

Background

The flow of construction workers in developed and developing countries has become one of the most important social phenomena in the global context. Approximately 40 million construction workers worked in all parts of China in 2010¹ and in America² the number of construction workers increased to more than 35.5 million by 2010. However they were not paid enough attention by people worldwide, and were still sustaining various physical health problems in addition to social, environmental and economic problems. For example, the rate of occupational accidents and diseases among construction workers is still high worldwide³. According to statistics from International Labor Organization (ILO), 60,000 or 16.9% of 355,000 occupational safety accidents occurred in construction sites worldwide in 2003; this means one accident occurred every minute on a construction site³.

In China, construction workers were considered to be the second largest group of workers after agricultural workers, and the problems relating to quality of life among them were focused on not only by the government but also by other concerned non-governmental organizations. Because this special group of workers had greater working intensity and faced more survival and working stress than any other general group of workers, they were even unable to get support from their families and friends⁴. Furthermore, the environment of construction workers was unhealthy due to noise, dust or other hazards⁵. Their physical and psychological health was affected directly and indirectly⁶, which resulted in their quality of life being definitely influenced. It may be assumed that their quality of life is lower than the general population's, additionally, many basic needs of construction workers could not be satisfied^{7,4}.

Most published research related to quality of life focused on students, patients, the elderly and migrant workers, with the research on quality of life of construction workers limited⁷. Therefore, it was important to study the quality of life of construction workers in China to provide useful information⁸, so that the health care profession would be able to take steps to improve the health and the quality of life of construction workers.

Objective

The purpose of this research was to identify the quality of life of construction workers in Guangdong Province, People's Republic of China.

Methods

The setting in this study was Zhaoqing, Guangdong province, China, where the number of registered construction companies and construction workers increased from 2004 to 2008, accounting for a growth rate of 98.5% and 35.8% respectively compared with 2004⁹.

According to the number of construction workers employed in each company, the sizes of construction companies in Zhaoqing city were stratified into three types: more than 200 workers – 81 companies, between 100–200 workers – 110 companies, less than 100 workers – 94 companies. The simple random sampling was conducted by the list of total construction companies (285) which were registered. Due to the fact that it was not easy to get into construction companies for data collection, only three construction companies were recruited in this study. Then, only one Construction Company of each type was randomly selected and assigned as Construction Company A, Construction Company B, and Construction Company C, each one representing a different size company.

Stratified random sampling was conducted during sample selection procedure. The three groups of target population in three types of Construction Companies consisted of 209 construction workers, 135 construction workers, and 56 construction workers aged more than 18 years old in three types of construction sites respectively. The lists of names of construction workers were given by the managers of three construction sites, and the proportions of workers in each type of construction site were calculated in table 1. Simple random sampling was conducted to select desired samples. For example, to obtain 49 construction workers from 56 eligible construction workers from Construction Company C, the code numbers for all 56 construction workers were prepared and put in a box, then the researcher drew one number at one time from the box, When a construction workers' number was drawn, that worker was selected to be a participant in this study. Then the procedure was repeated until the desired numbers were achieved. The same method was applied to select the desired number of samples in other two construction companies.

In order to identify quality of life of construction workers in Guangdong Province, People's Republic of China, and the target population selected were rurally-registered, construction workers⁹ aged more than 18 years old in Zhaoqing, Guangdong province, China. A total of 349 construction workers were enrolled in this study.

The instrument of this study is divided into two parts. Part 1 is concerned with demographic characteristics of construction workers, including age, gender, marital status, educational attainment, monthly income, length of work, working days per week, working hours per day, days off per month, number of children, and common physical problems,

and diseases. Part 2 is the WHOQOL questionnaire in Chinese version, it consists of 26 items with 5 domains including general domain (2 items), physical domain (7 items), psychological domain (6 items), social relationship domain (3 items), and environmental domain (8 items). The score was divided into a 5-point scale based on the perception of the subjects. 1 was the lowest meaning very dissatisfied with their quality of life, 2 means dissatisfaction with their quality of life, 3 means neither dissatisfaction nor satisfaction with their quality of life, 4 means some satisfaction with their quality of life, and 5 is highest scale and means very satisfied with their quality of life. The estimated score of questionnaire in Chinese version ranged from 26 to 130. The reliability of the questionnaire in the Chinese version was tested and gained Cronbach's Alpha Coefficients 0.82.

