

## **CHAPTER IV**

### **RESULTS**

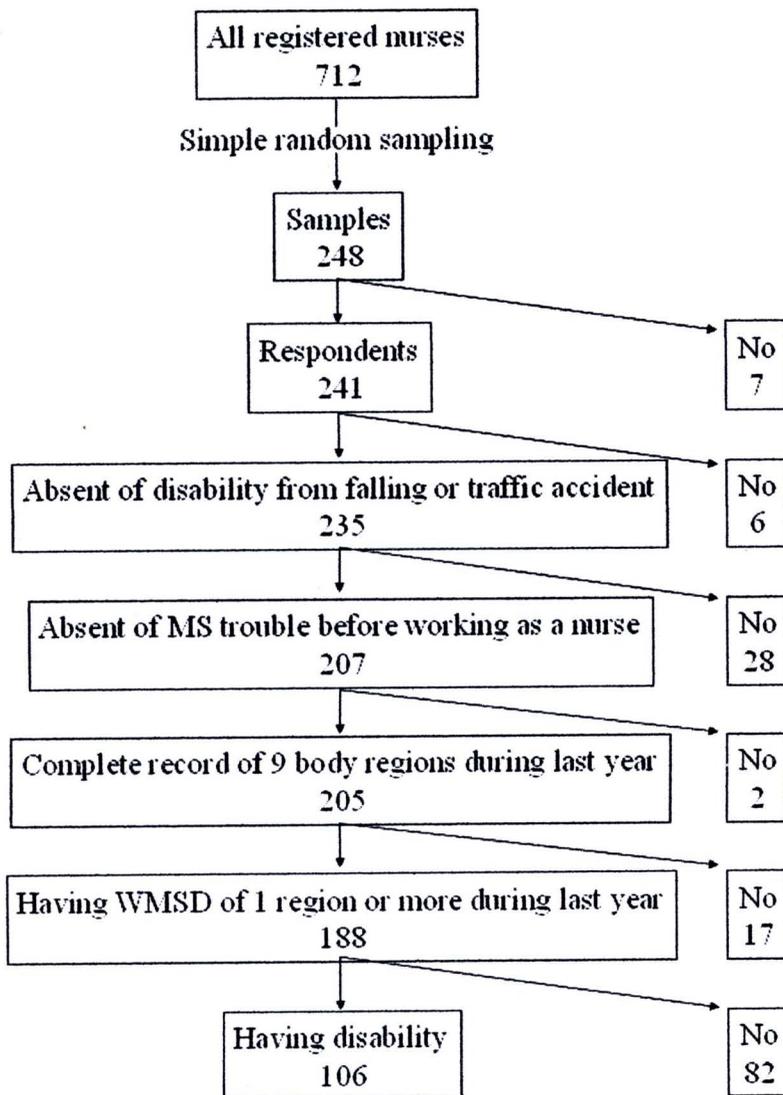
This was a descriptive study on the “Prevalence of Work-Related Musculoskeletal Disorders among Registered Nurses at Srinagarind Hospital, Thailand”.

#### **4.1 Flow chart of the nurses**

Figure 1 demonstrated that from the study population of 712 registered nurses, a sample of 248 nurses was randomly selected by simple random sampling. There were 241 nurses responded to the questionnaire. Among them, 36 nurses were not fulfilled for further analysis because of disability from past accident, musculoskeletal trouble before working as a nurse or incomplete records. Altogether, 205 nurses were analyzed for their prevalence of WMSD and related disability.

#### **4.2 Socio-demographic characteristics of the nurses**

Table 8 shows socio-demographic characteristics of the nurses. It appeared that most of them were female. The minimum and maximum ages were 23 and 57 years old respectively. The mean and standard deviation of age was  $34.8 \pm 7.7$  years, while median and interquartile range was  $33.0 \pm 12.0$  years. About a half of the nurses were married. Approximately one-fifth had administrative position in the working units. Only 1.5% of the nurses were smokers. The mean and standard deviation for cumulative duration of employment was  $12.1 \pm 7.9$  years. The mean and standard deviation for weight was  $53.7 \pm 7.4$  kilograms. The mean and standard deviation for height was  $158.1 \pm 5.2$  centimeters.



