



California Center for Population Research
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CCPR-046-07

December 2007

*California Center for Population Research
On-Line Working Paper Series*

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Short running head: insomnia and migration status in China

Abstract

Study Objectives: Insomnia is influenced by psychosocial and environment factors.

This study aims to examine the differential of insomnia symptoms between rural-to-urban migrants and non-migrants in China.

Design: A cross-sectional study.

Setting: Ten townships throughout China.

Patients or Participants: One hundred and ninety-seven Chinese adults aged 18 to 64 years, with an oversample of migrants.

Measurements and Results: Professional interviewers and community doctors used a questionnaire to collect information on migration, insomnia symptoms, and other variables. Multivariable binomial logistic regression models were used to examine the relations between migration status and presence of at least one insomnia symptom, while adjusting for age, sex, education, income, number of chronic medical conditions, depression, and other covariates. The numbers of permanent urban residents, rural non-migrants, and rural-to-urban migrants in the study were 93 (47%), 47 (24%), and 57 (29%), respectively. The probability of reporting at least one of the five insomnia symptoms measured was 40% for permanent urban residents, 62% for rural non-migrants, and 68% for migrants ($P = 0.001$). Using permanent urban residents as the reference group, the multiply-adjusted odd ratios of having at least one insomnia symptom were 3.00 (95% CI: 1.36 – 6.62) for migrants and 1.86 (95% CI: 0.73 – 4.74) for rural non-migrants. The adjusted odd ratio for insomnia symptoms predicted from each additional chronic medical condition was 1.71 (95% CI: 1.13 – 2.60).

Conclusions: Compared to permanent urban residents, rural-to-urban migrants in China have higher prevalence of insomnia symptoms. The number of chronic medical conditions reported is also independently related to sleep disturbance.

Key words: migration status, insomnia, China

Introduction

Insomnia is an extremely common symptom and a serious public health concern. According to the text revision to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), insomnia is defined as 1) difficulty falling asleep (sleep onset), 2) difficulty staying asleep (sleep maintenance), and/or 3) poor quality of sleep (non-restorative sleep) for at least 1 month. Previous epidemiological studies have indicated that 30% to 48% of the general adult population report symptoms of insomnia, and 10% to 15% have the diagnosis of chronic insomnia.^{1,2} Compared to people without sleep disturbances, those with insomnia have lower quality of life, higher risks of traffic and industrial accidents and medical co-morbidity, and increased health service utilization.³⁻⁵ It has been estimated that in 1995 the direct costs of insomnia in the United States totaled \$14 billion.⁶ In addition to medical causes, insomnia symptoms are influenced by psychosocial and environment factors. Research has suggested that psychosocial stress may be considered as both a predisposing and a precipitating cause of insomnia.^{7,8}

In the past two decades, economic reforms and relaxed legal restrictions on migration in China have led large numbers of people to move out of villages into cities in search of work. Because of China's vast population and high internal migration rate, about one in six migrants world-wide is a person who has moved from one place to another within China.⁹ Compared to permanent urban residents, Chinese rural-to-urban migrants are under increased psychosocial stress due to lower socioeconomic status, job insecurity, lack of social support in the cities, and discrimination.^{10,11} However, no

studies to date have examined differences in insomnia symptoms between migrants and non-migrants in China.

The present study analyzed data from 197 men and women from 10 different townships in China to explore the cross-sectional relations between insomnia symptoms and migration status.

Methods

Study participants

This study was conducted as a feasibility pre-test for the Migration and Health in China project, a nationally representative sample survey of 3,000 Chinese adults aged 18 to 64 years, with an oversample of migrants, which would yield roughly 2,000 non-migrants and 1,000 migrants. To cover the range of fieldwork conditions likely to be encountered in the future, the current study selected 10 townships throughout China, according to type of township (urban versus rural), in-migration rate (for urban areas), out-migration rate (for rural areas), and presence of substantial numbers of large factories or construction sites within townships. Four small geographic areas were selected within each township, chosen with probability proportional to population size. All households within these small areas were enumerated and sampled randomly. Adults within each household were then sampled randomly, in such a way as to produce completed interviews for five people in each small area and thus 20 interviews per township, resulting in a sample of 200 adults. Professional interviewers used a questionnaire to collect information on demographic characteristics, migration, education, income, marriage, occupation, residential history, family history, and psychosocial stress. Community doctors then interviewed the respondents regarding common physical symptoms, health behaviors, chronic medical conditions, injuries, functional status, and access to health care. One hundred and ninety-seven (98.5%) participants agreed to provide answers to the health section of the questionnaire and were included in the analysis.

Measures

The questionnaire for this study was designed in English, translated into Chinese, and then translated back to English to ensure accuracy. The only exception was the Center for Epidemiologic Studies Depression Scale (CES-D), for which a previously validated Chinese version was used.

