

Health Indicators and Geographic Mobility among Young Rural-to-Urban Migrants in China

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Abstract

The process of rural-to-urban migration in China is accelerating with increased modernization and industrialization. To address the issues of health outcomes and geographic mobility among this population, data from 4,208 rural-to-urban migrants in two major metropolitans of China were analyzed. Results indicate that average duration of migration was 4.3 years, with younger migrants being more mobile than their older counterparts. After controlling for possible confounders, increases in mobility were associated with unstable living arrangements, substandard employment conditions, suboptimal health status, inferior health-seeking behaviour, elevated level of substance use, depressive symptoms and expression of dissatisfaction with life and work. The findings in the present study underscore the need for improved living and employment conditions and increased healthcare services available to rural-to-urban migratory population.

Introduction

A substantial global literature suggests that migration is associated with an increased risk for poor health (McKay et al. 2003). This increased risk may be related to such contextual and psychosocial factors as adopting a new socio-cultural environment, coping with changes in traditions and lifestyles, dealing with economic transitions, and overcoming barriers to gain access to local community services including healthcare delivery. Previous research has documented that stigmatization causes anxiety, which may contribute to mental and physical illnesses (Darmon and Khlal 2001; Pudaric et al. 2000). The existing literature on the relationship between migration and health has largely been limited to migrants within the United States and European countries, and those seeking permanent resettlements such as trans-culture or trans-country immigrants and war refugees (Darmon and Khlal 2001; Diaz et al. 2001; Pernice and Brook 1996; Pudaric et al. 2000). In contrast, there is limited data available regarding the relationship between migration and health status among temporary, rural-to-urban migrants in many developing countries, including China, which houses one-fifth of the world's population.

Migration from rural to urban areas was restricted in China through the official household registration (“hukou”) system for almost a quarter century until economic reform took place in the late 1970s (Zhang, L. 2001). Under the “hukou” system, each individual is officially registered as either a rural or an urban resident. Rural residents could not freely move to or settle in urban areas in order to become urban residents. With the introduction in 1979 of the Rural Household Contract Responsibility System, a form of rural economic reform, China experienced rapid growth in agricultural productivity (e.g., agriculture GDP increased from 2.7% in 1970–1978 to 7.1% in 1979–1984) (Anderson et al. 2003) and a subsequent surplus of rural labour (e.g., agriculture labourers decreased from 81% in 1970 to 49% in 2000) (Anderson et al. 2003). Concurrently, rapid economic growth in urban China widened the income gap between the urban and rural areas to a historically high level in the 1990s (Anderson et al. 2003). This increasing income gap has provided a strong incentive for rural residents to migrate to urban areas in search of employment opportunities and better lives. Consequently, millions of Chinese farmers have left their villages to go to cities, forming the rural-to-urban migration, one of the largest internal migrations in China’s recent history (Zhang, L. 2001).

According to the recent Chinese governmental statistics, there are approximately 114 million rural-to-urban migrants in China, accounting for 23.2% of total rural labour and 9% of the total population in China (CNBS 2003). The rural-to-urban migrants were individuals who moved from rural areas to urban areas for jobs. These migrants work or live in urban areas without official urban household registration (i.e., urban “hukou”). Most of these migrants come from the poor rural areas in interior provinces, to form a general geographic pattern of migration from the middle and western parts of China to the eastern and coastal regions, where economic development was more advanced. Because of existing legal restrictions on employment and housing in urban areas, approximately 80% of the migrants do not permanently relocate (e.g., obtaining official urban “hukou”) (Zhang, L. 2001).

While the current magnitude of the rural-to-urban migration is already substantial, China is facing an anticipated increase of rural-to-urban migration in the coming years because of several salient socioeconomic factors. Both the rural-urban income disparity and the rural labour surplus have continued to rise in China in recent years. Approximately 70% of the Chinese population live in rural areas. One-quarter of rural Chinese households lived on less than one US dollar a day in 1999, compared to only 1% of urban households in the same economic condition (Anderson et al. 2003). When China became a member of the World Trade Organization (WTO) in 2002, part of China’s obligation to the WTO was to decrease the duties on imported farm produce from 22% in 2001 to less than 15% after the phase-in period, and to permanently eliminate some quotas of agriculture product imports (Anderson et al. 2003). As a result, Chinese agriculture production will decrease and the surplus of rural labour will increase. With a simultaneous increase of labour needs of urban industries, more rural-to-urban migration will be expected in the coming years.

In addition, the Chinese government has gradually been relaxing its control on rural-to-urban population movement. Until recently, there had been strong government control over rural-to-urban migration. For example, there have been several institutionalized barriers to migrants seeking legitimate employment in urban areas, including the government’s restriction on specified industries and corporations to employ migrants. For example, the Beijing municipal government published annual guidelines permitting or restricting certain occupations to employ migrants. In 1999, the list contained at least 36 “restricting” occupations that included telephone operators, store salesclerks, bus drivers and conductors, box-office clerks, warehouse clerks and hotel attendants (Li et al. 2005).