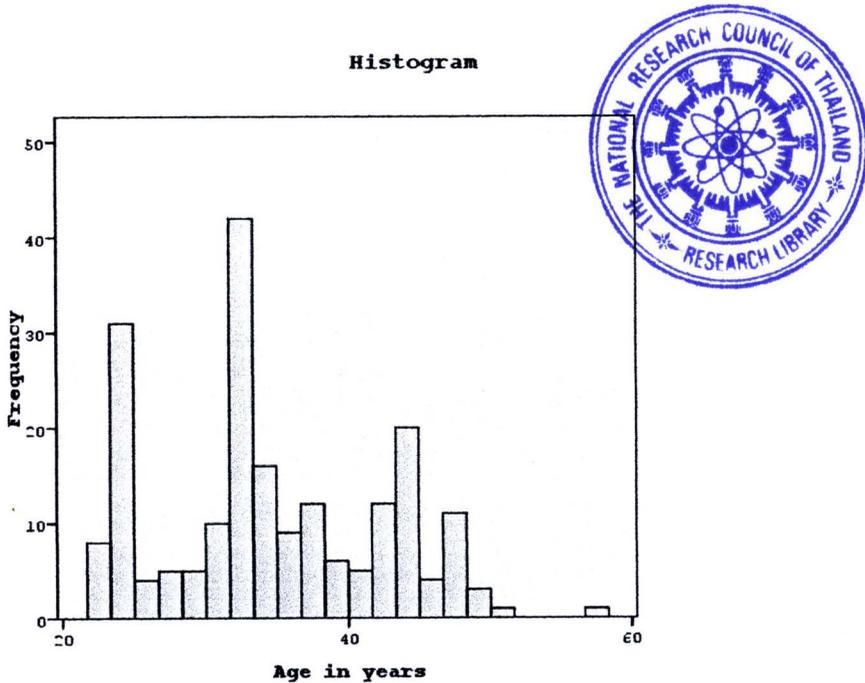
**Remarks:** MS = Musculoskeletal

WMSD = Work-related Musculoskeletal Disorders

**Figure 1** Flow chart of the nurses

**Table 8** Socio-demographic characteristics of the nurses (N = 205)

<b>Socio-demographic Characteristics</b>	<b>Number</b>	<b>Percent</b>
<b>Gender</b>		
Male	16	7.8
Female	189	92.2
<b>Marital status</b>		
Single	94	45.9
Married	102	49.8
Divorced or separated	9	4.4
<b>Smoking</b>		
No	202	98.5
Yes	3	1.5
<b>Having administrative position in the working unit</b>		
No	162	79.0
Yes	43	21.0
<b>Age (years)</b>		
Minimum = 23.0, Maximum = 57.0		
Mean = 34.8, Standard deviation = 7.7		
Median = 33.0, Interquartile range = 12.0		
<b>Height (centimeters)</b>		
Minimum = 149.0, Maximum = 178.0		
Mean = 158.1, Standard deviation = 5.2		
Median = 158.0, Interquartile range = 6.0		
<b>Weight (kilograms)</b>		
Minimum = 37.0, Maximum = 75.0		
Mean = 53.7, Standard deviation = 7.4		
Median = 53.0, Interquartile range = 10.0		
<b>Duration of employment in Srinagarind Hospital (years)</b>		
Minimum = 1.0, Maximum = 30.0		
Mean = 12.1, Standard deviation = 7.9		
Median = 11.0, Interquartile range = 12.0		



**Figure 2** Histogram of age (in years) of the nurses (N = 205)

#### 4.3 Prevalence of work-related musculoskeletal disorders

Table 9 shows that 91.7% (95% CI: 86.8%, 94.9%) of the nurses had WMSD for at least one body region in the past year. The annual prevalence of WMSD with disability was 53.7% (95% CI: 46.6%, 60.6%).