Migration status

Migration status was determined based on the internal household registration (*hukou*) system in China. The distinction between rural and urban registration creates disparities in socioeconomic status and in access to state-provided social services.¹² Thus, many people leave their villages and migrate to cities in order to improve their circumstances. To capture rural-to-urban migration, a person was classified as a migrant if s/he had rural *hukou* and was not registered at the place where s/he was interviewed (i.e., had no local *hukou*). The remainder of the sample was divided into permanent urban residents and rural non-migrants. Permanent urban residents were respondents who had urban *hukou*, regardless of their migration status. Rural non-migrants were those with rural *hukou* who were registered locally. The rationale for this 3-category classification is that local registration does not matter much for those who have urban *hukou*. Thus, even though some permanent urban residents live in places other than where they are registered, they are hardly distinguishable from those who have both urban *hukou* and local registration.

Insomnia

There were 5 sleep-related questions in the questionnaire: 1) “How often do you have trouble falling asleep?”, 2) “How often do you have trouble with waking up during the night?”, 3) “How often do you have trouble with waking up too early and not being able to fall asleep again?”, 4) “How often do you get so sleepy during the day or evening that you have to take a nap?”, and 5) “How often do you feel really rested when you wake up in the morning?”. The participants were asked to choose from the 3 provided answers of “seldom/never”, “sometimes”, or “most of the time”. An answer was considered as a positive insomnia symptom, if the participant chose “most of the time” for questions 1 through 4 or “seldom/never” for question 5. The number of insomnia symptoms was also calculated by summing all the positive answers.

Other variables

Depression was assessed using the Center for Epidemiologic Studies Depression Scale. The CES-D is a 20-item self-reported measure of symptoms, with each item scored on a scale of 0 to 3 points.¹³ The range of the total score is from 0 to 60. The Chinese version has been validated previously.^{14,15} A score of 16 or higher was used as the cut-off point to indicate depression.¹⁶

The participants were asked whether they had the following nine chronic medical conditions: hypertension, diabetes, hypercholesterolemia, heart disease, stroke, lung disease, kidney disease, gastrointestinal disease (e.g. peptic ulcer disease, gastroesophageal disease, and gastroenteritis), and cancer. The *number of chronic medical conditions* was the sum of the medical conditions the respondents reported.

Additional information collected included demographic characteristics, such as age and sex. *Education* was categorized as completing senior high school education or equivalent versus less than senior high school education. *Income* was classified as monthly income equal or above versus below 1,000 Renminbi (approximately \$133 U.S. dollars per month). *Smoking and alcohol use* were dichotomized into current users and non-users for each. The frequency of *physical exercise* was divided into 3 categories: exercise five times or more per week, some exercise, and no exercise. *Access to health care* was measured by two questions: 1) whether the respondent had any type of health insurance, and 2) whether s/he usually got regular medical care at public or private clinics. In China, public clinics are generally considered as having higher quality care than private ones.

Data analysis

The associations of migration status with insomnia symptoms and other variables were first examined in bivariate analyses. For continuous variables, the means and standard deviations were calculated for each of the three groups: permanent urban residents, rural non-migrants, and migrants. Non-parametric Kruskal-Wallis test was used to determine the statistical significance of the differences. For categorical variables, the percentage of respondents with a particular characteristic was calculated for each category of migration status. Statistical significance was determined by a Chi-square test. The difference was considered statistically significant if the 2-sided P value was less than 0.05.

Logistic regression models were used to further examine the relation between migration status and presence of at least one insomnia symptom. The multivariable model adjusted for potential confounding variables, including age, sex, education, income, smoking, alcohol use, exercise, type of clinic for regular medical care, insurance, number of chronic medical conditions, and depression. All analyses were performed using the SAS system, windows version 9.1 (SAS Institute, Cary, North Carolina).

Results

The average age of the study participants was 43 years (s.d. 13 years) and 48% were male. The numbers of permanent urban residents, rural non-migrants, and migrant were 93 (47%), 47 (24%), and 57 (29%), respectively. Table 1 summarizes the distributions of sociodemographic characteristics, health behaviors, measures for access to health care, and medical conditions by migration status. Migrants were younger than both permanent urban residents and rural non-migrants and were least likely to have health insurance. Compared to the other two groups, rural non-migrants had lower education and income levels, were least likely to receive regular medical health care at public clinics, and reported more depression and other chronic medical conditions, which is consistent with urban-rural differences that are well established for China.¹⁷

Among all respondents, the prevalence of individual insomnia symptom ranged from 11% for “having trouble falling asleep” to 25% for “feeling sleepy during the day”. Fifty-three percent of the participants reported at least one of the five symptoms, but only 2% had all 5 symptoms. Both migrants and rural non-migrants were more likely than permanent urban residents to report sleep disturbances (Table 2). The probability of reporting at least one insomnia symptom was 40% for permanent urban residents, 62% for rural non-migrants, and 68% for migrants (overall P value = 0.001). Pair-wise comparisons showed significant differences between permanent urban residents and rural non-migrants (P = 0.01) and between permanent urban residents and migrants (P < 0.001). However, the difference between rural non-migrants and migrants was not statistically significant (P = 0.47). Permanent urban residents also reported fewer

insomnia symptoms than rural non-migrants (pair-wise P value = 0.01) and migrants (pair-wise P value = 0.001).

