

Lack of health risk awareness in low-income Chinese youth migrants: assessment and associated factors

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Abstract

Objective To analyze and assess health risk awareness of youth migrants in China and the factors that influence it, and to provide evidence for making health promotion interventions and decreasing health risks among Chinese youth migrants.

Method This was a cross-sectional survey conducted in 2009 among rural-to-urban migrants aged 15–24 years in Tianjin and Xi'an, China. A total of 1,838 youth migrants were enrolled by the stratified cluster sampling method. An anonymous questionnaire was self-administered to investigate health risk awareness. The *t* test and χ^2 test were used to analyze differences between different groups. Logistic regression analysis was used to test the influence of various sociodemographic, living condition, and occupational factors.

Results The smoking rate of men (66.8%) was higher than that of women (6.8%; $P < 0.05$), the rate of sexual intercourse in men was higher than in women (56.8 vs 27.7%; $P < 0.05$), and 75.7% of participants had written into medical care systems with 40.4% of them having undergone a physical examination during the last year. Only 438 of the participants (26% of 1,647) were considered to have a satisfactory level of health risk awareness [273 (32.4% of 958) from Tianjin and 165 (28.8% of 689) from Xi'an]. No significant difference was found between

the youth migrant populations of the two cities. The percentage of youth migrants with a satisfactory level of health risk awareness who thought they had a good health status was higher than that with an unsatisfactory health risk awareness who thought they had a good health status ($P < 0.05$). Logistic regression analysis showed that gender, age, education, reading the newspaper, and occupation significantly influenced on health risk awareness.

Conclusion Youth migrants in China have a low health risk awareness. Combined and targeted health education interventions should be promoted to increase their health risk awareness.

Keywords Youth · Migrant · Health risk · Health education · Health promotion

Introduction

Although there are many possible definitions of a “health risk”, according to the World Health Organization (WHO) global health risks report 2009 [1], it can be broadly defined as “a factor that raises the probability of adverse health outcomes”. The five leading risk factors, namely, unsafe sex, alcohol use, unsafe water and sanitation, high blood pressure, and being underweight as a child, are responsible for one-quarter of all deaths in the world and for one-fifth of all disability adjusted life years. Reducing exposure to these risk factors would increase global life expectancy by nearly 5 years [2]. Each risk has its own causes, and many have their roots in a complex chain of events over time, including socioeconomic factors, environmental and community conditions, and individual behavior. The causal chain offers many entry points for interventions [3]; in addition there are many ways that

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populations can be targeted. The two major approaches to reducing risk are targeting (1) high-risk people and (2) risk in the entire population [4]. One of important points is the health risk awareness of the target population. A high level of health risk awareness is very useful to increase the perceptual vigilance on diseases, improve utilization and demands of health services, and decrease health risk [5].

Low-income populations are most affected by risks associated with poverty, such as undernutrition, unsafe sex, unsafe water, poor sanitation and hygiene, and indoor smoke from solid fuels [1]. One subgroup frequently identified as being vulnerable to acquiring behaviors that are considered to be health risks is that of rural-to-urban migrants. The transition of China to a global economic player has led to greater disparities between rural and urban economies, a situation which resulted in 147.35 million rural-to-urban migrations in China in November 2005 [6], and 261.39 million migrations in 2011 [7]. According to the an investigation report on Chinese migrant workers [8], most rural-to-urban migrants are relatively young, with an average age of 28.6 years. After they graduate from primary or middle school, many young migrants travel to eastern China or large cities to work in the manufacturing sector or as laborers in the construction industry, or as service workers.

Young migrants face disproportionate health risks because of their poor working and living conditions, suffering from disproportionately high rates of infectious diseases, occupational diseases, reproductive health problems, and mental diseases [9–14]. Therefore, there is a clear need to increase the health risk awareness of young migrant workers. To this end, a comprehensive assessment of this target population, including their utilization of existing health services and information on all aspects of health [occupational health, reproductive health, human immunodeficiency virus (HIV)/tuberculosis (TB), among others] would provide valuable information.

