

Effects of Workplace Conditions on Taiwanese Workers' Quality of Life

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Background. Rapid industrialization in Taiwan over the past 20 years has resulted in many changes in the workplace and has had a considerable affect on the quality of life (QOL) of Taiwan's workers. QOL has a profound effect on workers' ability to adapt and function in the workplace. The objective of this study was to evaluate workers' QOL with regard to conditions in the workplace.

Methods. We selected 1,726 workers from the Labor Insurance Bureau's registry (7,597,386 Taiwanese workers) using proportional probability sampling, and interviewed them with a structured questionnaire. The demographic profiles of the workers in this study were very similar to those of the general worker population in Taiwan. The QOL of workers was determined using the modified World Health Organization Quality of Life (WHOQOL) questionnaire-Taiwanese version.

Results. Workers were most concerned about the following: career promotion, workload and nature of the work, salary, and benefits. The most frequently reported methods of coping with stress were sleeping, exercising and complaining to colleagues. After adjusting for age, gender and occupation using multiple regression analysis, the number of perceived hazards in the workplace, stress and anxiety, and satisfaction with safety and health conditions all had significant effects on workers' QOL.

Conclusions. Workplace conditions (such as perceived number of hazards in the workplace, safety and health conditions, stress and anxiety) were significantly correlated to workers' QOL. The authors recommend that workers be educated to care about the safety conditions in the workplace and that companies try to improve workers' QOL and their working environment.

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Key words

quality of life, Taiwanese workers, workplace conditions

INTRODUCTION

The workplace poses a variety of hazards to workers, such as physical and chemical hazards, which may harm workers' health. The nature of the work will affect the kinds of hazards posed and injuries sustained by the workers [1]. The health of workers, in the context of safety in the workplace, has become a great concern to Taiwan's Council of Labor (COL), and workers' self-evaluation of

health in the workplace has been periodically monitored since 1994. The frequency of symptoms related to occupation has increased, especially musculoskeletal problems. The percentage of males and females complaining of musculoskeletal problems increased from 37.3% and 40.3%, respectively, in 1994 to 50.3% and 55.1%, respectively, in 1998. Other symptoms include eye and respiratory discomfort. In Taiwan, all workers' health must be periodically monitored. The percentage of pre-employment health examinations increased from 28.2% in 1990 to 37.2% in 1998. The percentage of workers who were periodically monitored increased from 26.5%

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in 1990 to 33.1% in 1998. Nine percent of workers reported feeling stress and anxiety in the workplace. Fifty one percent reported experiencing stress but not anxiety [2]. Stress and anxiety in the workplace can affect workers' performance efficiency and quality of life (QOL) [3]. QOL in this study is defined as individuals' perceptions of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [4]. Previous studies [5,6] have shown that QOL can be affected by life satisfaction, which in turn may be related to conditions in the workplace and may affect the worker turnover rate. There is little data in the literature to show the effect of work conditions in the workplace on QOL. The objective of this study was to evaluate workers' QOL and to understand the relationship between QOL and conditions in the workplace.

MATERIALS AND METHODS

Subjects Population

We randomly selected 1884 workers from Taiwan's Labor Insurance Bureau registry (7,597,386) on a proportional probability basis. Further details of the sampling strategy used are described in Liang (2001) [7]. Subjects' demographic profiles were very similar to individuals of each occupation in the general worker population. Of the 1884 workers, 1726 (91.6%) were interviewed.

Instruments

A structured questionnaire which included workers' demographic data and QOL was administered to each worker. Conditions in the workplace were determined by selfevaluation in the form of a questionnaire. Workers were interviewed to determine which items on the questionnaire caused stress and anxiety, and which coping strategies were employed. Workers estimated the number of hazards in the workplace and were asked to assess how well the workplace made provisions for workers' health and safety.