The cumbersome and costly administrative procedures required of migrants rendered it difficult to obtain the necessary permits for legitimate employment in cities. Rural migrants were required to pay as many as 12 different fees to local government and to obtain up to six governmental registrations or permits for employment (Li et al. 2005). It normally took migrants at least three months and cost them from 500 to 1,000 Yuan (about one month salary) to obtain all of the required registration and permits for employment (most of which need to be renewed annually). Failing to obtain these

registrations and permits had significant consequences. Migrants without the temporary residency permit were considered to be “illegal migrants” and subjected to incarceration and/or deportation by the urban public security agencies. Because of the increasing societal concern about the welfare of the migrants and increasing social tension between migrants and urban residents, both central and local governments have started to relax some regulations on rural-to-urban migration. For example, the Beijing government abolished the employment restriction in 2001 and waived some mandatory fees in 2002. The deportation law was abolished nationwide in June 2003 in response to the brutal death of a young college graduate arrested and placed in custody by local police as an “illegal migrant.” While it is too early to evaluate the actual impact of these regulatory changes on the well-being of migrants in cities, the changes certainly will encourage new waves of rural-to-urban migration.

Given the size of this mobile population movement and the likelihood that this process will accelerate as modernization and industrialization proceed, the health status and access to healthcare of this migratory population have become significant public health issues in China. In moving from the rural to the urban context, migrants also encounter a rapid change of working and living conditions, a weakening of family supports and a fragmentation of their social support network that may negatively impact their well-being and health status (Diaz et al. 2001; Gao et al. 2001; Huang 2000; Pernice and Brook 1996; Stafford 1986; Tie 1999; Ying 2003). In addition, the healthcare infrastructure in China may not be sufficient to provide adequate healthcare to migrants. Along with extreme expansions of economic opportunities for the country, China's healthcare system has undergone substantial reconstruction since 1978, when the country began moving from a planned economy to a market economy.

The primary objective of the medical reform in the 1980s was cost recovery for the hospitals and other healthcare providers (Bogg et al. 1996). Parallel to its residence registration system, there have been separate health service systems for rural and urban residents. About 80% of the country's total health budget is relocated to funding hospital-based treatment in the urban areas, although the urban residents account for just 30% of the country's population (Zhang 2001). For the rural population, coverage by the affordable and generally effective cooperative health insurance reached a peak in the middle 1970s when nearly 90% of the rural population was covered. In the 1980s, rural cooperative health insurance collapsed and the coverage fell to only 5% in 1989 (Bogg et al. 1996; Grogan 1995). Virtually all rural residents must now pay for their healthcare out of their own pockets, at the point of service. The urban population, which used to be protected by governmental health insurance, has been covered primarily by employment-based health financing since 1980s (Grogan 1995).

The Chinese government's efforts to commercialize and privatize many health services have stressed the capabilities of many rural and urban health institutions, causing substantial and frequently unaffordable increases in the direct cost to patients. In both the rural and urban areas, healthcare is becoming a fee-for-service commodity that is more available to the rich than it is to the poor. As a result, access to healthcare is declining in many sectors of the population (Lampton 2003; Smith 1998). A recent study in China found that among those in the lowest income bracket who reported illness, 70% did not obtain treatment because of financial difficulty (Gao et al. 2001). Because of the temporary and informal nature of their employment, most migrants who arrive in cities without any healthcare insurance are not entitled to many of the privileges and benefits available to their urban counterparts, including health care coverage (Li et al. 2005; Zhang, L. 2001). For example, only 22.5% of female migrants in Beijing received any maternal health or family planning education, compared to almost 100% of urban residents (Zheng et al. 2002).

Even though the proportion of the rural-to-urban migrants is substantial (about 9% of the total Chinese population and 13% of the population aged 15 to 64 years), little attention has been paid to the health risk and health-seeking behaviour of these Chinese migrants. Therefore, the current study, utilizing cross-sectional data from 4,208 migrants residing in two large metropolitan areas in China, was designed to explore the association of increased geographic mobility with indices of health status and health-seeking behaviour among rural-to-urban migrants. An increasing geographic mobility is

defined as a more frequent movement in relation to the duration of migration. We hypothesized that the mobility of rural-to-urban migrants would be positively associated with (1) substandard living (e.g., unstable dwelling arrangement, poor living condition); (2) worsened employment (e.g., less pay, long working hours, more working days, and high frequency of changing job); (3) suboptimal health condition; (4) reduced health-seeking behaviour; (5) elevated substance-use behaviours (e.g., tobacco use and alcohol consumption); and (6) increased mental health symptoms (e.g., depressive symptoms, life dissatisfaction).

Methods

Survey Sites and Participants

Data were collected from migrants residing in Beijing and Nanjing, China in 2002. Beijing and Nanjing are two cities 1,200 kilometres apart. According to the China 2000 Census data, Beijing (the capital of China) has a population of 13.82 million urban residents and 3 million (22%) rural-to-urban migrants. Nanjing (the provincial capital of Jiangsu) has a population of 6.2 million urban residents and 800,000 (13%) rural-to-urban migrants.

The study sample was comprised of respondents who participated in an HIV/STD prevention feasibility study among rural-to-urban migrants in China. The details regarding sampling methodology and outreach procedures are described elsewhere (Li et al. 2004). Briefly, 10 occupational clusters and job markets (for migrant job seekers) were selected as the sampling frame for participant recruitment. The occupational clusters that employed more than 90% of the migrants included restaurants, barbershops/beauty salons, bath houses, dance halls/bars, construction companies, street vendors, small retail shops, hotels, domestic services and factories. Participants were recruited from their workplaces or job markets using a “quota-sampling” procedure such that the number of participants recruited in each occupational cluster was approximately proportional to the overall estimated distribution of migrants in the cluster.