Table 3 shows the multivariable logistic regression analyses of the relations between migration status, number of chronic medical conditions, and the presence of at least one insomnia symptom, with and without adjustment for other covariates. Using permanent urban residents as the reference group, the unadjusted odd ratios of having at least one insomnia symptom were 3.28 (95% CI: 1.63 – 6.58) for migrants and 2.44 (95% CI: 1.20 – 5.08) for rural non-migrants. The multiply-adjusted odds ratios were 3.00 (95% CI: 1.36 – 6.62) and 1.86 (95% CI: 0.73 – 4.74), respectively. Compared to rural non-migrants, the adjusted odds ratio for migrants was 1.61 (95% CI: 0.62 – 4.15). Insomnia was also significantly associated with the number of chronic medical conditions, but not with age, sex, depression, or other covariates.

Discussion

The findings from this sample of adult Chinese men and women showed that, compared to permanent urban residents, both rural-to-urban migrants and rural non-migrants had a higher prevalence of insomnia symptoms. The association persisted only among migrants after adjustment for other potential predictors for sleep disturbances. The number of chronic medical conditions reported was also independently related to insomnia symptoms.

The association between psychosocial stress and insomnia has been well established. Compared to people without sleep difficulty, those with insomnia reported more stressful life events before the onset of the disorder.¹⁸ A recent study in college undergraduates indicated that negative family life stress, together with academic stress, predicted highest levels of insomnia.¹⁹ Sleep complaints were also common in patients with posttraumatic stress syndrome or anxiety disorder.^{20,21} Although there are minimal data on rural-to-urban migrants, one previous study has shown that Kurdish immigrant men in Sweden were 2.7 times more likely to have sleeping difficulties than native Swedish men, even after adjustment for age and the other explanatory variables.²²

This study is the first to demonstrate that rural-to-urban migrants in China had a higher prevalence of insomnia symptoms, compared to permanent urban residents. More migrants in the sample reported at least one insomnia symptom, even though they were younger than permanent urban residents and should have had lower risk for insomnia.²³ This association between migrant status and sleep disturbance was only minimally influenced by the multiple potential confounding variables adjusted in the models. Rural-

to-urban migrants in China are under increased psychosocial stress. They face the problems of lack of the support system of the extended family, stress and financial difficulties if job search efforts are unsuccessful, and employment restriction and discrimination in the cities.¹⁰ Because of the higher housing cost for non-residents, they frequently live in crowded, low-quality housing, often at the work site. Migrants tend to work at jobs that permanent urban residents do not want because the work is difficult, unpleasant, poorly paid, and of low social status. They accept such employment because the financial returns are superior to what they could earn at their rural homes and they expect their jobs to be temporary.²⁴ Moreover, as members in the families who generate a substantial amount of the family income, they often have the responsibility of sending money back home in the form of remittances.²⁵

The prevalence of insomnia symptoms in rural non-migrants was similar to that in migrants and higher than the prevalence in permanent urban residents. Moreover, rural non-migrants also had the least favorable profile of the factors potentially associated with insomnia, including more depression, a higher number of chronic medical conditions, lower education and income, and limited access to good health care. After adjustment for these confounding variables, the higher odds of sleep disturbance among rural non-migrants compared to permanent urban residents was attenuated and no longer statistically significant (odds ratio of 2.44 in the unadjusted model versus 1.86 in the multiply-adjusted model). These results indicated that the psychosocial stress and medical illnesses captured by the measures in the current study might be important mediating factors for higher prevalence of insomnia symptoms among rural non-migrants.