Quality of life is a broad ranging concept, incorporating, in a complex way, the persons' physical health, psychological state, level of independence, social relations, personal beliefs, and relationship to salient features of the work environment [8]. The World Health Organization Quality of Life (WHOQOL) questionnaire is a multidimensional, multilingual profile which was designed for cross-cultural subjective assessment [9]. The main outcome measures were QOL scores for the Taiwan edition of the WHOQOL-BREF questionnaire which includes 24 facets and two global WHOQOL items from the WHOQOL conceptual constructs and two additional facets specifically designed for the Taiwan WHOQOL-BREF edition [10]. The 28 facets on the QOL questionnaire were assigned conceptually to four domains: physical, psychological, social relationships and environment. The scores for some facets were reversed to allow for comparisons with other facets with a scale of 1 to 5 representing "very bad(1), bad(2), neither bad nor good(3), good(4), very good(5)". A higher score meant a higher QOL in that facet.

Interviewers completed each interview within 30 to 40 minutes. Companies/factories were contacted to arrange time for the workers to be interviewed privately. Before the study, the questionnaire was pre-tested to check the wording, sequencing and ease of comprehension and was modified accordingly. Five experts from the various fields (public health, statistics, environmental health, epidemiology and occupational hygiene) conducted a content validity test. Twenty subjects were used to test the reliability of the QOL questionnaire (Cronbach's coefficient, range: 0.83–0.87).

Statistical Analysis

All data were analyzed using the SAS/pc 6.12 package [11] and frequencies of stress and anxiety and coping strategies among males and females were compared. Multivariate logistic regression was used to analyze the factors that affected QOL. There were no

Table 1. Causes of stress and anxiety in the workplace among males and females (multi-choice)

	Male (N = 859) n (%)	Female (N = 867) n (%)	<i>p</i> value*
Job does not fit career plan	72 (8.4)	90 (10.4)	NS
Dissatisfaction with job characteristics	205 (23.9)	205 (23.6)	NS
Poor workplace conditions	135 (15.7)	110 (12.7)	NS
Interpersonal problems with co-workers	67 (7.8)	67 (7.7)	NS
Personality conflict with the manager	85 (9.9)	88 (10.1)	NS
Problem with personnel management	122 (14.2)	136 (15.7)	NS
No opportunity for self-improvement	109 (12.7)	129 (14.9)	NS
Problem with salary/benefits	173 (20.1)	207 (23.9)	NS
Problems with promotion	221 (25.7)	193 (22.3)	NS
Sexual discrimination/harassment	16 (1.9)	35 (4.0)	< 0.01
Distance of workplace from home	43 (5.0)	38 (4.4)	NS
Other	58 (6.8)	40 (4.6)	NS
None	303 (35.3)	312 (36.0)	NS

*Based on chi-square test.

Table 2. Coping methods among males and females (multi-choice)

	Male (N = 859) n (%)	Female (N = 867) n (%)	<i>p</i> value*
Sleeping	507 (59.0)	529 (61.0)	NS
Exercise	307 (35.7)	296 (34.1)	NS
Going to movie theaters/Shopping	153 (17.8)	303 (34.9)	< 0.01
Traveling	103 (12.0)	164 (18.9)	< 0.01
Drinking	98 (11.4)	19 (2.2)	< 0.01
Smoking	163 (19.0)	16 (1.8)	< 0.01
Playing video parlor games	79 (9.2)	43 (5.0)	< 0.01
Singing or playing musical instruments	84 (9.8)	98 (11.3)	NS
Praying	63 (7.3)	98 (11.3)	< 0.01
Complaining to friends or relatives	184 (21.4)	316 (36.4)	< 0.01
Discussing problems with the boss	92 (10.7)	75 (8.7)	NS
Other	53 (6.2)	47 (5.4)	NS

*Based on chi-square test.

significant differences between males and females with regard to the demographic data. Because of some incomplete questionnaire items, all analyses were based on the maximum valid sample.

RESULTS

Table 1 shows the items for stress and anxiety in the workplace for males and females. There were no differences for all items except for sexual discrimination/harassment (females = 4.0%, males = 1.9%). Approximately 65% of workers reported experiencing stress and anxiety in the workplace. The most frequently reported item among males was career advancement and promotion (25.7%), followed by nature of

work (23.9%) and workplace conditions (15.7%). For females, the most frequently reported item was salary and benefits (23.9%), followed by nature of work (23.6%) and career advancement and promotion (22.3%).