However, to date, there is little in the way of integrated research and comprehensive evaluation of young migrants' self-reported health risk awareness. In addition, existing studies on health care demands and utilization among migrants which rely on prevalence rates and non-visit rates are characterized by limitations. In 2009, in the framework of a China–United Nations Joint Program on protecting and promoting the rights of China's vulnerable youth migrants (aged 15–24 years), the WHO, United Nations Population Fund (UNFPA), and the Chinese Ministry of Health launched a project aimed at developing a health promotion model for youth migrants at various pilot sites (mainly in Tianjin and Xi'an). The ultimate goal of the project was to increase the health knowledge and risk awareness of youth migrants and to improve their access and utilization of health services.

The study reported here, which is a baseline survey on health risk awareness among youth migrants in Tianjin and Xi'an, was conducted by Peking University with full support of the UNFPA. In our study, we first established an index of health risk awareness, which was derived from responses to questions associated to health-related knowledge, aspects of personal hygiene practice, and knowledge of HIV/acquired immunodeficiency syndrome (AIDS) and related behavioral aspects, awareness and knowledge of occupational hazards, and health service utilization. The contents of the questions were associated to the five leading risk factors. A composite score was used as the index score to assess whether a participant has a good health risk awareness or not, with a score of 21 (70% correct answers) indicating an individual with good health risk awareness. We then used this index of health risk awareness in an attempt to evaluate health risk awareness among youth migrants in Tianjin and Xi'an and analyze the factors influencing this awareness.

Method

Sampling and data collection

From June to December 2009, we conducted a cross-sectional survey among rural-to-urban migrants in two cities: Tianjin, Northern China, which is governed as a direct-controlled municipality, and Xi'an, the capital city of Shaanxi Province, northwest China. Our study was in accordance with the ethical standards of the committee responsible for human experimentation of Peking University and with the Helsinki Declaration. In order to understand the overall health risk awareness level of youth migrants, participants were enrolled based on local predominating occupational clusters. The migrant populations of Tianjin and Xi'an are of different economic types. Because many economic and technical development zones were located in Tianjin city, a large number of migrants move to Tianjin and work in hotels and restaurants or in the manufacturing and construction sectors. Xi'an is famous for its long history and landscape, so that many migrants work in hotels and restaurants or are self-employed. We used the following equation to calculate sample size in each occupational cluster: $n = \mu_x^2 \pi(1 - \pi) / \delta^2$ where μ_x was given a value of 1.96, δ a value of 0.05, and π a value of 30% [10]. Considering a loss rate of 10%, we enlarged the sample size to 355 individuals in each occupational cluster. After obtaining permission from gatekeepers, employers, and workplace managers, trained interviewers approached eligible migrants. An eligible subject was defined as an individual who (1) had a rural residence, (2) worked in the city without having a permanent residence, and (3) was between

18 and 25 years of age. After providing informed consent, participants were asked to complete an anonymous self-administered questionnaire in a separate room at their workplace or a nearby place convenient to them. The questionnaire, which had been pilot tested and revised prior to the main study, took approximately 30 min to complete. Assistance, in the form of a question reader, was provided to a small number of respondents with limited literacy. Questionnaires were checked for completeness on-site, and a small gift was provided to respondents. A total of 2,129 participants were asked to complete the questionnaire, and 1,838 completed questionnaires were ultimately obtained, yielding a response rate of 86.3%.

Measures

The survey collected the following information: (1) social and migratory demographic characteristics, (2) health-related knowledge, behaviors and awareness, including a knowledge of infectious diseases, non-communicable chronic diseases, HIV/AIDS, reproduction, and occupational health hazards, and (3) utilization of health services.

The respondents were asked to supply information on social and migratory demographic aspects, including age, gender, ethnicity (Han, Hui, Man, Mongolian, or others), birthplace, marital status (single, married, or divorced), educational level (primary, middle, high school, or post-secondary education), and occupation. They were also asked to provide information on their living and working conditions, including the type of dwelling, utilities in the dwelling, years as a migrant worker, daily working hours, monthly income and expenses, recreational activities, and media consumption (television, Internet, and newspapers).