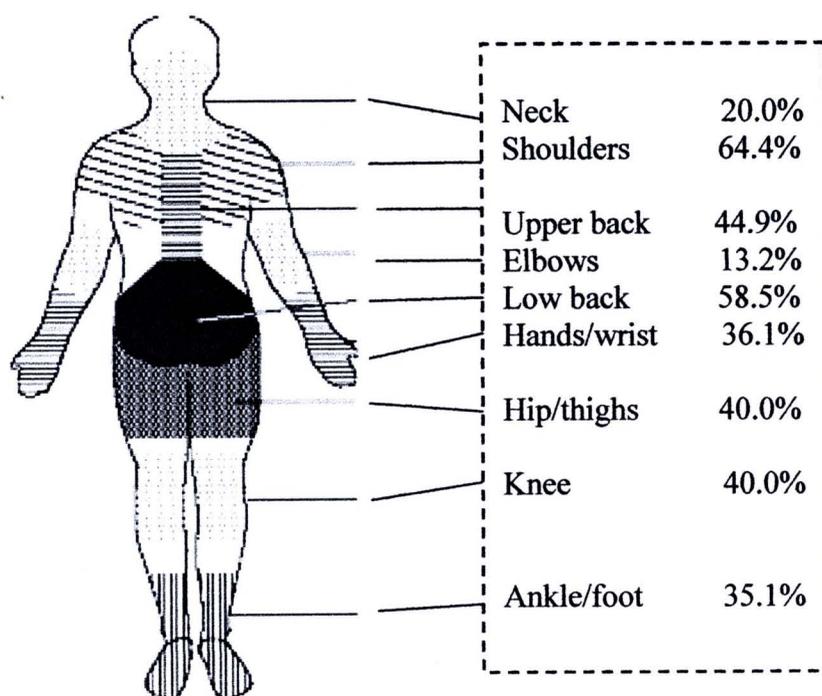
**Table 9** Annual prevalence of work-related musculoskeletal disorders (N = 205)

Work-related Musculoskeletal Disorders	Number	Percent
Annual prevalence		
No	17	8.3
Yes	188	91.7
Annual prevalence with disability		
No	95	46.3
Yes	110	53.7

**Remarks:**

1. The annual prevalence of work-related musculoskeletal disorders among registered nurses was 91.7% (95% CI: 86.8%, 94.9%).
2. The annual prevalence of work-related musculoskeletal disorders with disability was 53.7% (95% CI: 46.6%, 60.6%).

Figure 3 and Table 10 shows the yearly and weekly prevalence of WMSD by 9 body regions. The top three affected regions for the yearly prevalence were shoulder, low back and upper back (64.4%, 58.5% and 44.9% respectively). These ranks were similar in the weekly prevalence. The least common body region which was affected by WMSD was elbow in both situations.



**Figure 3** Annual prevalence of work-related musculoskeletal disorders by 9 body regions (N = 205)

**Table 10** Weekly and yearly prevalence of work-related musculoskeletal disorders by 9 body regions (N = 205)

<b>Work-related Musculoskeletal Disorders by Body Regions</b>	<b>Weekly Prevalence N (%)</b>	<b>Yearly Prevalence N (%)</b>
Neck		
No	177 (86.3)	164 (80.0)
Yes	28 (13.7)	41 (20.0)
Shoulder		
No	74 (36.1)	73 (35.6)
Yes	131 (63.9)	132 (64.4)
Upper back		
No	123 (60.0)	113 (55.1)
Yes	82 (40.0)	92 (44.9)
Elbow		
No	190 (92.7)	178 (86.8)
Yes	15 (7.3)	27 (13.2)
Lower back		
No	90 (43.9)	85 (41.5)
Yes	115 (56.1)	120 (58.5)
Wrist/Hand		
No	135 (65.9)	131 (63.9)
Yes	70 (34.1)	74 (36.1)
Hip/Thigh		
No	133 (64.9)	123 (60.0)
Yes	72 (35.1)	82 (40.0)
Knee		
No	131 (63.9)	123 (60.0)
Yes	74 (36.1)	82 (40.0)
Angle/Foot		
No	138 (67.3)	133 (64.9)
Yes	67 (32.7)	72 (35.1)