Survey Procedures

Data were collected employing the “Migrant Health Behaviour Survey,” a self-administered questionnaire developed through the joint efforts of investigators both in China and the United States. The questionnaire was pilot-tested for comprehension among young migrants in China and was considered to be a culturally appropriate assessment tool (Li et al. 2004). Over the course of a 45-minute session, participants completed the survey individually or in a small group (3–5 people) at worksites or public locations appropriate for survey administration. Trained data collectors provided assistance to a small number of participants (approximately 20) with limited literacy by reading survey items to them. Respondents were provided with small monetary compensation for their participation. The Institutional Review Boards at West Virginia University and Wayne State University in the United States as well as Beijing Normal University and Nanjing University in China approved the study protocol.

Measures

Demographic Measures

Variables used for measuring demographic characteristics included age, gender and education attainment (no formal education, Grades 1–6, Grades 7–9, Grades 10–12 and post-secondary education). Ethnicity (Han, Hui, Man, Mongolian and others) was also assessed, but since respondents with an ethnic background other than Han (the nation's ethnic majority) consisted of only 3% of the survey sample, they were grouped into a single category as non-Han for data analysis in the current study.

Mobility

Participants were queried about the entire duration of migration (in years) and the number of cities to which they had ever migrated. The correlation between these two variables was 0.41 ($p < .01$).

A ratio of the number of migratory cities to the total migration years was used as an index of mobility for each respondent. The mobility index ranged from 0.06 to 12.5 with a greater number indicating a higher level of geographic mobility (e.g., more frequent movement in relation to the duration of migration).

Living Conditions

Three items were employed to assess current living conditions: (1) type of residence in the city (apartment building, flat house, underground storage space and work shed); (2) frequency of changing residence (never, once every two to three years, once per year, at least two to three times per year); and (3) availability of basic utilities in the dwelling (e.g., toilet, kitchen, city water, gas/cylinder, telephone, TV set, shower or bath tub). To quantify living conditions, a composite score was created by indexing respondents who lived in a substandard residence (e.g., lived in an underground storage space or a work shed), lacked basic utilities in the dwelling (e.g., having no more than half of the eight utilities identified), and changed residence at least two to three times a year. The resultant living condition composite score consisted of values of 0, 1, 2 and 3 and was reverse-coded, so that greater numbers indicated better living conditions.

Employment Conditions

Five items were employed to assess general employment conditions. Participants were first asked two general questions: (1) How many different jobs have you had since you migrated to cities? (2) Where are you working now (e.g., restaurant, beauty saloon/barber, bathhouse/sauna centre/massage, dance hall/karaoke/bar, construction, street vendor, small store/shop, hotel, domestic service, factory or no job)? Respondents who identified themselves as being currently employed (or self-employed) were queried further about average hours worked per day, average monthly income (in Chinese currency Yuan) and days off per month. A composite score of employment condition was created by indexing respondents who had worked more than three different jobs in the past, had unstable employment or were self-employed (e.g., street vendor, small store/shop, domestic service), had monthly income below the 25 percentile of the sample (e.g., 500 Yuan), worked at least 10 hours per day and had fewer than four days off per month. The final employment score consisted of values 0 through 5 and was reverse-coded so that a higher score indicated a better employment condition.

General Health Condition

Nine items were employed to measure the general health condition of the study population. These items were developed by modeling items from the SF-12 Health Survey (Ware et al. 1996) in the Chinese setting. The items assessed participants' general health conditions (from poor to excellent), limitations and effects of their health conditions (both physical and emotional) on their daily work and social life in the past month. The Cronbach alpha for the nine items was 0.66. A composite health score was created by indexing those participants who reported poor health and severe limitations in their work productivities and daily life because of physical and emotional problems. The composite index was reverse-coded and ranged from 1 to 9 with a higher score indicating a better health condition.

Health-seeking Behaviour

Following a general question about how often the participant became ill in cities on a 5-point scale (where 1=never, 5=always), participants were asked additional questions assessing health-seeking behaviour in the event of an illness (e.g., do nothing, self-treatment, go to hospital, go to regular clinics or go to underground clinics).

Participants were also asked whether they ever had a physical checkup and if they had access to healthcare facilities near their workplaces or their city residences. A composite score was created by indexing respondents who did nothing or self-treated for illness; never received any physical checkup; or had no knowledge about a healthcare facility nearby. Again, the composite score was

reverse-coded so that a higher score indicated a greater tendency of health-seeking behaviour. In addition, the participants were queried about the possible reasons for not seeing a doctor when they became ill.

Substance Use

Data on substance use were comprised of information on cigarette and alcohol consumption. Participants were asked how many cigarettes they had smoked each day during the previous month (did not smoke; 1–5 cigarettes; 6–10 cigarettes; 11–15 cigarettes; 16–20 cigarettes; more than a pack). In addition, participants were asked how many times they were intoxicated with alcoholic beverages during the previous month (none, once, twice, three times or at least four times). A composite score was created by indexing respondents who smoked at least half a pack a day during the previous month and were intoxicated at least once in the previous month. The composite score consisted of values 0 through 2, with a higher score indicating a higher level of substance use.

