on an ongoing basis. Nurses who response high workload or many patients in limited time, definitely could not complete high nursing care for patients following organizational policy. Consequently, they could coexist with feeling of frustration and tension. They could lack of energy and felt that their emotional resource were used up.

After controlling for nurse characteristics and nurse staffing levels, there was no significantly association between nurses' work environment with emotional exhaustion. This finding is inconsistent with previous studies which reported that nurses who worked in hospitals having better care environment suffered less emotional exhaustion than those in hospitals having poor care environments (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2008; Bogaert et al., 2009a; Fynn, et al., 2009; Laschinger et al., 2001; Leiter & Laschinger, 2006; Patrician et al., 2010; Vahey et al., 2004). The findings of this study may reveal that a set of organizational supporting nursing practice environment including nurse participation in hospital affairs; nursing foundations for quality of care; nurse manager ability, leadership, and support for nurses; and collegial nurse-physician relations in hospitals may differ from a set of organizational supports or characteristics promoting low emotional exhaustion. It is assumed that nurses in hospital with good nurses' work environment did not necessarily less emotional exhaustion of nurse in study hospitals.

After controlling for nurse characteristics, there was no significant association between the nurses' work environment and nurse staffing levels on high depersonalization. This finding is inconsistent with a the study of Vahey et al. (2004)

which found that the likelihood of having higher than average depersonalization were lower in units with good environments than that of in units with mixed environments and lower in units with mixed environments than that of in units with poor environments, by factors of 0.68. Additionally, previous studies presented that depersonalization was generally related to interpersonal relationship at the workplace (Maslach & Jackson, 1981b); satisfaction with manager support (Lee & Ashforth, 1996; Prosser et al., 1997). This result is explained that nurses' work environment and workload in study hospitals may be not direct effect to the feeling of depersonalization of study nurses. The feeling of appearance of subjective impressions of change affecting the person or the surrounding world of nurses in study hospitals may result from feelings of being emotionally overextended and depleted of one's emotional resources. This reason can be explained by the study of Bogaert et al. (2009b) and Leiter and Laschinger (2006) which found that there was no direct impact of nurses' work environment on depersonalization subscale, nurses' work environment impacted depersonalization subscale through emotional exhaustion subscale. Depersonalization was generally not related to workload (Janssen, Jonge, & Bakker, 1999). Additionally, it is possible that a set of organizational characteristics promoting depersonalization of nurses in study hospitals may differ from or at least not completely aligned with a set of organizational characteristics supporting nursing practice.

After controlling for nurse characteristics, there was no significantly association between the nurses' work environment and nurse staffing levels on low personal accomplishment. This finding is consistent with a previous study which reported that there was no relationship between nurses' work environment and low

personal accomplishment (Vahey et al., 2004). However, this study finding was inconsistent with prior studies which displayed that personal accomplishment was related to a lack of resources for performing their job, lack of necessary supplies, tools, or information (Maslach & Jackson, 1981b), coping, control, and organizational commitment (Greenglass & Burke, 2002) participation and various types of rewards at the work setting (Lee & Asforth, 1996). The study of Leiter and Laschinger (2006) found a direct path (positive weighted) from nursing model of care to personal accomplishment. The study of Bogaert et al. (2009a) revealed that nurse working in hospital supporting collegial nurse- physician relations had significant lower personal accomplishment.

This study finding can be explained by the study of Bogaert et al. (2009b) which found that a structural equation model suggested that aspects of nurse practice environment were not only direct impact job outcome through personal accomplishment but also indirect impact job outcome through emotional exhaustion, depersonalization, and then personal accomplishment. It can imply that nurses' work environment and workload could be not direct effect to the feeling of personal accomplishment of study nurses but their feeling of personal accomplishment could be resulted from feelings of depersonalization. Moreover, it can be possible that a set of organizational characteristics reducing personal accomplishment of study nurses could be differ from or at least not completely aligned with a set of organizational characteristics supporting nursing practice.