#### 4.4 Working activities of the nurses

Due to table 11, it is shown that the top five frequent working activities of the nurses during an eight-hour shift were “documenting nursing records”, “repositioning client in bed”, “preparing & distributing medication”, “preparing & keeping equipment” and “lifting client up in bed” (96.1%, 75.6%, 75.1%, 73.7% and 70.3% respectively). The least working activity was “transferring client by one person” (20.5%).

**Table 11** Working activities of the nurses in an eight-hour shift (N = 205)

<b>Frequent Working Activities in an Eight-hour Shift</b>	<b>Number</b>	<b>Percent</b>
Lifting client up in bed	144	70.3
Transferring client between bed to wheelchair	126	61.5
Transporting client by wheelchair	78	38.0
Repositioning client in bed	155	75.6
Bed bath	129	62.9
Assisting client to toilet	100	48.8
Feeding bed ridden client	60	29.3
Transferring client by one person	42	20.5
Transferring client by two persons	133	64.9
Making bed when client in it	96	46.8
Making bed when client not in it	62	30.2
Moving bed when client in it	110	53.7
Changing absorbent pad	97	47.3
Preparation equipment	151	73.7
Preparing & distributing medication	154	75.1
Documenting nursing records	197	96.1

#### 4.5 Working with awkward postures, repetition, force or vibration

Regarding table 12, the top three frequent awkward postures were neck/shoulder were not in neutral position, standing for long periods and bending & twisting waist (67.3%, 64.4% and 61.4%). The least frequent working activity was “working via vibrating equipment, such as cutting off machine” (4.4%).

**Table 12** Working with awkward postures, repetition, force or vibration (N = 205)

<b>Working with Awkward Postures, Repetition, Force or Vibration</b>	<b>Never N (%)</b>	<b>Sometime N (%)</b>	<b>Often N (%)</b>	<b>Always N (%)</b>
Working above shoulder height	8 (3.9)	138 (67.3)	58 (28.3)	1 (0.5)
Working with arm away from body	5 (2.4)	100 (48.8)	89 (43.4)	11 (5.4)
Hyperextension of wrist	4 (2.0)	79 (38.5)	108 (52.7)	14 (6.8)
Neck/shoulder not in neutral position	2 (1.0)	65 (31.7)	124 (60.5)	14 (6.8)
Bending and twisting waist	3 (1.5)	76 (37.1)	113 (55.1)	13 (6.3)
Sitting for long periods	37 (18.0)	113 (55.1)	48 (23.4)	7 (3.4)
Standing for long periods	9 (4.4)	64 (31.2)	109 (53.2)	23 (11.2)
Working with the help of computer	7 (3.4)	155 (75.6)	39 (19.0)	4 (2.0)
Bending knees for long periods	39 (19.0)	139 (67.8)	26 (12.7)	1 (0.5)
Working in uncomfortable posture	10 (4.9)	114 (55.6)	75 (36.6)	6 (2.9)
Lifting objects between 5-10 kg	26 (12.7)	107 (52.2)	66 (32.2)	6 (2.9)
Lifting objects between 10-25 kg	42 (20.5)	114 (55.6)	44 (21.5)	5 (2.4)
Lifting objects up more than 25 kg	70 (34.1)	71 (34.6)	57 (27.8)	7 (3.4)
Hand and arm demand of high strength	15 (7.63)	86 (42.0)	93 (45.4)	11 (5.4)
Working via vibrating equipment	157 (76.7)	39 (19.0)	8 (3.9)	1 (0.5)
Keeping previous posture continuously	41 (20.0)	112 (54.6)	43 (21.0)	9 (4.4)

#### 4.6 Work mental demand of the nurses

From table 13 and 14, it appeared that majority of the nurses had low work mental demand (73.2%). None of them had high mental demand. About one-fifth of the nurses had unclassified mental demand.