Depression

Depressive symptoms were measured using the Centre of Epidemiological Studies Depression Scale (CES-D) (Radloff 1977). The 20-item CES-D was introduced into China in the early 1990s (Wang 1993). The existing Chinese version of the CES-D was modified by the investigators to ensure the accuracy of the translation. The modified scale was found to have high reliability for the current study sample (Cronbach's alpha = 0.85). The scale scores ranged from 0 to 60, with higher scores indicating higher frequency of depressive symptoms.

Life Satisfaction

A scale comprised of two questions was used to assess participants' general satisfaction with their current life or employment on a 5-point scale (1=very dissatisfied, 5=very satisfied). The scale was found to have adequate reliability for the current study (Cronbach's alpha=0.75). The mean score of the two items was retained as an overall life satisfaction index. For those respondents who were unemployed, only the life satisfaction score was employed as the index in the analysis.

Statistical Analysis

Overall distributions of all measures by gender were assessed using Chi-square test for categorical variables and ANOVA for continuous variables. Associations between mobility index and health-related measures were examined using multivariate analysis of covariance (MANCOVA). The mobility index was used as the main between-subjects factor. To categorize the mobility index into a between-subjects factor in the MANCOVA model, the sample was divided into five groups using the 20th, 40th, 60th and 80th percentiles of the mobility index as thresholds. Because mobility can be potentially confounded by age, gender, marital status and level of education attained, these factors were included in the MANCOVA model either as additional between-subjects factors (e.g., gender, marital status) or covariates (e.g., age, education attainment). Pillais F test (Stevens 1996) was used for evaluating multivariate significance. The conventional F test was used for univariate testing. The t statistic was used to assess the significance of covariates.

Results

Sample Characteristics

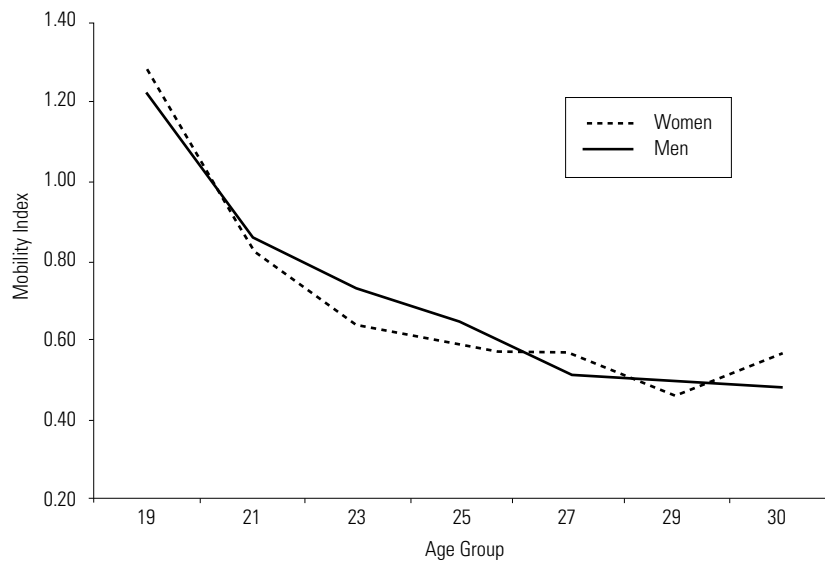
A total of 4,301 migrants were approached for the survey, of whom 24 (0.6%) refused to participate (10 from Beijing and 14 from Nanjing). Sixty-nine additional respondents were excluded from the database either because of substantial missing data (e.g., more than half of the variables were missing) or missing data on key variables (e.g., gender). The final sample consisted of 4,208 respondents (Table 1), with 53% being from Beijing and 47% from Nanjing. Of the total sample, 40% were female and 60% were male; the mean age was 23.5 years (SD=3.8). The majority of the respondents

were of Han ethnicity (97%), were single (72%) and had at least some elementary school level education (94%). Male respondents were 1.12 years older than the female respondents ($p < .01$) and significantly more of the females than the males (77% versus 68%, $p < .01$) were single.

Mobility

As shown in Table 1, respondents had an average migration history of 4.29 years ($SD = 3.05$). More than half (58%) had migrated to two or more cities and 30% had migrated to three or more cities. There was no gender difference in the mobility index between genders (mobility index = 0.76 for women versus 0.72 for men). While men tended to move more frequently than women did from one city to another (e.g., 67% men versus 46% women had migrated to two or more cities, $p < .01$), men also had a longer migratory history than women did (4.84 years versus 3.48 years, $p < .01$). As shown in Figure 1, the mobility index significantly differed by age, with younger migrants being more mobile. In addition, the mobility index differed by marital status with those migrants who had never been married being more mobile than those who were married (0.83 versus 0.52, $p < .0001$). The association between mobility index and marital status was consistent across gender (e.g., the mobility index was 0.83 for unmarried women and 0.53 for married women; 0.83 for unmarried men and 0.51 for married men).

Figure 1. Association between age and mobility among Chinese rural-to-urban migrants



Description of Health Indicators

Living Arrangement

As shown in Table 1, 76% of the respondents reported living in apartment buildings or flat houses, 12% in underground storage spaces and 8% in work sheds/shelters. Eighty-six percent reported that their dwellings were equipped with tap water; 58% with a toilet; 45% with a kitchen; 42% with gas line or cylinder; 33% with a telephone; 55% with a TV set; and 41% with a shower or bath tub. Eight percent reported that they had none of the seven basic utilities/equipments listed above in their residence. Approximately one-quarter of the respondents reported changing their residence at least two to three times a year.