The coping strategies of male and female workers are compared in Table 2. The most frequent strategy among males was sleeping (59.0%), followed by exercising (35.7%). Among females, the most frequent coping strategy was sleeping (61.0%), followed by complaining to friends or relatives (36.4%). There were significant differences between males and females for the following items: alcohol consumption, smoking, going to video game parlors, going to movie theaters/shopping, traveling, praying, and complaining to friends or relatives. The former three items were more

Table 3. Relationship of perceived number of workplace hazards and quality of life for males and females

	N	Physical	Psychological	Social	Environmental
Males					
0	353	4.41 ± 0.49	3.62 ± 0.57	3.56 ± 0.51	3.59 ± 0.50
1	195	4.40 ± 0.41	3.65 ± 0.52	3.54 ± 0.54	3.60 ± 0.52
2	135	4.33 ± 0.52	3.51 ± 0.61	3.46 ± 0.53	3.48 ± 0.47
≥3	175	4.16 ± 0.58	3.31 ± 0.56	3.36 ± 0.52	3.28 ± 0.46
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01
Females					
0	564	4.34 ± 0.50	3.50 ± 0.60	3.54 ± 0.19	3.56 ± 0.50
1	140	4.34 ± 0.48	3.49 ± 0.56	3.50 ± 0.50	3.50 ± 0.52
2	79	3.95 ± 0.60	3.27 ± 0.58	3.36 ± 0.53	3.31 ± 0.43
≥3	81	3.98 ± 0.52	3.14 ± 0.58	3.23 ± 0.53	3.20 ± 0.45
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01

* Based on F-test of one-way ANVOA.

Table 4. Comparison of male and female workers' satisfaction with workplace conditions and quality of life

	N	Physical	Psychological	Social	Environmental
Males					
Excellent	102	4.54 ± 0.40	3.90 ± 0.53	3.80 ± 0.52	3.86 ± 0.50
Good	357	4.41 ± 0.46	3.64 ± 0.54	3.59 ± 0.49	3.58 ± 0.49
No opinion	353	4.25 ± 0.57	3.39 ± 0.54	3.35 ± 0.50	3.36 ± 0.43
Poor	353	3.99 ± 0.60	3.19 ± 0.56	3.27 ± 0.54	3.23 ± 0.51
Very poor	4	4.02 ± 0.86	2.79 ± 0.86	2.95 ± 1.12	2.84 ± 0.92
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01
Females					
Excellent	87	4.60 ± 0.68	3.85 ± 0.62	3.85 ± 0.50	3.88 ± 3.52
Good	350	4.36 ± 0.42	3.54 ± 0.57	3.57 ± 0.45	3.59 ± 0.47
No opinion	342	4.18 ± 0.55	3.31 ± 0.56	3.37 ± 0.49	3.34 ± 0.45
Poor	52	4.18 ± 0.55	3.31 ± 0.56	3.37 ± 0.49	3.18 ± 0.47
Very poor	4	3.79 ± 0.27	3.13 ± 0.42	3.10 ± 0.48	2.88 ± 0.23
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01

* Based on F-test of one-way ANVOA.

frequent among males, and the latter four items were more frequent among females.

There was a significant negative correlation between number of hazards and QOL for both males and females. The higher the perceived number of hazards in the workplace, the lower the QOL was. Males had consistently higher QOL scores in each of the four domains compared to females. The mean score in the physical domain was higher than in the other domains (Table 3).

Male and female workers' satisfaction with workplace conditions and QOL is compared in Table 4. Males and females' QOL scores were similar in each domain, but males' QOL scores were slightly higher. There were significant positive correlations between QOL scores and satisfaction with workplace

conditions. When the male satisfaction rating was 'very poor', QOL scores in psychological, social and environmental domains were lower than 3. However, for females, only the latter domain was lower than 3.