Burnout is a complex occupational disorder, and it develops with various subscales. Therefore, to be successful in dealing with burnout, it is important to address the factors associated with its all subscales. This study demonstrated that

among burnout subscales, EE subscale is the most significant predictors of negative outcomes. It is important to focus on predictors of EE and prevent it. Even though, the other two subscales of burnout help to explain the phenomenon, they are predictive of negative outcome on in a few studies. This study may support previous studies that used only EE subscale of the MBI as burnout and found that EE subscale can predicted by nurses' work environment and nurse staffing levels (Aiken, Clarke, & Sloane, 2002; Aiken, Clarke, Sloane, Sochaski, et al., 2002; Aiken et al., 2008; Friese, 2005; Leiter & Lachinger, 2006; Raffery et al., 2001; Raffery et al., 2007; Sheward et al., 2005).

Factors Predicting Quality of Nursing Care in Thai Public Hospitals

The study results showed that after controlling for nurse characteristics and nurse staffing levels, nurses who reported favorable work environment were less likely to report fair/poor care quality compared with nurses who report unfavorable work environments. The study finding was consistent with previous studies which found that higher levels of overall nurses' work environment were associated with higher levels of trust in management ($r = .56$) which was associated with higher perceptions of patient care quality ($r = .34$). Positive work environment characteristics were associated with lower burnout levels ($r = -.62$) which in turn were associated with higher perceived quality ($r = -.42$) (Laschinger et al., 2001). Findings from the study of Aiken, Clarke, and Sloane (2002) suggested that after controlling for country/site nurses working in hospitals and staffing, with weak organizational support for nursing care were twice as likely to report the quality of care on their units as fair or poor (OR = 2.44, 2.05-2.91), $p<0.001$.

Similarly, Flynn (2007) presented that the organizational support for nursing, as an indicator of a supportive work environment, was positively correlated with nurse-assessed quality of care ($r = .49$, $p < .0.001$). Findings from Aiken et al. (2008) revealed that after controlling for nurse and hospital characteristics and staffing, the odds of nurses assessing quality of nursing care as poor or fair was lower by 40% in hospitals in the mixed category relative to the poor category and in the better category relative to the mixed one. The study of Patrician et al. (2010) revealed that compared with nurses who reported unfavorable work environment, nurses who reported unfavorable work environments were nearly 11 times more likely to report fair to poor care quality, controlling for all other independent variables in the model. Recently, results from Bogaert et al. (2009b) revealed that goodness of fit statistics confirmed an improved model with burnout subscales in mediating positions between nurse practice environment dimensions and both job outcomes and nurse-assessed quality of care, explaining 20% and 46% of variation in these two indicators, respectively. This finding can imply that the presence of supportive organizational characteristics including opportunities for staff nurses to participate in organizational decisions, a focus on quality care, a supportive manager, nurse-physician relationships affected in part of managerial practices, and results in nurses had support to provide nursing care for patients with superior outcomes.

In terms of nurses' work environment subscales, after controlling of nurse characteristics and nurse staffing levels there was association between nursing foundation subscale and the quality of nursing care as fair/poor. Nurses in study hospitals supporting nursing foundation factor was significantly associated with decreasing of reporting quality of nursing care as fair/poor. The study finding was

inconsistent with previous study in that nursing foundation subscale was not statistically associated with quality of nursing care at the last shift of work (McCusker et al., 2004). However, this study results could be explained that creating work environment supporting nursing foundation such as nursing philosophy, a nursing model of care, nurses' clinical competence, and continuing education for nurses promoted not only competency and knowledge of nurses but also the standard or guideline for nurses to provide nursing care for patient with less undesirable outcomes.

After controlling for nurse characteristics and nurses' work environment, the addition of each patient to nurses' workload was associated with increasing of nurse reporting in the quality of nursing care as fair/poor. This finding was consistent with previous studies that nurses in hospitals with higher nurse staffing levels reported higher level of poor quality of nursing care (Aiken, Clarke, & Sloane, 2002; Aiken et al, 2008; Sochalski, 2004; Rafferty et al., 2007). A possible explanation is that number of nurses influenced the timing for nurses to identify the patients' problem. Timing was also important for nurses to deliver nursing care to patient and patient recue, likewise reducing poor quality of care.

In summary, this study found that nurse burnout and quality of nursing care can be predicted by nurses' work environment and nurse staffing levels. Additional analyses also present that job satisfaction can be predicted by nurses' work environment subscales including nursing foundation and nurse manager. The quality of nursing care can be predicted by nurses' work environment subscales including nursing foundation. The findings suggested that improving nurses' work environment and nurse staffing in Thai hospitals holds promise for reducing nurse burnout thus

improving nurse retention at the hospital as well as potentially improving the quality of care.