Table 1. Demographic characteristics and living conditions of 4,208 rural-to-urban migrants in China

	Overall	Female	Male
N(%)	4208(100%)	1699(40%)	2509(60%)
Mean age (yr)	23.49(3.80)	22.82(3.55)	23.94(3.90)****
Total yrs of migration	4.29(3.05)	3.48(2.42)	4.84(3.30)****
Han ethnicity	4053(97%)	1623(96%)	2430(97%)*
Single	2921(72%)	1275(77%)	1646(68%)****
Education attainment¹			
£6	252(6%)	131(8%)	121(5%)
7-9	2313(56%)	849(51%)	1464(59%)
10-12	1372(33%)	598(36%)	774(31%)
>12	231(6%)	103(6%)	128(5%)
# of cities migrated¹			
One	1725(42%)	911(54%)	814(33%)
Two	1152(28%)	489(29%)	663(27%)
Three	668(16%)	178(11%)	490(20%)
Four	295(7%)	59(4%)	236(10%)
≥Five	309(7%)	42(2%)	267(11%)
Site of residence¹			
Building	1349(32%)	702(42%)	647(26%)
Flat	1855(44%)	672(40%)	1183(47%)
Underground	515(12%)	239(14%)	276(11%)
Shelter	348(8%)	29(2%)	319(13%)
Other	126(3%)	50(3%)	76(3%)
Utilities in dwelling			
Toilet	2434(58%)	1112(66%)	1322(53%)****
Kitchen	1896(45%)	779(46%)	1117(45%)
Running water	3617(86%)	1521(90%)	2096(84%)****
Gas	1767(42%)	769(46%)	998(40%)****
Telephone	1400(33%)	638(38%)	762(31%)****
TV set	2290(55%)	960(57%)	1330(53%)*
Shower/bathtub	1710(41%)	733(43%)	977(39%)**

None of the above	347(8%)	90(5%)	257(10%)*
Frequency of changing site of residence¹			
Never	1906(44%)	852(51%)	954(39%)
once 2-3 years	551(13%)	222(13%)	329(13%)
once per year	776(19%)	295(18%)	481(20%)
≥2-3 times per year	996(24%)	298(18%)	698(28%)

Note 1. Responses significantly differed by gender ($p < .0001$).

* $p < .05$, ** $p < .01$, *** $p < .0001$

More women than men lived in apartment buildings (42% versus 26%), and more men than women lived in work sheds (13% versus 2%, $p < .01$). More women than men had access to telephones, city water, gas and shower/bathtub, and women in general tended to stay longer than men in the same residence (51% versus 39% never moved, $p < .01$).

Employment Conditions

Nearly all of the respondents (96%) were currently working (or “earning money”). Whereas 67% had worked two or more jobs since migrating to the city, only 2% reported having never been employed. Distribution of the migrants who were currently working by job location is presented in Table 2. Approximately half of the respondents worked in three occupation sectors (18% in construction companies, 17% in restaurants and 13% in barbershop or beauty salon) and less than one-tenth worked in domestic services (4%) or retail (2%). The average monthly income for all respondents was 878 Yuan (equivalent to \$110 with the current exchange rate) ranging from zero to 12,000 Yuan per month. On average, migrants worked 10 hours per day and received approximately three days off per month.

Significant gender differences in type of employment were observed ($p < .01$). For example, more women than men reported working in restaurants (20% versus 15%), barbershops or beauty salons (20% versus 9%), hotels (8% versus 4%) and domestic services (8% versus 1%). In contrast, more men than women reported working in construction (29% versus 1%). Men made slightly more money than women made (907 Yuan versus 836 Yuan, $p < .01$) and had fewer days off each month (2.77 versus 3.04, $p < .01$).

Table 2. Employment situation of rural-to-urban migrants in China

	Gender		
	Overall	Female	Male
How many jobs you have had?¹			
None	75(2%)	31(2%)	44(2%)
One	1309(31%)	584(35%)	725(29%)
Two	1263(30%)	539(32%)	724(29%)
Three	907(22%)	354(21%)	553(22%)
Four	312(8%)	102(6%)	210(8%)

≥Five	310(7%)	78(5%)	232(9%)
Place of current employment¹			
No job	149(4%)	54(3%)	95(4%)
Restaurant	709(17%)	345(20%)	364(15%)
Beauty Parlour	548(13%)	337(20%)	211(9%)
Bath house/ massage parlour	350(8%)	210(12%)	140(7%)
Dance hall/bar	234(6%)	210(6%)	136(6%)
Construction	744(18%)	18(1%)	726(29%)
Street Vendor	307(7%)	102(6%)	205(8%)
Small retail shop	73(2%)	46(3%)	27(1%)
Hotel	229(6%)	129(8%)	100(4%)
Domestic service	159(4%)	142(8%)	17(1%)
Factory	340(8%)	116(7%)	224(9%)
Other	346(8%)	96(6%)	250(10%)
Monthly income (Yuan)	877.97(727.35)	835.58(741.73)	906.92(716.09)**
Daily working hours	10.16(3.30)	10.09(3.51)	10.20(3.15)
Days off per month	2.88(2.25)	3.04(2.22)	2.77(2.27)****

Note 1. Responses significantly differed by gender ($p < .0001$).