Data analysis

The Statistical Package of Social Science 20.0 was used for analyzing all descriptive statistics. Frequency and percentage were used to describe gender, marital status, educational achievement, the number of living children, and chronic disease. Mean and standard deviation were utilized to describe age, number of years, working days per week, and working hours per day, days-off per month, monthly income, and to identify quality of life and its components.

Results

Ages of construction workers ranged from 21 to 57 years, with a mean score of 34.33 (SD=8.49). The sample was composed of males (77.4%, n=270) and females (22.6%, n=79), 67.6% (n=236) of construction workers were under the age of forty years. Most subjects were married, 84.5% (n=295), and

the majority had experienced senior education or less (77.9%, n=296), received low level monthly salary (52.5%, n=183) and less than five years working experience (40.1%, n=140). 73.3% (n=256) worked more than nine hours per day and 79.9% (n=256) of them worked 6 or 7 days per week. Moreover, approximately half of them (49.5%, n=173) could take only 1 to 3 days-off per month and approximately 40% of them had 1 or 2 children. Furthermore, the majority of construction workers (82.2%) had no diseases, while 5.7% (n= 20) of them suffered from backache, and 3.2% (n=11) sustained peri-arthritis of shoulder.

Table 1 shows the mean, standard deviations, minimums, maximum scores, and 95% confidence interval for each domain of construction workers' quality of life. The mean scores of general domain, physical health, psychological health, social relationship, environmental domain and total quality of life of construction workers were 4.08 (SD=1.71, 95% CI: 3.91-4.27), 16.61 (SD=3.90, 95% CI: 16.21-17.03), 14.65 (SD=2.66, 95% CI: 14.38-14.94), 6.44 (SD= 1.82, 95% CI: 6.25-6.64), 12.47 (SD=3.47, 95% CI: 12.11-12.84), and 58.14 (SD=9.46, 95% CI: 57.14-59.13) respectively. According to the proportion of mean score in total estimated score of each domain, environmental domain ranked at the bottom of the list with 31.17%, followed by general domain and social relationship, with 40.8% and 42.93% respectively, and then physical health and psychological health, with 47.45% and 48.83% respectively. The score of total quality of life of construction workers ranged from 27 to 100.

Based on the information shown in table 2, the quality of life of construction workers was separated into three levels, including low, moderate, and high

levels. It showed that the majority of subjects had a low level of quality of life (67.05%, n=234), followed by moderate level of quality of life (32.95%, n=115) and there was no high level of quality of life among subjects.

In the physical domain, the results showed that the majority of subjects felt that physical pain often prevents them from doing what they need to do and that they were dissatisfied with the capacity of their work. 48.7% of subjects claimed little energy was left for their daily life, leading to the vast majority feeling dissatisfied with their capacity to perform daily living activities including sleep. Furthermore, most (60.1%) considered that medical treatment was crucial in their daily life, but not easily accessible.

In the psychological domain, 51.9% of subjects experienced negative feelings quite often, such as anxiety, stress, and depression. Therefore, some felt that there was little meaning in their life, and they were not satisfied with themselves.

In the social domain, most subjects (74.2%) could not obtain support from their friends. What's more their personal relationships were not satisfactory.

In the environmental domain, financial aspects were very crucial for construction workers, and findings showed that the vast majority (79.4%) didn't have enough money to meet their needs, which could lead to a lack of opportunity for leisure activities. Another aspect was the physical environment of construction sites; 58.2% of subjects considered their physical environment not to be healthy at all. This included their living place, and could be attributed to noise, dirt, dampness, and clutter of a construction site.

Discussion

General domain ranked second lowest among the five domains. This could be interpreted to mean

that most of the construction workers considered their quality of life to be moderate or low level, which corresponded to a survey reported by¹¹ Jiang (2010b), showing that the quality of life of most young migrants was considered to be poor or moderate level, and merely 29.2% considered themselves as having a very good quality of life. It could be explained that the migrants aged 18 to 65 years in urban city areas experienced poor working environment and living conditions, high intensity labor, a large expenditure, low educational achievement, low social safeguards, a lack of entertainment, and a lack of training¹¹.