Table 5 shows the relationship of stress and anxiety with QOL. When workers (males and females) reported both stress and anxiety in the workplace, QOL scores were lowest in each of the four domains, followed by stress only. There were significant differences between the three groups (None, stress only, both stress and anxiety) in each domain.

Using multiple regression analysis, the males' QOL scores in the physical and psychological domains were higher than for females. QOL was lowest among workers under the age of 30. The highest QOL score

Table 5. Relationship of stress and anxiety among males and females with quality of life

	N	Physical	Psychological	Social	Environmental
Males					
None	227	4.52 ± 0.40	3.74 ± 0.55	3.65 ± 0.50	3.67 ± 0.50
Stress only	507	4.30 ± 0.53	3.50 ± 0.56	3.48 ± 0.53	3.46 ± 0.48
Both	116	4.19 ± 0.52	3.35 ± 0.60	3.27 ± 0.49	3.28 ± 0.51
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01
Females					
None	236	4.43 ± 0.50	3.65 ± 0.01	3.63 ± 0.43	3.66 ± 0.52
Stress only	491	4.24 ± 0.52	3.40 ± 0.56	3.46 ± 0.50	3.40 ± 0.49
Both	109	4.09 ± 0.56	3.20 ± 0.65	3.30 ± 0.60	3.29 ± 0.52
<i>p</i> *		< 0.01	< 0.01	< 0.01	< 0.01

* Based on F-test of one-way ANVOA.

was among 45 to 60 year-olds in the psychological domain, but for 30 to 44 year-olds, the highest QOL score was in the social domain. For occupation, QOL scores were highest among specialists. There was a negative correlation between QOL and anxiety and stress: workers who reported both stress and anxiety had the lowest QOL scores. There was a negative correlation between number of perceived hazards in the workplace and QOL scores, and a positive correlation between satisfaction with workplace safety and health conditions and QOL scores (Table 6).

DISCUSSION

The increasing number of hazards in the workplace over the past two decades has had a considerable impact on workers' health. In 1990, Taiwan's Council of Labor implemented a plan to improve safety and health conditions in the workplace. The measures included a zero injury policy, and self-monitoring of safety conditions. In addition, companies and factories were encouraged to improve and maintain health and safety conditions. More than 80% of companies in Taiwan employ 30 workers or less, and the managers of these companies have so far shown a poor response to the Council of Labor's health and safety guidelines. To help combat this problem the Council has recently begun monitoring workplace health and safety conditions in different kinds of industries to identify which companies pose the greatest hazards to

workers [12]. A survey of 18,120 workers conducted by Taiwan's Council of Labor in 1998, revealed that 57% of workers were dissatisfied with conditions in the workplace. The chief complaint of all workers was exposure to workplace hazards due to noise, dust and temperature. About 20% reported having fallen in the workplace, and 29% reported sustaining cuts or abrasions.

Causes of stress and anxiety were similar for males and females. Males were most concerned about problems related to promotion (25.7%), whereas females were most concerned about salary and benefits (23.9%). Neither males nor females expressed much concern about conditions in the workplace. This may be due to a perceived lack of hazards in the workplace or to workers' abilities to tolerate these hazards. Pugliesi [13] stated that "differential exposure and vulnerability to social roles and role characteristics have been suggested to account for gender differences in well-being" and that "these differences occur primarily in the proximate effects of self-esteem and social integration on distress and happiness". Our results indicate that Taiwanese workers are able to accept a hazardous workplace provided that they are satisfied with their job in other areas, such as salary and benefits. According to our study, males' and females' coping methods were also significantly different except for sleeping which was the most common coping strategy for both sexes. Discussing problems with the manager is generally regarded as an effective way of

Table 6. Factors affecting workers' quality of life using multiple regression analysis