**Table 13** Work mental demand of the nurses (N = 205)

<b>Work Mental Demand</b>	<b>Strongly Agree N (%)</b>	<b>Agree a Bit N (%)</b>	<b>Disagree a Bit N (%)</b>	<b>Strongly Disagree N (%)</b>
Working demands good concentration	20 (9.8)	61 (29.8)	30 (14.6)	94 (45.9)
Working demands good memory	9 (4.4)	50 (24.4)	45 (22.0)	101 (49.3)
Working demands a considerable level of attention	13 (6.3)	44 (21.5)	48 (23.4)	100 (48.8)
Working demands strong responsibility	9 (4.4)	36 (17.6)	17 (8.3)	143 (69.8)
Not complicated, can accomplish task easily	94 (45.9)	51 (24.9)	46 (22.4)	14 (6.8)
The work can be achieved without continuous concentration	103 (50.2)	38 (18.5)	50 (24.4)	14 (6.8)

**Table 14** Level of work mental demand of the nurses (N = 205)

<b>Level of Work Mental Demand</b>	<b>Number</b>	<b>Percent</b>
High	0	0.0
Low	150	73.2
Unclassified	55	26.8

#### 4.7 Job control of the nurses

Due to table 15 and 16, Majority of the nurse (70.7%) had high job control and nearly one-third of them had low job control.

**Table 15** Job control of the nurses (N = 205)

<b>Job Control</b>	<b>Very few N(%)</b>	<b>A few N(%)</b>	<b>Moderate N(%)</b>	<b>Very much N(%)</b>
You are able to control various job-management	0 (0.0)	2 (1.0)	136 (66.3)	67 (32.7)
You are able to deal with the important job	0 (0.0)	1 (0.5)	101 (49.3)	103 (50.2)
You are able to handle time-management	0 (0.0)	9 (4.4)	128 (62.4)	68 (33.2)
You can allocate task to working staff in the unit properly	2 (1.0)	20 (9.8)	121 (59.0)	62 (30.2)
You can determine any task finished in time	0 (0.0)	4 (2.0)	92 (44.9)	109 (53.2)
You participate in making policy and schedule in your work institute	4 (2.0)	51 (24.9)	117 (57.1)	33 (16.1)

**Table 16** Level of job control of the nurses (N = 205)

<b>Level of Job Control</b>	<b>Number</b>	<b>Percent</b>
High	145	70.7
Low	60	29.3

#### 4.8 Social support of the nurses

Due to table 17 and 18, Majority of the nurse (75.6%) had high social support and nearly one-fourth of them had low social support.

**Table 17** Social support of the nurses (N = 205)

<b>Social Support</b>	<b>Never N (%)</b>	<b>Rare N (%)</b>	<b>Sometimes N (%)</b>	<b>Frequent N (%)</b>
Supervisor is concerned	0 (0.0)	16 (7.8)	132 (64.4)	57 (27.8)
Friendly coworkers	0 (0.0)	8 (3.9)	114 (55.6)	83 (40.5)
Supervisor pays attention	1 (0.5)	9 (4.4)	104 (50.7)	91 (44.4)
Competent coworkers	0 (0.0)	0 (0.0)	86 (42.0)	119 (58.0)
Helpful supervisor	0 (0.0)	9 (4.4)	101 (49.3)	95 (46.3)
Helpful coworkers	0 (0.0)	3 (1.5)	115 (56.1)	87 (42.4)

**Table 18** Level of social support of the nurses (N = 205)

<b>Level of Social Support</b>	<b>Number</b>	<b>Percent</b>
High	155	75.6
Low	50	24.4

#### 4.9 Working task attitude of the nurses

According to table 19, majority of registered nurses at Srinagarind Hospital had rather high working task attitude. The median of visual analog scale of items indicating feeling of the work or during work ranged from 7 to 10.