General health-related knowledge

Participants were asked to answer nine questions directed toward assessing their knowledge of infectious diseases, non-communicable chronic diseases, and life style. The measure of internal consistency reliability, Cronbach's α , was 0.643.

Personal hygiene practice

Participants were asked to answer seven questions aimed at assessing their personal hygiene practice. The internal consistency reliability measure, Cronbach's α , was 0.409.

Knowledge of reproduction and HIV/AIDS

Thirteen survey questions were directed toward assessing the respondent's knowledge of HIV/AIDS prevention, sexual intercourse, contraception, and condom use. The

internal consistency reliability measure, Cronbach's α , was 0.802. Only the first three questions about HIV/AIDS prevention and contraception were used for the health risk awareness assessment because response process would be stopped in the case of a participant who reported having no sexual intercourse.

Awareness and knowledge of occupational hazards

Six survey questions assessed the respondents' awareness and knowledge of occupational health aspects and awareness and use of occupational health services. The internal consistency reliability measure, Cronbach's α , was 0.430.

Health service utilization

The questionnaire included three questions to determine a participant's use of health services: "Did you have a physical examination in the past year?", "Do you have medical insurance?", and "Do you actively seek health knowledge?". Cronbach's α was 0.227.

Health risk awareness

In our study, health risk awareness was composed of general health-related knowledge, personal hygiene practice, knowledge of reproduction and HIV/AIDS, knowledge and awareness of occupational hazards, and health service utilization. The composite score of general health knowledge was created by summing all correct or positive answers (from a total of 28 questions), with higher scores reflecting higher levels of health risk awareness. A personal score of ≥ 21 was considered to indicate an individual with a satisfactory level of health risk awareness. The health risk awareness in the two provinces was compared based on the frequency of individuals with a satisfactory level of health risk awareness.

Statistical methods

Data were independently entered twice and validated using Epidata software ver. 3.1 (EpiData Association, Odense, Denmark). All statistical analyses were performed using SPSS software ver. 13.0 (SPSS, Chicago, IL). Samples were deleted if answers to more than half of the questions were missing in any one part, information was missing for key demographic variables (e.g., gender), or the answers were illogical (e.g., a man aged 10 years old but married). Samples with one-half or less of the questions unanswered were treated as random missing data and remained in the analysis; they were deleted only when the respective statistical analysis was performed. Frequencies, percentage, ratios, t test, χ^2 test, and Wilcoxon rank sum test were used

to analyze the data, and logistic regression analysis was used to test for the influence of factors associated with a person with a satisfactory level of health risk awareness. The dependent variable was a satisfactory level of health risk awareness or not, and independent variables entered into multivariate model included city, gender, age, education, marital status, monthly expenditure, monthly income, watching television, reading newspapers, using the Internet, living environment, occupation (no job, manufacturing, hotel and restaurant, construction, and self-employed), and occupational training. Satisfactory statistical significance was set at $P < 0.05$.

Results

Sample characteristics

A final sample size of 1,684 was retained in our database. A total of 1,838 migrants in Tianjin and Xi'an were surveyed, but 154 questionnaires were deleted from the data file due to substantial missing data in the completed questionnaire. The validity rate of the questionnaires was 91.6%.

Table 1 presents the characteristics of study participants in Tianjin and Xi'an. The mean age of participants was 21.23 ± 2.23 years. In Tianjin, a large proportion of those surveyed were had completed middle school (47.9%) or high school (35.8%); in Xi'an, these values were 34.5 and 44.0%, respectively ($P < 0.05$). The education levels and living conditions of the respondents were much better than those reported previously in similar studies [15]. Most of the respondents (79.3%) were single, and there was no significant difference in this characteristic between Tianjin and Xi'an.

Due to the different economies in Tianjin and Xi'an, youth migrant workers in the two sample areas had different occupational choices. In Tianjin, half of the respondents worked in manufacturing factories, while most of the others worked in hotels and restaurants, with some working in the construction sector. In contrast, half of the Xi'an respondents worked in hotels and restaurants, while some were self-employed.