Domain	N	Physical		Psychological		Social		Environmental	
		β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Sex									
Female	773	0		0		0		0	
Male	801	0.096	***	0.112	***	0.021		0.026	
Age (yr)									
≤29	464	0		0		0		0	
30-44	739	0.000		0.068	*	0.110	***	0.041	
45-59	342	-0.061		0.129	**	0.095	**	0.084	*
≥60	29	-0.149		0.072		0.127		0.122	
Occupation									
Non/semi-skilled	445	0		0		0		0	
Skilled	351	-0.012		-0.036		-0.011		-0.050	
Semi-professional	370	0.050		0.032		0.082	*	0.018	
Professional	360	0.016		0.052		0.046		-0.023	
Specialist	48	0.187	*	0.167	*	0.129		0.147	*
Stress and Anxiety									
None	422	0		0		0		0	
Stress only	938	-0.173	***	-0.178	***	-0.115	***	-0.123	***
Both	214	-0.209	***	-0.277	***	-0.239	***	-0.242	***
Number of perceived hazards									
0	822	0		0		0		0	
1	317	0.036		0.065		0.011		0.027	
2	199	-0.141	***	-0.053		-0.051		-0.082	*
≥3	236	-0.175	***	-0.185	***	-0.111	**	-0.187	***
Satisfaction with safety and health conditions									
Very poor	7	0		0		0		0	
Poor	84	0.096		0.249		0.391	*	0.490	**
No opinion	639	0.398	*	0.481	*	0.492	**	0.606	***
Good	664	0.530	**	0.651	**	0.669	***	0.790	***
Excellent	180	0.662	***	0.893	***	0.840	***	1.020	***

p* < 0.05; *p* < 0.01; ****p* < 0.001 (Based on Wald's test).

coping with stress and anxiety in the workplace, and yet our results showed that only about 10% of males and females reported using this coping strategy. Females were more willing than males to share their problems with a relative or friend. However, both male and female reluctance to discuss their stress at work could have a marked effect on their commitments to the workplace and the QOL of the individual workers. The vast majority of companies in Taiwan do not make use of psychological counselors, so workers must relieve their stress and anxiety in other ways, such as sleeping, exercise and shopping. The DOH is currently implementing health promotion and education in semi-conductor manufacturers and includes recommendations to increase physical activity and participate in

other stress-relieving activities, such as meditation and flower arranging. Companies are being encouraged to promote these stress reduction activities among their workers.

Workplace QOL was significantly related to perceived number of hazards and satisfaction with safety and health conditions. There have been few studies which have investigated the relationship between workplace stressors and workers' QOL. A previous study [14] emphasized the relationship between interpersonal conflict at work and psychological outcomes. Cheung compared sex differences with job satisfaction and found that sex was not attributable to differences in work values. Cheung suggests that "placing higher values on the tasks and team dimensions, and a lower value on the

reward dimensions lead to greater job satisfaction" [15]. Job factors (e.g. job control, pay) and job attitudes (e.g. satisfaction, alienation and stress) had a significant effect on workers' physical and psychological well-being [5]. A longitudinal study was conducted to investigate women's work experiences in a male-dominated industry. The results showed a relationship between work-role quality and QOL and self-reported health [16]. In the current study, our results indicate that workplace conditions may be affected by job satisfaction which in turn may have an impact on QOL. Satisfaction with safety and health conditions is one part of overall job satisfaction. Organizational and individual factors affect mental health and job satisfaction [17]. Workers who reported that they perceived safety and health conditions to be excellent had the highest QOL scores, especially for the environmental domain.

Because the current study is cross-sectional, it is very difficult to accurately establish the relationship between QOL and workplace conditions. In addition, there is no baseline data with which to compare our data. Future studies may be compared with the results of the current study to show the effectiveness of future government policies or programs related to health and safety. Another limitation is the use of questionnaires which may not accurately reflect the workers' exposure to hazards in the workplace. Despite these limitations, the results of this study are very consistent. Furthermore, our data could be a reference used by Taiwan's Council of Labor to monitor and improve health and safety conditions.

In conclusion, our findings show that males and females employ different coping strategies and that there are different causes of stress and anxiety for both sexes. Only 13.5% of males and 12.5% of females reported that poor workplace conditions caused stress and anxiety. Workplace conditions (such as perceived number of hazards in the workplace, safety and health conditions, level of stress and anxiety) were significantly

correlated to workers' QOL. The authors suggest that companies constantly monitor and improve workplace conditions in order to minimize the risks posed to workers and thereby reduce workers' stress and anxiety.