General Health Conditions

As shown in Table 3, about one-quarter of the respondents reported they had fair or poor health. One-quarter to one-third of the respondents said that their health conditions had prevented them from performing activities that require moderate strength (such as moving a table, climbing stairs to fifth or sixth floor). One-quarter and one-tenth of the respondents reported that physical problems had reduced or prevented their work performance and accomplishment in the previous month, respectively. About half of the sample reported that emotional problems had prevented them from achieving their goals or that they suffered emotional unrest. About 5% of the respondents reported that physical pain had prevented their normal work most or all the time in the last month and a similar number of respondents reported that their health problems (either physical or psychological) had limited their social activities most or all the time. There were some gender differences, with more females reporting poor or fair health (25% versus 21%, $p < .0001$) and being affected or disturbed by their physical and emotional problems (mean health composite index was 7.55 for females and 7.65 for males, $p < .05$).

Health-seeking Behaviour

Approximately one-eighth of the sample (9% females and 15% males) reported no illness during migration. As shown in Table 3, among those who reported ever becoming ill, 7% claimed that they did nothing, approximately 50% reported self-treatment or treatment at hospitals, 19% reported treatment from public clinics and a small number (2%) reported seeking treatment from practitioners not licensed to practice medicine. Although significant gender differences were found among

respondents in terms of from whom and where medical care was sought, differences were relatively small (Table 3). The top reasons for not seeing a doctor for treatment included excessive cost (32%), limited time (18%) and inconvenience (11%). Seventy percent of the sample (77% women and 66% men) reported having received a physical examination, although only 28% of the sample received a self-initiated physical examination. More women than men received a physical examination because it was required by their employees or others (50% versus 37%).

Substance Use

About one-tenth of the sample reported smoking more than 15 cigarettes daily in the past month and 28% reported intoxication with alcohol at least once during the same time period. Significantly more men than women were heavy cigarette smokers (18% versus 2%, $p < .01$) and alcohol abusers (36% versus 16%, $p < .01$).

Depressive Symptom and Life Satisfaction

As shown in Table 3, the mean score of CES-D among this sample of rural-to-urban migrants was 11.52 (SD=9.45); the CES-D score was relatively similar for males and females. More than one-quarter of the sample reported dissatisfaction with their life situation (27%) or current work (28%), with more men than women reporting dissatisfaction with their life (29% versus 23%, $p < .01$) or current work (30% versus 26%, $p < .01$).

Table 3. Health-related outcomes among rural-to-urban migrants in China

	Gender		
	Overall	Female	Male
General health condition			
Poor or fair health	946(23%)	426(25%)	520(21%)****
Health prevented activities require moderate strength	1584(38%)	885(53%)	699(28%)****
Health prevented climbing 5–6 floors	977(24%)	475(29%)	502(20%)****
Accomplished less because of physical problem	1127(27%)	441(26%)	686(28%)
Could not do much because of physical problem	448(11%)	161(10%)	287(12%)*
Accomplished less because of emotional problem	1613(39%)	670(40%)	943(38%)
Not very careful because of emotional problem	2037(49%)	852(51%)	1185(48%)*
Pain prevented normal work most or all time	167(4%)	61(4%)	106(4%)
Health limited social activities most/all the time	195(5%)	65(4%)	130(5%)**
What did you do when you got sick¹			
Did nothing	241(7%)	103(7%)	138(7%)
Self-treated	1860(51%)	784(51%)	1076(51%)
Went to big hospital	1797(49%)	796(52%)	1001(47%)**
Went to formal clinic	711(19%)	246(16%)	465(22%)****
Saw unlicensed doctor	74(2%)	19(1%)	55(3%)**

Top 6 reasons for not seeing a doctor			
Illness was not serious	2798(67%)	1180(71%)	1618(65%)*****
Had medicine handy	1342(32%)	610(36%)	732(30%)*****
Too expensive to see a doctor	1334(32%)	513(31%)	821(33%)
No time	756(18%)	321(19%)	435(18%)
Afraid affecting job	633(15%)	278(17%)	355(14%)*
Inconvenience	466(11%)	173(10%)	293(12%)
Did you ever receive a physical exam?²			
Yes, I did it on my own will	1168(28%)	457(27%)	711(29%)
Yes, I did it because I was required to do so	1777(42%)	849(50%)	928(37%)
No, I never did it	1243(30%)	383(23%)	860(34%)
Substance use			
Smoked more than half pack daily last month	479(11%)	30(2%)	449(18%)*****
Got drunk \geq once last month	1184(28%)	275(16%)	909(36%)*****
Depression (CESD)	11.52(9.45)	11.55(9.83)	11.50(9.18)
Dissatisfied with			
Current life	1114(27%)	388(23%)	726(29%)*****
Current work	1184(28%)	434(26%)	750(30%)*****

Note 1. Data were available only from those who had ever become ill.

Note 2. Responses significantly differed by gender ($p < .0001$).

* $p < .05$, ** $p < .01$, **** $p < .0001$

Association between Health Indicators and Mobility

As shown in Table 4, the categorized mobility index did not vary appreciably among men and women. In contrast, mobility varied with age and marital status, such that younger single migrants were more mobile ($p < .01$ for age and marital status). Additionally, migrants who were more mobile earned less money per month than migrants who were not as mobile (range from 694 Yuan to 944 Yuan, $p < .01$). Mobility was found to be negatively associated with a variety of health indicators examined in this study.