**Table 19** Working task attitude of the nurses (N = 205)

<b>Feeling of the Work or During Work (Visual Analog Scale from 0 to 10)</b>	<b>Min, Max</b>	<b>Mean, SD</b>	<b>Median, IQR</b>
Fatigue	2, 10	6.9, 1.8	7.0, 2.0
Risk factor or cause of accident	1, 10	6.4, 2.1	7.0, 3.0
Should be concerned on the job	3, 10	7.5, 1.8	8.0, 3.0
Difficult and complicated	2, 10	7.1, 1.9	7.0, 3.0
Working rhythm	2, 10	6.5, 1.9	7.0, 3.0
Responsibility	6, 10	9.3, 1.1	10.0, 1.0
Be interested on working	1, 10	8.0, 1.7	8.0, 2.0
Working independently	2, 10	6.5, 1.9	7.0, 3.0

#### 4.10 Bivariate analysis

Regarding table 20, it appeared that only cumulative duration of employment had marginal significant association with the annual WMSD with disability. All other socio-demographic variables show no significant association.

**Table 20** Association between annual WMSD with disability and socio-demographic characteristics (N = 205)

Socio-demographic Characteristics	N	% WMSD with disability	Statistics	P-value
Gender			Pearson chi-square	0.460
Male	16	62.5		
Female	189	52.9		
Marital status			Fisher's exact test	0.786
Single	94	53.2		
Married	102	52.9		
Divorced / Separated	9	66.7		
Cumulative duration of employment (years) Having WMSD (N=188): Median, IQR = 10, 14 No have WMSD (N=17): Median, IQR = 12, 12			Mann-Whitney U test	0.096
Age (years) Having WMSD (N=188): Median, IQR = 33, 14 No have WMSD (N=17): Median, IQR = 34, 12			Mann-Whitney U test	0.122
Weight (kilograms) Having WMSD (N=188): Median, IQR = 53, 11 No have WMSD (N=17): Median, IQR = 53, 10			Mann-Whitney U test	0.614
Height (centimeters) Having WMSD (N=188): Median, IQR = 158, 6 No have WMSD (N=17): Median, IQR = 158, 6			Mann-Whitney U test	0.728

From table 21, there were 2 working activities that had statistical significant association with WMSD with disability. They were “frequent making bed when client in it” and “frequent documenting nursing records” (p-value 0.036 and 0.026 respectively). The activity of “frequent preparation of equipment” had marginal significant relationship (p-value 0.057).

**Table 21** Association between annual WMSD with disability and working activities (N = 205)

Working Activities	N	% WMSD with disability	Statistics	P-value
Frequent documenting nursing records			Fisher's exact test	0.026
No	8	12.5		
Yes	197	55.3		
Frequent making bed when client in it			Pearson chi-square	0.036
No	109	46.8		
Yes	96	61.5		
Frequent preparation of equipment			Pearson chi-square	0.057
No	54	42.6		
Yes	151	57.6		
Frequent transferring client by one person			Pearson chi-square	0.115
No	163	56.4		
Yes	42	42.9		
Frequent moving bed when client in it			Pearson chi-square	0.164
No	95	48.4		
Yes	110	58.2		
Frequent bed bath			Pearson chi-square	0.273
No	76	48.7		
Yes	129	56.6		
Frequent making bed when client not in it			Pearson chi-square	0.319
No	143	55.9		
Yes	62	48.4		