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REFERENCES

1. Lund T, Borg V. Work environmental and self-rated health as predictors of remaining in work 5 years later among Danish employees 35-59 years of age. *Exp Aging Res* 1999;25:429-34.
2. Chen S. Survey on safety and health condition among Taiwanese workers. *Bull Safety and Health (Chinese)* 2000;42:6-9.
3. Achat H, Kawachi I, Levine S, et al. Social networks, stress and health-related quality of life. *Qual Life Res* 1998;7:735-50.
4. Coburn D. Work and general psychological and physical well-being. *Int J Health Serv* 1978;8:415-35.
5. Skevington SM. Investigating the relationship between pain and discomfort and quality of life, using the WHOQOL. *Pain* 1998;76:395-406.
6. Demestoy N, Brouillette L, De Courval LP. Stress and residents' lifestyle. Survey of family medicine residents at McGill University. *Can Fam Physician* 1993;39:1576-80.
7. Liang WM, Kuo HW, Wang CB, et al. Development of an occupation referent population for epidemiological study. Taiwan IOSH88-M301, 1999.
8. The WHOQOL Group. The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties. *Soc Sci Med* 1998;46:1569-85.
9. The WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychol Med* 1998;28:551-8.
10. Lin ML, Yao KP, Hwang JS, et al. Scale descriptor selection for Taiwan-version of questionnaire of World Health Organization quality of life. *Taiwan Public Health Assoc J* 1999;18:262-70.
11. SAS/STAT, User's Guide. Release 6.12, SAS Cary, N.C., 1992.
12. Chang CK. Introduction of assessment and self-evaluation in hazardous workplace based on regulation of inspection. *Bull Work Safety and Health (Taiwan)* 1994;7:6-7.
13. Pugliesi K. Work and well-being: gender differences

- in the psychological consequences of employment. *J Health Soc Behav* 1995;36:57-71.
14. Frone MR. Interpersonnal conflict at work and psychological outcomes: testing a model among young workers. *J Occup Health Psychol* 2000;5: 246-55.
 15. Cheung CK, Scherling SA. Job satisfaction, work values, and sex differences in Taiwan's organization. *J Psychol* 1999;133:563-75.
 16. Bergman B, Carlsson SG, Wright I. Women's work experiences and health in a male-dominated industry. A longitudinal study. *J Occup Environ Med* 1996;38:663-72.
 17. Elovainio M, Kivimaki M, Steen N, et al. Organizational and individual factors affecting mental health and job satisfaction: a multilevel analysis of job control and personality. *J Occup Health Psychol* 2000;5:269-77.

工作環境特性對台灣地區勞工生活品質之影響

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背景 近二十年台灣地區工業化快速地發展，導致工作環境有劇烈之改變，同時這種改變有相當程度會影響勞工之生活品質，而導致勞工在職場適應性及功能之不良影響。因此，本研究之目的在評估工作環境之條件對工人生活品質之影響。

方法 利用等機率抽樣方式，從勞保局7,597,386勞工檔案中隨機抽出1,726代表性勞工。此樣本之人口基本特性與母群體十分相似。勞工生活品質之測量是利用世界衛生組織發展之量表翻譯成中文版。

結果 一般勞工在職場最關心的事物前三項為：個人前途發展、工作負荷及特性、薪資及福利。而最常面對這些壓力之方法包括：睡覺、運動及向同事抱怨居多。經多變項迴歸分析得知影響工人生活品質之因素包括：性別、職場危害之數目、壓力及焦慮程度及對工作場所安全及衛生滿意度。

結論 影響工人生活品質之工作環境因素包括職場危害之數目、壓力及焦慮程度及對工作場所安全及衛生滿意度。作者建議勞工應教導注意職場之安全狀況，同時業者亦應儘量改進工人之生活品質及其工作環境。（中台灣醫誌 2002;7:206-14）

關鍵詞

生活品質，工人，工作環境

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