Living conditions were related to occupation—most of those working in the manufacturing and construction sectors were living in accommodation provided by their employer, while hotel and restaurant workers and the self-employed were living in rented rooms or with relatives and friends. Wherever the migrants lived, conditions were crowded and there was poor ventilation and a lack of basic sanitary facilities. Half of the respondents (50.1%) had left their hometown and worked as a migrant worker during the past 3 years.

Health-related knowledge, behavior, and awareness

Table 2 showed the results of health-related knowledge, behaviors, and awareness among youth migrant workers. Most youth workers knew how to prevent infectious diseases—by being vaccinated and avoiding unsafe drinking water. However, only 43.3% of respondents (and only 38.1% in Tianjin) gave correct answers about the symptoms of TB. Approximately one-third of respondents correctly answered questions about non-communicable diseases (NCD), anemia, and hypertension. These results show that health education in migrant workers needs improvement and that more attention should be paid to providing comprehensive general health-related knowledge to this population subgroup. Most respondents had good personal hygiene practices; they did not consume much alcohol, washed their hands, brushed their teeth, and regularly changed their underwear. The no-smoking overall rate was 34.5%; smoking rates were 65.5% overall (60.3% in Tianjin and 72.7% in Xi'an), being significantly much higher in men (66.8%) than women (6.8%; $P < 0.05$).

Among the 1,684 participants, 674 (40%) reported having had sexual intercourse. The number of those with sexual experience was higher among men (56.8%) than among women (27.7%, $P < 0.05$). Men also answered more questions on reproduction and HIV/AIDS correctly than women. For example, 77.6% of men knew about using condoms for contraception and preventing HIV infection, while only 56.7% of women answered the associated questions correctly ($P < 0.05$); 23.8% of men knew the mode of transmission HIV/AIDS compared to only 20% of women ($P < 0.05$). In addition, 61.3% of men used a condom during their last sexual encounter, while only 49.4% of women used a condom ($P < 0.05$).

Knowledge of occupational health was low. Only 54.1% of participants believed that there was some hazardous material in or around their workplace, and just 29.5% of subjects gave correct answers on the symptoms of chemical poisoning. Only 36.3% of subjects identified the explosive symbol.

Although 71.2% of participants had written into medical care systems, only 40.7% of them had taken a physical examination in the last year. The reasons why they did not take physical exams included a lack of time and the view that it was unnecessary or that it was too expensive. In addition, 75.9% of participants showed initiative in seeking health information and health knowledge.

Health risk awareness

The assessment of health risk awareness took into account general health-related knowledge, personal hygiene practice, reproduction and HIV/AIDS knowledge and behaviors,

Table 1 Study samples in Tianjin and Xi'an

Characteristic	Total (n = 1,684)		Tianjin (n = 976)		Xi'an (n = 708)	
	n	%	n	%	n	%
Gender^a						
Male	778	46.2	549	56.3	229	32.3
Female	906	53.8	427	43.8	479	67.5
Age (mean ± SD)	21.23 ± 2.23		21.34 ± 2.11		21.09 ± 2.39	
Education^a						
Primary	62	3.7	32	3.3	30	4.3
Middle school	712	42.3	467	47.9	245	34.5
High school	661	39.3	349	35.8	312	44.0
Post-secondary	211	12.5	97	9.9	114	16.3
Marital status						
Single	1,335	79.3	777	79.6	558	78.6
Married	346	20.5	198	20.3	148	20.8
Divorced	4	0.2	1	0.1	3	0.4
Type of current work^a						
No job	53	3.1	0	0	53	7.5
Manufacturing	405	24.0	398	40.8	7	1.0
Hotel and restaurant	646	38.4	286	29.3	360	50.6
Construction	288	17.1	277	28.4	11	1.5
Self-employed	229	13.6	1	0.6	228	32.1
Others	51	3.0	9	0.9	42	5.8
Living in^a						
Quarters in place of work	992	58.9	831	85.1	161	22.7
Rental unit	437	26.0	92	9.4	345	48.6
Relatives/friend's house	61	3.6	5	0.5	56	7.9
Own house/family house	177	10.5	36	3.7	141	19.9
Years as migrant worker						
<3 years	843	50.1	448	45.9	395	55.8
≥3 years	841	49.9	528	54.1	313	44.2