**Table 21** Association between annual WMSD with disability and working activities (N = 205)  
(Cont.)

Frequent transferring client between bed to wheelchair			Pearson chi-square	0.329
No	97	49.4		
Yes	126	56.3		
Frequent assisting client to toilet			Pearson chi-square	0.349
No	105	50.5		
Yes	100	57.0		
Frequent repositioning client in bed			Pearson chi-square	0.356
No	50	48.0		
Yes	155	55.5		
Frequent feeding bed ridden client			Pearson chi-square	0.388
No	145	51.7		
Yes	60	58.3		
Frequent changing absorbent pad			Pearson chi-square	0.565
No	108	55.6		
Yes	97	51.5		
Frequent preparing & distributing medication			Pearson chi-square	0.658
No	51	51.0		
Yes	154	54.5		
Frequent lifting client up in bed			Pearson chi-square	0.823
No	61	52.5		
Yes	144	54.2		
Frequent transferring client by two persons			Pearson chi-square	0.852
No	72	52.8		
Yes	133	54.1		
Frequent transporting client by wheelchair			Pearson chi-square	0.966
No	127	53.5		
Yes	78	53.8		

Due to table 22, no variable indicating physical workload had neither significant nor marginal significant association with WMSD with disability.

**Table 22** Association between annual WMSD with disability and physical workload (N = 205)

<b>Physical Workload</b>	<b>N</b>	<b>% WMSD with Disability</b>	<b>Statistics</b>	<b>P- value</b>
<b>Lifting objects between 5-10 kg</b>			Fisher's exact test	0.114
Never	26	57.7		
Sometimes	107	52.3		
Often	66	50.0		
Always	6	100.0		
<b>Sitting for long periods</b>			Fisher's exact test	0.440
Never	37	48.6		
Sometimes	113	58.4		
Often	48	45.8		
Always	7	57.1		
<b>Neck/shoulder are not in neutral position</b>			Fisher's exact test	0.456
Never	2	0.0		
Sometimes	65	50.8		
Often	124	56.5		
Always	14	50.0		
<b>Lifting objects between 10-25 kg</b>			Fisher's exact test	0.492
Never	42	59.5		
Sometimes	114	50.0		
Often	44	54.5		
Always	5	80.0		

**Table 22** Association between annual WMSD with disability and physical workload (N = 205) (Cont.)

Physical Workload	N	% WMSD with Disability	Statistics
Keeping the previous posture continuously			Fisher's exact test
Never	41	48.8	
Sometimes	112	56.3	
Often	43	55.8	
Always	9	33.3	
Hyperextension of wrist and demand of high strength			Fisher's exact test
Never	4	25.0	
Sometimes	79	55.7	
Often	108	54.6	
Always	14	42.9	
Working with arm away from body			Fisher's exact test
Never	5	80.0	
Sometimes	100	53.0	
Often	89	53.9	
Always	11	45.5	
Bending and twisting waist			Fisher's exact test
Never	3	33.3	
Sometimes	76	50.0	
Often	113	56.6	
Always	13	53.8	
Working with computer for long periods			Fisher's exact test
Never	7	42.9	
Sometimes	155	55.5	
Often	39	48.7	
Always	4	50.0	

**Table 22** Association between annual WMSD with disability and physical workload (N = 205) (Cont.)

Physical Workload	N	% WMSD with Disability	Statistics
Working above shoulder height			Fisher's exact test
Never	8	50.0	
Sometimes	138	55.1	
Often	58	51.7	
Always	1	0.0	
Working in uncomfortable posture			Fisher's exact test
Never	10	40.0	
Sometimes	114	53.5	
Often	75	56.0	
Always	6	50.0	
Hand and arm demand of high strength			Linear-by- linear association
Never	15	53.4	
Sometimes	86	51.2	
Often	93	57.0	
Always	11	45.5	
Working using vibrating equipment			Fisher's exact test
Never	157	52.2	
Sometimes	39	56.4	
Often	8	62.5	
Always	1	100.0	
Working need to bend the knees for long periods			Fisher's exact test
Never	39	53.8	
Sometimes	139	54.0	
Often	26	53.8	
Always	1	0.0	

**Table 22** Association between annual WMSD with disability and physical workload (N = 205) (Cont.)

<b>Physical Workload</b>	<b>N</b>	<b>% WMSD with Disability</b>	<b>Statistics</b>
<b>Lifting objects up more than 25 kg</b>			Fisher's exact test
Never	70	54.3	
Sometimes	71	52.1	
Often	57	54.4	
Always	7	57.1	
<b>Standing for long periods</b>			Fisher's exact test
Never	9	55.6	
Sometimes	64	54.7	
Often	109	53.2	
Always	23	52.2	

Table 23 shows that social support had significant association while job control had marginal significant association with WMSD with disability (p-value 0.007 and 0.092 respectively). Work mental demand revealed no significant association.