Table 4. Association between health indicators and mobility among rural-to-urban migrants in China

	Overall	Mobility Index ¹				
		1	2	3	4	5
N(%)	4149 (100%)	832(20%)	668(16%)	1166(28%)	971(23%)	512(12%)
Demographic Characteristics						
Male	2470(60%)	494(59%)	414(62%)	677(68%)	578(60%)	307(60%)

Single	2898(72%)	399(50%)	395(61%)	860(76%)	85(86%)	429(86%)****
Age (years)	23.47(3.78)	25.83(3.48)	24.86(3.60)	23.22(3.44)	21.83(3.25)	21.45(3.45)****
Duration of migration (years)	4.28(3.04)	7.25(3.10)	5.78(3.12)	3.88(2.07)	2.61(1.61)	1.48(1.08)****
# of migratory cities	2.11(1.23)	1.42(.73)	2.16(1.23)	2.15(1.17)	2.37(1.29)	2.58(1.43)****
Monthly income (Yuan)	843(726)	945(709)	918(639)	828(698)	806(879)	685(545)****
Health Indicators						
Unstable living condition	2.04(.87)	2.14(.84)	2.05(.89)	2.03(.88)	2.01(.88)	1.96(.86)**
Worsened employment condition	2.96(1.13)	2.99(1.12)	3.07(1.12)	2.95(1.12)	2.87(1.12)	2.84(1.17)***
General health condition	7.61(1.29)	7.68(1.28)	7.74(1.29)	7.67(1.27)	7.47(1.30)	7.42(1.27)****
Health-seeking	2.09(.80)	2.20(.76)	2.08(.81)	2.04(.81)	2.08(.80)	2.04(.84)****
Substance use	.40(.59)	.35(.57)	.43(.62)	.42(.60)	.41(.60)	.35(.55)*
Depression	11.51(9.43)	10.40(9.13)	10.39(8.71)	11.35(9.31)	12.53(9.72)	13.20(10.08)****
Life satisfaction	3.03(.92)	3.18(.87)	3.05(.89)	3.02(.91)	2.92(.95)	2.98(.96)****

Note: 1. Fifty-nine participants (20 women 29 men) had missing value on the mobility index.

* $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0001$

Table 5 depicts the results of multivariate analysis on associations between mobility and health indicators. The MANCOVA model controlled for possible covariates such as age, gender, marital status, education and income. The model also assessed the interactions among mobility, gender and marital status. The analysis revealed a multivariate significance for mobility, gender and marital status as well as two of the interactions (i.e., mobility by gender and gender by marital status). Similar to the results from the bivariate analyses, increased mobility was associated with substandard living conditions ($p < .05$), worsened employment conditions ($p < .0001$), suboptimal health status ($p < .05$), low health-seeking behaviour ($p < .001$), higher numbers of depressive symptoms ($p < .0001$) and decreased life satisfaction ($p < .05$); gender was significantly associated with living condition ($p < .0001$), health-seeking behaviour ($p < .0001$) and substance use ($p < .0001$) in the multivariate model. In contrast, marital status was significantly associated with employment conditions ($p < .05$), depression ($p < .05$) and life satisfaction ($p < .01$). There were no significant interaction terms at the univariate level except the interaction between gender and marital status for living condition ($p < .05$) and health-seeking behaviour ($p < .01$).

Age was a covariate found to be negatively associated with employment conditions ($p < .001$). Monthly income, in contrast, was a covariate found to be positively associated with living condition, employment condition, substance use and life satisfaction ($p < .0001$). Likewise, migrants with higher levels of education had better living and employment conditions, more health-seeking behaviour and less depressive symptoms ($p < .0001$).

Discussion

The process of rural-to-urban migration in China is accelerating with increased modernization and industrialization. The fact that about half of the migrants were between the age of 18 and 29 years old (CNBS 2002) suggests that the migrant workforce in China is comprised largely of young adults. Migrants are particularly vulnerable to geographic mobility, financial instability and rapidly changing environments. In this study we report the geographic mobility and its association with a number of health indices among 4,208 rural-to-urban migrants in China. Data from the present study indicate a similar pattern of geographic mobility between migratory women and men.

Table 5. Results of multivariate analysis of covariance (MANCOVA)

	Main effects			Interaction				Covariate		
	Mobility (M)	Gender (G)	Single (S)	MXG	MXS	GXS	MXGXS	Age	Income	Education
Multivariate test (Pillai's F)	3.84****	45.07****	2.55*	1.37	1.26	2.62*	1.39			
Univariate test										
Living condition	2.91*	60.98****	.09	.79	1.38	4.44*	1.16	1.46	3.42***	8.75****
Employment condition	7.78****	1.68	4.71*	2.43*	.82	.85	.52	-3.31***	6.28****	11.14****
General health condition	3.18*	2.51	.38	.35	.16	.15	1.00	-1.74	-.58	.007
Health-seeking	4.97***	27.24****	.47	.98	1.16	8.55**	1.83	-.87	1.75	6.64****
Substance use	2.69*	218.30****	.12	2.17	1.28	.30	1.75	1.63	6.18****	-.29
Depression	7.78****	.00	5.66*	1.29	1.50	1.89	1.32	-.37	-.02	-3.59****
Life satisfaction	3.12*	3.48	8.67**	.89	1.66	.18	1.17	.92	4.90****	-1.58

p < .05, ** p < .01, *** p < .001, **** p < .0001

The increasing mobility among the rural-to-urban migrants is associated with being younger and single. Increasing mobility is also associated with low income, unstable living conditions, worsened employment, suboptimal health, low health-seeking behaviour, more substance use and depressive symptoms and less life satisfaction. Although only 4% of the migrants were not employed (or self-employed) at the time of the survey, most of the migrants with jobs were working in informal sectors or labour-intensive industries (e.g., entertainment and personal services for women and construction for men).