SD Standard deviation

^a There was a significant difference between Tianjin and Xi'an ($P < 0.05$)

occupational hazard knowledge, and an awareness and use of health care services. Table 3 presents the scores for the five parts of the survey questionnaire and the final health risk awareness in the youth migrants sampled in our study. A composite score was created by summing all correct or positive answers (possible range 0–28) of the 28 items, with higher scores reflecting higher levels of health risk awareness. A person who scored ≥ 21 was considered to have a satisfactory level of health risk awareness. There was no significant difference between scores for youth migrants in Tianjin (18.28 ± 3.87) and those in Xi'an (17.92 ± 3.83) ($P > 0.05$). However, scores for behavior and reproduction in Xi'an were significantly higher than those in Tianjin. Scores of health-related knowledge were higher in Xi'an, while those of occupational hazards and health service utilization were higher in Tianjin. Only 438 of the participants (26% of 1,647) were considered to have a satisfactory

level of health risk awareness, of whom 273 (32.4% of 958) were from Tianjin and 165 (28.8% of 689) were from Xi'an. No significant difference was found in health risk awareness between two cities.

Correlation between health risk awareness and health status

Table 4 shows the correlation between health risk awareness and health status among the youth migrants in our study sample. No difference was found in self-reported health status between youth workers with a satisfactory/unsatisfactory level of health risk awareness. However, the percentage of youth migrants with a satisfactory level of health risk awareness who thought they had a good health status was higher than that with an unsatisfactory health risk awareness who thought they had a good health status. In

Table 2 Correct responses to questions on health-related knowledge, behavior, and awareness among youth migrant workers in Tianjin and Xi'an

Contents	Total number (%)	Number in Tianjin (%)	Number in Xi'an (%)	P value ^a
Health-related knowledge				
Vaccine could prevent hepatitis B virus	1,405 (83.3)	797 (81.7)	608 (85.7)	0.03
Drinking unsafe water is susceptible to dysentery	1,201 (71.4)	674 (69.2)	527 (74.3)	0.02
Cough lasting for more than 2 weeks with blood-stained sputum is a symptom of tuberculosis	728 (43.3)	371 (38.1)	357 (50.6)	<0.001
Given regular treatment after suffered infectious diseases	1,502 (89.6)	865 (89.2)	637 (90.2)	0.49
Excessive alcohol consumption is harmful to the liver	1,089 (64.7)	610 (62.6)	479 (67.8)	0.03
Smoking is harmful to reproductive ability	1,185 (70.4)	698 (71.6)	487 (68.7)	0.20
Lean meat is a good means to prevent from anemia	516 (30.7)	302 (31.0)	214 (30.3)	0.71
High salt diet can easily cause hypertension	649 (38.6)	326 (33.4)	323 (45.6)	<0.001
Overweight and obesity are easy ways to develop diabetes	1,192 (71.2)	664 (68.4)	528 (75.1)	0.003
Health-related behaviors				
No smoking	562 (34.5)	377 (39.7)	185 (27.3)	<0.001
Excessive alcohol consumption on fewer than 5 occasions in the last 6 months	1,533 (92.7)	869 (90.3)	664 (96.1)	<0.001
Belief that good personal practice is important	1,558 (92.8)	887 (91.3)	671 (95.0)	0.005
Underwear is changed at least twice a week	1,548 (92.2)	905 (93.2)	643 (90.8)	0.07
Hands are washed before eating and after using a toilet	1,592 (94.8)	916 (94.5)	676 (95.2)	0.53
Teeth are brushed at least twice a day	1,089 (64.7)	630 (64.6)	459 (64.9)	0.93
Towel(s) are not shared with partners	1,440 (87.1)	879 (90.7)	561 (82.1)	<0.001
Reproduction-related knowledge and behaviors				
Ovulation time is in the second week of menstrual cycle	349 (21.2)	163 (17.0)	186 (27.1)	<0.001
The use of a condom is useful for contraception and HIV/AIDS prevention	1,090 (65.4)	606 (62.5)	484 (69.6)	0.003
Main modes of transmission of HIV/AIDS	356 (21.4)	181 (18.9)	175 (24.8)	0.004
Sexually active	674 (40.0)	389 (39.9)	285 (40.2)	0.89
Condom used in last sexual contact (for those who answered above question)	384 (57.7)	226 (59.0)	158 (55.7)	0.41
Occupational hazard knowledge and awareness				
Think about harmful substance/phenomena in work environment	912 (54.1)	627 (64.2)	285 (40.2)	<0.001
Understand symptoms of chemical poisoning	490 (29.5)	293 (30.7)	197 (28.0)	0.22
Understand meaning of explosive warning marker	612 (36.3)	436 (44.8)	176 (24.7)	<0.001
Believe occupational hazard could be avoided by preventive measures	1,043 (62.1)	655 (67.5)	388 (54.7)	<0.001
Wear suitable work clothes	1,356 (80.5)	846 (86.9)	510 (71.8)	<0.001
Know rights of occupational and health safety	1,350 (80.5)	818 (84.4)	532 (75.1)	<0.001
Health service utilization				
Take physical examination at least once a year	684 (40.7)	447 (45.8)	237 (33.6)	<0.001
Buy medical insurance	1,189 (71.2)	691 (71.3)	498 (70.9)	0.87
Seek health-related knowledge actively	1,277 (75.9)	766 (78.7)	511 (72.0)	0.001