The results of bivariate analysis were summarized in table 24. There were 6 potential significant factors ( $p \leq 0.10$ ) which might associate with WMSD with disability.

**Table 23** Association between annual WMSD with disability and psychosocial aspects at work (N = 205)

Psychosocial Aspects at Work	N	% WMSD with disability	Statistics	P-value
Social support			Pearson chi-square	0.007
Low	60	68.3		
High	145	47.6		
Job control			Pearson chi-square	0.092
Low	50	64.0		
High	155	50.3		
Work mental demand			Pearson chi-square	0.270
Low	150	51.3		
High	0	0.0		
Unclassified	55	60.0		

**Table 24** Summary of potential significant factors ( $p \leq 0.10$ ) from bivariate analysis

Potential Significant Factor	N	% WMSD with Disability	COR	95% CI	P-value
Social support					0.007
High	145	47.6	1.00		
Low	60	68.3	1.75	0.87, 3.57	
Frequent documenting nursing records					0.026
No	8	12.5	1.00		
Yes	197	55.3	8.67	1.07, 394.27	
Frequent making bed when client in it					0.036
No	109	46.8	1.00		
Yes	96	61.5	1.81	1.00, 3.29	
Frequent preparation of equipment					0.057
No	54	42.6	1.00		
Yes	151	57.6	1.83	0.93, 3.61	
Job control					0.092
High	155	50.3	1.00		
Low	50	64.0	2.38	1.21, 4.71	
Cumulative duration of employment (years)					0.096
Having WMSD (N=188): Median, IQR = 10, 14			NA	NA	
No have WMSD (N=17): Median, IQR = 12, 12			NA	NA	

#### 4.11 Multivariate analysis

From multivariate analysis in table 18, it appeared that only one factor had significant association with the annual prevalence of WMSD with disability. It was low job control with adjusted odd ratio of 2.22 (95% CI: 1.13, 4.38). In the samples, a nurse who had low job control had the chance to get WMSD with disability 2.22 times greater than that of a nurse who had high job control after adjusting the effect of social support, cumulative duration of employment, frequent preparation of equipment, frequent documenting nursing records and frequent making bed when client in it. In the study population, a nurse who had low job control would have the chance to get WMSD with disability from 1.13 to 4.38 times greater than that of a nurse who had high job control after adjusting of the above mentioned factors.

**Table 25** Multivariate analysis of association between annual WMSD with disability and potential significant factors (N = 205)

Potential Significant Factors	N	% WMSD with Disability	COR	AOR	95% CI	P-value
Job control						0.021
High	155	50.3	1.00	1.00		
Low	50	64.0	2.38	2.22	1.13, 4.38	
Frequent preparation of equipment						0.076
No	54	42.6	1.00	1.00		
Yes	151	57.6	1.83	1.83	0.94, 3.58	
Social support						0.116
High	145	47.6	1.00	1.00		
Low	60	68.3	1.75	1.74	0.87, 3.49	
Frequent documenting nursing records						0.134
No	8	12.5	1.00	1.00		
Yes	197	55.3	8.67	5.15	0.60, 43.92	
Frequent making bed when client in it						0.187
No	109	46.8	1.00	1.00		
Yes	96	61.5	1.81	1.49	0.82, 2.69	
Cumulative duration of employment (years)				0.99	0.95, 1.33	0.484
Having WMSD (N=188): Median, IQR = 10, 14			NA			
No have WMSD (N=17): Median, IQR = 12, 12			NA			