Results from the current study suggest that rural-to-urban migrants appear to experience many health risk behaviours. Whereas data from previous studies in China indicate that approximately 4% females in the general population consume minimal amounts of alcohol on a monthly basis (Wei et al. 1995), in this study 16% females reported having consumed alcohol to intoxication at least once during the past 30 days. These rates are unusually high in a culture where alcohol consumption is acceptable in social contexts (e.g., celebrations), but is frowned upon when it occurs in isolation (e.g., solitary drinking) (Williams 1998). Migrants in the present study were also found to smoke more cigarettes than the general Chinese adult population does: 18% males and 2% females were heavy smokers among the study sample, compared to 7.5% and 0.2% among male and female adults generally in China (Yang 1997). In spite of their high level of health risk, a substantial number of migrants in our sample did not report the utilization of health facilities for healthcare (e.g., over half self-treating or doing nothing when becoming ill). Although workers are required by the government to have routine physical examination before employment in urban areas (Zhi et al. 2000), migrants in the present study appeared reticent to seek routine physical examinations (i.e., approximately one-third never had any routine physical checkup).

In the absence of formalized access to education, employment and healthcare, any population is vulnerable to health risks (Booyesen and Summerton 2002; Krueger et al. 1990). Such a description is applicable to migrants in China. The legal system in China has significantly curtailed entitlement of the migrant population to basic benefits accorded to other segments of the population for almost half a century (Zhang, L. 2001). However, at any given point in time, it is difficult to characterize the nature of these restrictions because the government has repeatedly changed relevant regulations, particularly during the past decade. As a result, the migrant population is placed in a vulnerable position in two respects. First, regardless of the exact nature of legislative restrictions, migrants experience significant limitations to their entitlements. For example, migrants have to pay more than local residents for many of their daily essentials such as housing, utilities, education

and transportation (Li et al. 2005; Zhang, L. 2001). Second, the rapid change of legislation and governmental regulations further restricts access of the migrant population to entitlements to which they might have access because local authorities and programs responsible for policy implementation are uncertain as to the current legislative status. For example, in 2002 the Chinese government mandated reduction of the fees imposed by local governmental agencies on migrants for work, residence and housing permits. However, rather than increasing migrant access to these necessities, the government's initiatives resulted in the reduction of operations of these respective offices since they could no longer recoup expenses through the fees paid by migrants, thereby rendering it difficult or impossible for migrants to obtain the necessary permits, a situation exposing migrants' increased instability or mobility, as well as leaving the migrant population unable to access legitimate employment and proper housing (Zhang, L. 2001).

China faces a substantial challenge in developing a healthcare infrastructure sufficient to cover its 1.3 billion residents. This challenge is even greater considering the emerging population of rural-to-urban migrants. The Chinese government and the Chinese society in general are now starting to recognize the need for healthcare targeted specifically at rural-to-urban migrants (Liu et al. 2002; Wei, P. 2002; Xinghua News Agency 2003; Ying 2003). The findings in the present study underscore the need for increased medical and healthcare services available to this population in urban areas, as well as health promotion programs that target these migrants. Furthermore, the lack of basic facilities in their daily life, such as tap water, showers/bathtubs, restrooms and telephone lines further strains an already overburdened healthcare system. These findings underscore the importance of improving living and employment conditions in urban areas for this population.

This study has several potential limitations. First, respondents for this study were recruited through convenience sampling and therefore caution should be taken to generalize findings from this study to other migrant populations in China. Second, data used for this analysis are cross-sectional in nature; causality cannot be determined between mobility and health indicators. Third, there was no non-migrant comparison group in the current study. The lack of comparison group precludes any conclusion about the relative standing of migrants' health risks and health-seeking behaviour in comparison with other non-migratory populations in China (e.g., rural population, urban poor). Fourth, data on some specific health outcomes related to migration such as childhood immunization rates or infectious diseases were not available in this study. Despite these methodological limitations, this study is, to the best of our knowledge, one of the first efforts to examine the relationship of geographic mobility with health indicators, including health outcomes among rural-to-urban migrants in China. By providing preliminary data on important health indicators among rural-to-urban migrants in China, these findings will be helpful to China as it addresses issues and policies relevant to a vulnerable population with unique cultural, economic and health needs.

Findings in the current study, coupled with others (Grogan 1995; Li et al. 2005; Zhang, L. 2001; Zhi et al. 2000), suggest the need to systematically provide the rural-to-urban migrants with access to adequate and affordable healthcare while they are "floating" in the urban areas. Efforts are also needed to eradicate institutionalized and cultural barriers that have prevented migrants from benefiting from their urban life, by providing improved residency, employment and healthcare opportunities. Health promotion activities, including education and training (to both migrant and urban residents), are needed to improve the health conditions and lifestyles of rural-to-urban migrants and to enable migrants to assimilate themselves into the urban culture and environment.

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