HIV/AIDS Human immunodeficiency virus/acquired immunodeficiency syndrome

^a χ^2 -test was used to compare the percentages in the two cities

addition, the proportions of subjects reporting excellent and bad health status were higher among the unsatisfactory group than the satisfactory group. No difference was found in whether the respondents had been sick in the last 2 week. The percentage of common diseases contracted by youth migrants with a satisfactory level of health risk awareness during then last year was higher than that among those with an unsatisfactory level of knowledge ($P < 0.05$).

Logistic regression analysis of influencing factors

Table 5 depicts the results of the multivariate logistic regression analyses. Satisfactory health risk awareness or not was used as the dependent dichotomous variable. Independent variables included city in which youth migrant workers resided, gender, age, education, marital status, monthly expenditure, monthly income, watching television,

Table 3 Scores of health risk awareness among Tianjin and Xi'an youth migrant workers

Contents (no. of items)	Score for total study population (n = 1,684)	Score for Tianjin respondents (n = 976)	Score for Xi'an respondents (n = 708)	P value ^a
Health-related knowledge (9)	5.64 ± 2.03	5.46 ± 2.07	5.90 ± 1.95	<0.001
Behaviors (7)	5.91 ± 1.11	5.86 ± 1.13	5.98 ± 1.09	0.04
Reproduction (3)	1.08 ± 0.83	0.99 ± 0.80	1.22 ± 0.86	<0.001
Occupation hazards (6)	3.43 ± 1.39	3.80 ± 1.32	2.95 ± 1.33	<0.001
Health service utilization (3)	1.87 ± 0.86	1.96 ± 0.86	1.77 ± 0.85	<0.001
Total	18.13 ± 3.86	18.28 ± 3.87	17.92 ± 3.83	0.08

^a *t*-test was used to compare the scores in the two cities

Table 4 Correlation between health risk awareness and health status in youth migrants

Items	Unsatisfactory level of awareness, n (%)	Satisfactory level of awareness, n (%)	P value
How do you assess your health?			
Excellent	380 (38.9)	150 (34.3)	0.97 ^a
Good	414 (42.4)	229 (52.4)	
Normal	135 (13.8)	54 (12.4)	
Bad	23 (2.4)	3 (0.7)	
Unclear	25 (2.6)	1 (0.2)	
Did you get sick in last 2 weeks?			
Yes	132 (13.7)	66 (15.3)	0.44 ^b
No	831 (86.3)	366 (84.7)	
Did you contract a common disease(s) during the last year?			
Yes	583 (59.6)	289 (66.1)	0.02 ^b
No	395 (40.4)	148 (33.9)	