In the physical domain, most construction workers were dissatisfied or very dissatisfied with their quality of sleep, which could be due to the environment which was quite noisy and potentially harmful to health, they therefore didn't have a better situation for sleep. On the other hand, they possibly didn't have enough time for sleep because of extra work. Fernandez had reported that noise was considered as one of the most frequently found physical contaminants in construction sites, and its most negative influence was related to the hearing system and may produce professional deafness or even permanent deafness, which has quite crucial effects on human health and well-being¹². In addition, 53.6% of construction workers were very dissatisfied or dissatisfied with their capacity to perform daily living activities, this could be interpreted as long working hours during the day and the intensity of the work which may make them very tired, and as a result they were not interested in daily living activities or had no chance for joining in. Moreover, the majority considered themselves dissatisfied with their working ability which may be connected to their low income and low educational achievement. Furthermore, most subjects stated that they did not have enough energy to

handle their life due to fatigue which was relevant when compared to other occupations, because most of jobs on construction sites involved heavy physical labor⁶.

Psychological health was ranked at the highest level among five domains of quality of life. It could be explained that the majority of migrant workers carried the burden of financial and work stress, besides urban citizens discriminating against them, along with the unfair policies, all of which could increase their negative psychological issues¹³. In addition, in this domain the majority of subjects (79.7%) could not enjoy their life totally or even a little, which may be interpreted as insufficient money and limited time for enjoying life. Most construction workers worked more than 10 hours a day for a low salary. Work occupied most of the day meaning they had no chance to share their life. Moreover, most (66.7%) could not concentrate on what they wanted to do, due to work stress and anxiety, and could not accept their bodily appearance because of their dirty and poor clothes. Furthermore, most construction workers migrated to urban city areas to earn more money to send back to their families. However, the reality was at cross purposes for them; what they earned was just enough for their living expenses in urban city area. Then they experienced, felt guilty because they could not send more money to their families; they were surely not satisfied with themselves. One more aspect to be considered was their negative feelings, such as stress, depression, and anxiety, which could be influenced by a variety of factors encompassing finance, work stress, unfamiliar environment, living conditions, social relationships and the like. From such information, it was not difficult to know that the situation of under-utilized social resources was a crucial factor in psychological health of construction workers, and they should

establish a better relationship with local people. If they were to establish diverse social relationships with local people they would probably have a higher sense of self-worth and safety.

The social relationship domain was ranked at the middle among five domains, which could be explained by three aspects as follows:

Firstly, in China, the traditional social structure and cultural values come from the social support acquired by migrants derived from blood relationships and locals. After migrating to urban city areas from rural areas, the construction workers lost their rural personal relationships, which resulted in them lacking personal relationship in an unfamiliar city. The original relationships were crippled, and the new relationships were not established yet. Similar findings reported by Jiang, showed that the social support of young migrants was lower than that of young college students, due to the weakened personal relationships at home when they migrated to urban city areas¹¹. Furthermore, rural people were not good at communicating and expressing themselves, which could lead to difficulties in building new relationships.

Secondly, in this study, the majority of construction workers were aged ranging from 20 to 39 years old. They were the group most likely to be active sexually; in addition, most of their spouses were living far away from them. Therefore, they were not satisfied with their sex lives. Gao conducted research on the knowledge, attitude, and behavior related to AIDS among 378 construction workers, the findings were reported and showed that 80.8% of construction workers did not remain faithful to their spouses.

Finally, social relationship played a crucial role for construction workers. Leaving their familiar home village meant that they became disconnected with

their previously formed rural social support groups. However, after they arrived at urban area, they still relied on blood relationships rather than urban social relationships and institutions to deal with various issues. Similar results were presented when the construction workers were working at a remote site, where they could easily communicate with their colleagues¹¹. In addition, it was not convenient to contact their families, what they gained in support of sustenance or spirituality was less than the migrants in the manufacturing industry and service industries¹¹.

The environmental domain among construction workers was ranked at the bottom of the list compared with the other four domains. Similar findings were reported by Ding and Liu noting that the environmental domain among migrant workers in Jinan city was the lowest among four domains¹⁴. Huang et al. conducted a study on quality of life of migrant workers in Anhui City, China, and the result showed there were many factors in the environmental domain among migrant workers, such as working time. The migrant workers who had a longer working experience were more familiar than the migrant workers who experienced a shorter working period¹³. While in this study, the elements influencing environment among construction workers could be explained as follows:

Firstly, construction had a reputation for being a particularly unhealthy industry because of its rate of work-related illness making it one of the highest across all occupational groups. Health problems among construction workers were relevant because of poor physical environment, the number of high-risk activities involved and the peripatetic nature of the workforce. The nature of construction work involves building, repairs, renovating, modifying, and demolishing of structures. These activities involve work that

varies from fully mechanized activities to hard physical labor. The physical environment around construction sites was described by more than half of the subjects in this study as being not healthy at all or only a little healthy. This could be explained by the poor physical environment at the construction site due to flying dust, poor air quality, noise, and an abundance of dangerous equipment such as steel products, cement, and even explosives^{4,6}. Moreover, our senses are the primary interface with our physical environment. Therefore, the majority of construction workers complained that their physical environment was very poor and that they felt unsafe in their daily life.