The relationship between sleep problems and chronic medical conditions demonstrated in this study is consistent with previous reports. Data from 1,506 community-dwelling men and women aged 55-84 years in the United States showed that chronic medical diseases, but not aging per se, were associated with sleep complaints.²⁶ These medical conditions include heart disease, hypertension, and diabetes.²⁶⁻²⁸ Although the mechanisms underlying these associations are speculative, bodily pain and discomfort associated with various chronic medical conditions and side-effects from the treatments seem to play an important role.²⁶

Our results should be interpreted in the context of the strengths and limitations of this study. This is the first study that has directly examined the differential of insomnia symptoms between rural-to-urban migrants and non-migrants in China. Even though the sample size was relatively small, particularly for rural non-migrants, the respondents were recruited from 10 townships throughout the country and 98.5% of respondents provided complete information on migration status, insomnia symptoms, and other variables. Several limitations of this study merit discussion. The association between migration status and insomnia symptoms was cross-sectional in nature. Although it seems implausible that rural residents with insomnia would be more likely to migrate to cities, the data do not allow us to assess the temporal relationship between these two variables. Our classification of migration status did not differentiate urban-to-urban migrants from those urban residents who have never migrated or who obtained local *hukou* at their current place of residence. However, the impact of this misclassification should be modest, because urban-to-urban migrants are much smaller in number, and compared to rural-to-urban migrants, their socioeconomic status is usually closer to that

of urban residents who have local *hukou*.²⁹ Lastly, the study questionnaire did not measure the duration for insomnia symptoms and only a small number of respondents reported disturbances in all 3 domains of sleep onset, sleep maintenance, and non-restorative sleep. As a result, we could not examine clinical insomnia, based on the *Diagnostic and Statistical Manual of Mental Disorders*.

Despite these limitations, our data suggest that rural-to-urban migrants in China have higher prevalences of insomnia symptoms than do permanent urban residents. Further research with a larger nationally representative sample is needed to more accurately estimate the prevalence rate of insomnia symptoms in China. These new findings may shed new insights on the psychosocial determinants of insomnia in general population. The information will also help health professionals and policy makers to formulate effective intervention strategies and improve the health status for migrant workers in China.

Acknowledgement

This project was funded by the Unites States National Science Foundation (SES-0551279), the Chinese National High Technology Research and Development Program (2006AA02Z434), and 100-Talent Scientists Program, Chinese Academy of Sciences.

Dr. Hu also received funding from the National Institute on Aging (K23 AG021029) and California Center for Population Research at University of California, Los Angeles (R24 HD041022).

Table 1. The associations between migration status, sociodemographic characteristics, health behaviors, access to health care, and medical conditions.

Variables	Permanent urban residents (N = 93)	Rural non-migrants (N = 47)	Migrants (N = 57)	P – value **
Age, years *	43 ± 14	47 ± 11	39 ± 13	0.004
% male	46	49	49	0.92
% completing high school	54	6	23	< 0.001
% with monthly income above 1000 RMB ***	46	13	42	< 0.001
% current smoker	27	34	30	0.68
% current alcohol user	41	47	49	0.58
Exercise				
% exercise 5 times/week	26	9	21	< 0.001
% some exercise	31	9	12	
% no exercise	43	82	67	
% receiving medical care at public clinics	84	51	67	< 0.001
% having health insurance	70	55	44	0.006
Number of chronic medical conditions	0.5 ± 0.8	0.9 ± 1.2	0.4 ± 0.6	0.11
% depressed	20	45	26	0.01

* Data are presented as means (standard deviations) for continuous variables and percentages for categorical variables.

** P values are based on Kruskal-Wallis tests or Chi-square tests.

*** One U.S. dollar = 7.5 Renminbi (RMB)

Table 2. The associations between migration status and insomnia symptoms.

Variables	Permanent urban residents (N = 93)	Rural non-migrants (N = 47)	Migrants (N = 57)	P – value **
Insomnia symptoms *				
% having trouble falling asleep	9	17	11	0.32
% waking up easily during the night	10	19	23	0.08
% waking up too early	11	34	25	0.003
% feeling sleepy during the day	17	26	39	0.01
% waking up, not feeling rested	22	21	26	0.76
% with at least one insomnia symptom	40	62	68	0.001
Number of insomnia symptoms	0.7 ± 1.1	1.2 ± 1.3	1.2 ± 1.2	0.002

* Data are presented as means (standard deviations) for continuous variables and percentages for categorical variables.

** P values are based on Chi-square tests or Kruskal-Wallis tests.

Table 3. The unadjusted and adjusted odd ratios of migration status and number of chronic medical conditions for the presence of at least one insomnia symptom

	Odds ratios (95% confidence intervals)	
	Unadjusted	Adjusted *
Migration status		
Migrants versus permanent urban residents	3.28 (1.63 – 6.58)	3.00 (1.36 – 6.62)
Rural non-migrants versus permanent urban residents	2.44 (1.20 – 5.08)	1.86 (0.73 – 4.74)
Each additional chronic medical condition	1.73 (1.20 – 2.50)	1.71 (1.13 – 2.60)

* Model included migration status, age, sex, education, income, smoking, alcohol use, exercise, type of clinic for health care, insurance, number of chronic medical conditions, and depression.

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