Satisfactory and unsatisfactory refers to youth migrants with a satisfactory/unsatisfactory health risk awareness, respectively

^a Wilcoxon rank sum test was used to compare the sum ranks in the two groups

^b χ^2 -test was used to compare the percentages in the two groups

reading newspapers, using the Internet, living environment, occupation, and occupational training. Of the above, gender, age, education, reading the newspaper, and occupation (restaurants and hotels, manufacturing, or construction sectors, which could provide system management or occupational training) showed significant influences on health risk awareness.

Discussion

Findings from this study suggest that many young rural-to-urban migrant workers lack health risk awareness. Our study revealed that only 26% of participants had a satisfactory awareness of health risks. Most migrants lacked knowledge about infectious diseases, NCD, reproduction, HIV/AIDS, and occupational health hazards, while some had poor personal hygiene practices.

Table 5 Results of the multivariate logistic regression analyses on association between satisfactory health risk awareness and sociodemographic, living condition, and occupational factors

Variables	OR	95.0% CI for OR ^a		P
		Lower	Upper	
Age	1.2	1.1	1.3	<0.001
Gender (male/female; reference: female)	2.1	1.5	2.8	<0.001
Education (reference: primary school)				
Middle school	1.3	0.65	2.5	0.482
High school	2.3	1.2	4.5	0.014
Post-secondary	4.7	2.3	9.5	<0.001
Newspaper (reference: no reading)				
Occasion	1.2	0.70	2.0	0.512
Regular	2.5	1.4	4.5	0.001
Occupation (reference: no job)				
Manufacturing	2.8	1.8	4.2	<0.001
Hotel and restaurant	1.8	1.2	2.7	0.003
Construction	2.7	1.6	4.5	<0.001
Constant	0.001			<0.001

Variables entered into multivariate model included city, gender, age, education, marital status, monthly expenditure, monthly income, watching television, reading newspapers, using the Internet, living environment, occupation, and occupational training

OR Odds ratio, CI confidence interval

^a Results on the independent variables that showed no significant association with satisfactory health risk awareness were not shown in the table

Migration is associated with greater risks for poor health in general. This may be because of situational and psychosocial factors, such as economic and cultural transitions, as well as reduced access to health care services [8, 16–18]. Overall, in our investigation, most youth migrants had some degree of health awareness, sought useful health knowledge, and utilized health services when they became sick. Young migrants in the two cities had a good understanding of vaccinations, the hazards of smoking and being overweight, as well as the ways HIV/AIDS is transmitted. However, they lacked knowledge about TB, anemia,

hypertension, reproduction, contraception, and chemical poisoning. These results confirmed the findings of other reports [15, 19, 20] and suggest that these aspects of health-related knowledge should be strengthened in the future. Compared to our youth migrants in Tianjin, those in Xi'an had higher health awareness scores in terms of knowledge, behaviors, and reproduction, possibly because there was a relatively larger percentage of respondents with higher education levels in Xi'an. In addition, the higher percentage of youth migrants working in the construction and manufacturing sectors in Tianjin was associated with a better knowledge of occupational hazards.

Young migrants in general showed a number of risky behaviors, such as smoking, drinking, unsafe sex, sharing towels, among others. The smoking rate among the respondents from Tianjin and Xi'an was about 60.3 and 72.7% respectively, which is higher than that of the National Prevalence Survey in 2002 (54.8%) [21]. This is information that should be used to help young migrants adopt good personal hygiene practices, quit smoking, and reduce alcohol consumption. Unsafe sexual behaviors in youth migrants include premarital sex, commercialized sex, not using a condom, and induced abortions. Chang and her colleagues also found that the rate of having had a sexual experience among youth who had left school was 42.6% (62.3% in males, and 37.7% in females) [22]. Other researchers [23–25] have reported higher rates of unsafe sexual behaviors among youth migrants. Most youth migrants work away from their hometown, and they may behave differently that they would in their hometown. Young people are a sexually active segment of the population, and separation from their families, lovers, and communities may make such youth migrants more prone to peer pressure and urban life style influences, ultimately leading them to engage in more risky behaviors. More efforts and interventions among youth migrants are needed to control the growing epidemic of sexually transmitted diseases (STDs) in China [15, 26].