Secondly, the anterior survey on living environment and the conditions of refectory in 14 construction sites in Sanmen City, Henan province, China was conducted by Wei et al., and Wang & Li. It showed that the living environment of construction workers and the conditions of refectory in construction sites were poor, which influences the health of construction workers, consequently this should be enhanced and improved by the relevant people^{14,15,16}.

Thirdly, their only financial resource was in construction work which provided a low monthly income as mentioned as a demographic for construction workers. Moving to urban areas for the great majority of construction workers was for the sole purpose of earning more money. As a result the level of income could have a bearing on their living satisfaction. Lü reported that migrant workers very dissatisfied or dissatisfied with their quality of life, usually connected that question with their monthly income¹⁷.

In conclusion, health services they received were poor when compared with urban citizens. The majority were not satisfied with available health services which could be interpreted as poor self-evaluation

health status and deficient health services from hospitals or communities. Guan et al. conducted a research on the analysis of hard-hat health status and satisfaction of medical treatment in the Caifeidian industrial district. Its aim was to explore needs, utilization and satisfaction of health services among construction workers. The results showed that the rate of incidents was high, and the most unsatisfying aspect with health services was the doctors, medical experts, and the lack of medical equipment¹⁸. Furthermore, age, gender, education and marital status were crucial factors in the satisfaction with health services¹⁹. One previous research was conducted on assessing the provision of occupational health services in 183 construction industries. The result showed merely 32% of establishments (n=58) performed any environmental assessment, 20% (n=37) provided medical examinations of their employees and 38% (n=70) offered health and safety talks. The scores for provision of occupational health services were generally low, especially for the component of surveillance concerning workers' health¹⁹. What's more, Liu, Huang & Fang reported that construction companies ignored the health status of construction workers, approximately 70.6% of whom could not receive medical examinations at fixed periods²⁰.

In addition, the information related to occupational safety should be taken into account by managers of construction companies and health care professionals; the relevant training must be implemented all around for all construction workers, which is the only way to reduce the rate of occupational diseases and injuries. Furthermore, the needs of construction workers for health services should be provided by construction companies or government since nearly half of subjects (48.4%) are not satisfied with current provisions at all. Finally a great number

of them (70.5%) were dissatisfied with transportation provisions, which could be interpreted as unfamiliarity with the environment around them and receiving a low level of salary. Consequently, they had virtually no chance to obtain effective transportation.

Suggestions

Replication of this study with a larger sample size and randomly selected sample from other provinces in China is necessary. Moreover, a longitudinal study is required to determine if the perception of quality of life is changed due to a different duration of time or diverse environmental situations. As the data collection of this study was conducted during spring, the weather was not too cool or too hot. Research conducted implementing nursing intervention on improving quality

of life of construction workers through experimental or quasi-experimental research is indicated. Furthermore, health care professionals should provide more health education for this special group as they have a low educational attainment and most could not get the relevant information they require. Construction companies should follow construction laws to protect construction workers from dangerous environments or to try to solve their financial problems so that construction workers are able to maintain a better life.

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Table 1 Means, standard deviations, minimum, maximum score, and 95% confidence interval for each domain of quality

Quality of life domains	Estimated score	Min score	Max score	Mean± SD	95% CI
1. General domain	2 - 10	2	9	4.08±1.71	3.91-4.27
2. Physical health	7 - 35	8	29	16.61±3.90	16.21-17.03
3. Psychological health	6 - 30	6	24	14.65±2.66	14.38-14.94
4. Social relationship	3 - 15	3	13	6.44±1.82	6.25-6.64
5. Environment	8 - 40	8	25	12.47±3.47	12.11-12.84
Total score	26 - 130	27	100	58.14±9.46	57.14-59.13

Note: CI = confidence interval

Table 2 Frequency and percentage of construction workers classified according to levels of quality of life.

Quality of life levels	Frequency (n=349)	Percentage (%)
Low level of quality of life (26-60.6)	234	67.05
Moderate level of quality of life (60.7-95.3)	115	32.95
High level of quality of life (95.4-130)	0	0

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