Although China has an enormous migrant worker population, occupational diseases and injury epidemiology and prevention have only recently become heightened concerns, in an effort to improve workplace safety and prevent costly injuries. Perry and colleagues [27] reported that migrant workers had higher rates of work-related injury, suggesting that unskilled migrant workers from rural communities and villages may take on more hazardous jobs and experience more injuries. In our study, we assessed the knowledge and awareness of occupational hazards among youth migrants and found that integrated occupational training courses incorporating occupational health and safety were necessary for these people. A new multi-sector cooperation health education system should be established to implement occupational training. It should be comprised

of members of the health, education, and labor departments and include employers.

Although there was no statistical significance in self-reported health status between youth workers with a satisfactory and those with an unsatisfactory level of health risk awareness, a higher proportion of good health status and a lower proportion of bad health status in the satisfactory group suggests these individuals had a more comprehensive and correct understanding of health, which help them make an appropriate assessment of disease and its treatment. The higher percentages of excellent and bad health status assessments, respectively, in the group with an unsatisfactory level of health risk awareness indicated these individuals had an incorrect and superficial understanding of health and the treatment of disease. The percentage of common diseases contracted during the last year was higher in youth migrants with a satisfactory level of knowledge than in their 'unsatisfactory' counterparts. This finding suggests that health risk awareness may increase after an individual suffers from a disease(s). Such an individual would then be more concerned and take action to prevent the disease if he/she believed it would have potentially serious consequences. These findings indicated that intervention activities, including providing a correct and comprehensive understanding of health and the treatment of disease, are important for youth migrant workers.

The multivariate logistic regression analysis results showed that age, gender, education, reading newspapers, and an occupation which could provide system management or occupational training were beneficial toward increasing health risk awareness. Health risk awareness was higher among men, older migrants, those with higher education levels, those who read newspapers, and those who worked in a social workplace. Male migrants were often involved in more dangerous work and were more likely to engage in unsafe sexual intercourse, so they showed a higher health risk awareness and more interest in learning about health-related knowledge. Older migrants with higher education levels who read newspapers showed more concern about their health status and wanted to know how to resolve their health problems. All of these factors indicate that the urban social environment substantially influenced youth migrant health behaviors. Youth migrants can also be significantly impacted by their peers and colleagues [28]. Reproductive health knowledge levels among migrants whose friends were local residents were higher than that of those who had no local friends. This suggests that both policy and community could play an important role in migrant health education activities by creating advantageous living and working conditions.

The study has several limitations. Firstly, the information collected was self-reported. Respondents' health risk awareness levels may be exaggerated because a positive answer to the question might be perceived by the

participants as socially desirable, whereas risk behaviors, such as sexual behaviors, might be underreported since risk behaviors are not socially desirable. Secondly, using only two study sites and five occupational groups may limit the findings. The conventional factors found to be significant in this study may not be applicable to the general public given the sample size, differential sampling, and lack of comparability with national surveys. Thirdly, another limitation may be that no comparison groups were selected in baseline survey. Finally, because of the cross-sectional nature of the data, most responses were evaluated retrospectively and recall bias was therefore unavoidable.

Conclusion

Our study found youth migrants have some health related knowledge, but are still at high risk of STDs, unplanned pregnancies, NCD, and occupational diseases. They also have limited access to social medical insurance and preventive technology. To change youth migrants' behavior and improve their health risk awareness, health related knowledge communication combined with various interventions should be introduced. Preventive skills training in factories and occupational training agencies, activities based on communities, and social support would all improve youth migrants' health behaviors and health risk awareness development and formation.

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Conflict of interest statement The authors declare that there are no conflicts of interest.

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