

***Hukou*-Restricted Migration and Migrants' Health: Evidence and Policy Implication**

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Abstract: Since the 1980s, rapid economic development in China has continued to attract great numbers of migrants from rural to urban labor markets. As a result, the constraints of the *hukou* registration system on migration flows have gradually declined. Nevertheless, institutional barriers associated with the *hukou* remain for migrants in their social integration in destination. And these have led to substantial negative impacts on migrants' physical, social and psychological wellbeing.

Regional institutional variation and recent reforms in the *hukou* system at the provincial or lower level set up a semi experimental context in which to examine how institutional or structural differences can affect migrants' wellbeing. This study analyzes the health-related differences between migrants in two major migrant-receiving cities, Beijing and Shenzhen. To eliminate the effect of self-selection in destination choice, we use propensity score matching to remove the observable differences which are relevant in destination choice and to make the respondents in the two cities more comparable. With the matched samples, we examine the net effect of migration destination on health outcomes and health service use. We found that migrants in Shenzhen have relatively poorer physical and psychological health compared with those in Beijing, and that they have more unmet health needs in spite of their higher use of health services. We discuss the structural and institutional factors which may be relevant to the observed net health differences, including the differences in policy implementation and regulations between these two cities.

Key words: the *Hukou* registration system · Institutional arrangements · Destination effect · Migrants' health

Introduction

Since its establishment in the late 1950s, the *hukou* registration system in China has played a key role in controlling flows of population migration and

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redistribution of social resources. The *hukou* registration system distinguishes individuals according to their registration type and locality. Public resources, social welfare and services are planned and distributed according to *hukou* registration status. In a sense, the *hukou* registration system has been central to individuals' socioeconomic life in the decades since the establishment of the planned economy. And partly as a result of delayed social and institutional reform, this situation has not changed even in the era of drastic economic reform. As such, migrants without changed *hukou* registration (the so-called "floating population"), especially those migrating from rural to urban areas, are likely to face institutional exclusion in the destination place and this has the potential to have a great impact on migrants' physical and psychological wellbeing.

It has been well-documented that in China rural-urban migrants experience the greatest *hukou*-related institutional barriers and are particularly vulnerable to potentially detrimental health effects (e.g., Huang et al. 2001; Xiang 2004; Wang et al. 2006; Zhao et al. 2008; et al.). This is for reasons that include but are not confined to the following: 1) Rural-urban labor migrants usually have lower health-related *knowledge*, and lower *awareness* of health risks, health needs and available services compared with the residents in the host cities (Wang, An, et al. 1999; Zheng et al. 2001; Huang et al. 2005a, 2005b; Zhang et al. 2006; Cheng et al. 2007; et al.); 2) Migrants are *financially less well-off* yet have strong incentives to save and send money back home, which makes them more likely to sacrifice personal health for economic reasons (Ge et al. 2004; Zhang et al. 2007; et al.); 3) Due to the disconnection (or truncation) of *social networks and traditional moral constraints*, migrants are less restricted by traditional norms, and more likely to engage in risky behaviors (Xie et al. 2006; Xie et al. 2007; Zhang & Lu 2005; et al.); 4) They also tend to have *undesirable/unsafe living and working conditions*. Partly due to the financial constraints, labor migrants usually live in crowded, low-quality housing in poor communities (Jaakkola & Heinonen 1995; Roberts 1997; Chen et al. 2001; Meng & Zhang 2001; Wang et al. 2002; Shen & Huang 2003; Liang & Xiang 2004; An et al. 2006; Fang et al. 2007; Wang et al. 2007; et al.). They are also more likely to work in labor-intensive jobs, work for extended hours, and be exposed to heightened occupational health hazards (Roberts 1997; Tan 2003; Jiang 2006; et al.). 5) Despite the socioeconomic contributions they make, labor migrants enjoy very limited *social welfare, subsidies/benefits, and public services* in the host cities (Wang & Zuo 1999; Chen et al. 2006a, 2006b; Li et al. 2006a, 2006b; Liu et al. 2006; Gao, Qiao, et al. 2008; et al.). They are largely marginalized, and this marginalization is detrimental to their physical and psychological wellbeing (House et al. 1988).

Despite the socio-institutional constraints encountered in the migration process, the population of rural-urban migrants has kept increasing over the past few decades. And in response to the ever-increasing population migration and the rapid socioeconomic and demographic transition, reforms were recently introduced to the *hukou* registration system. In 1997, the State Council approved the *Scheme for Experimental Reform of the Small Township Census Registration*

Control System, which launched progressive reform of the *hukou* system for small townships¹. In 2010, the central government reinforced the reform of *hukou* system in both middle and small cities (*Opinions of the CPC Central Committee and the State Council on Exerting Greater Efforts in the Overall Planning of Urban and Rural Development and Further Solidifying the Foundation for Agricultural and Rural Development*), which officially paved the way towards equal citizenship for migrants in medium-sized and small cities.²

In line with progressive *hukou* reform, social welfare provision for migrants has also seen some improvements. For instance, in 2003, the State Council issued the *Notification on Improving Peasant Migrant Workers' Employment Management and Services*.³ In addition to other improvements, this document first addresses the issue of developing social medical insurance for migrants at local level. In 2004, the General Office of the Ministry of Labor and Social Security issued the *Opinion on Promoting Medical Insurance Participation of Employees in Mixed Ownership Enterprises and Non-Public Economic Organization*, which emphasizes the central importance of providing medical insurance for migrant workers and improving medical insurance system in large and medium-sized cities. And in 2006, the State Council issued the *Opinions towards Solving the Problems of Rural Migrants*,⁴ which clearly states that it is vital to have equal social insurance provisions for rural migrants.

In accordance with the guidelines put forward by the central government at the national level, *hukou*-related reforms and trials of social insurance provision for migrants have started at the local regional level. However, China has implemented a decentralized financing scheme in many social welfare programs in the post-reform era. And partly because of socioeconomic and demographic diversity, various regions and cities introduce different regulations regarding policies and social provision for migrants in their localities. This gives rise to substantial regional disparity in social welfare programs and population wellbeing, both in general and for migrants in particular.

To investigate the situation of migrants' health and understand the potential relationship between socio-institutional arrangements and migrants' health outcomes, this study addresses the following research questions: First, how do rural-urban migrants fare in different destinations, particularly in terms of their physical and psychological wellbeing and health service use? Second, is there any independent destination effect on migrants' health outcome, in view of the significant decentralization in financing and local autonomy in migrant-related policies and social provisions? Third, what can the destination difference of institutional arrangements tell us about the migrants' wellbeing, especially in the era of *hukou*-restricted population migration? To address these questions, we choose Shenzhen and Beijing as two cases to examine destination-related

1 http://www.gov.cn/gongbao/content/2001/content_60769.htm

2 http://www.gov.cn/gongbao/content/2010/content_1528900.htm

3 http://www.gov.cn/zwgk/2005-08/12/content_21839.htm

4 http://www.gov.cn/jrzq/2006-03/27/content_237644.htm

differences in migrants' health and health service use, and to explore the potential role of institutional and structural factors in migrants' health. Before we go into details about the empirical evidence on migrants' health using the aforementioned two cases, we first review briefly the main features and evolution of China's medical care system.

Brief review of China's health care system

China has implemented a dual health care system in rural and urban areas since 1950s, paralleling its institutional and socioeconomic segregation. From the 1950s, the urban population was covered by work-unit-based health insurance, and the rural population was covered under rural cooperative medical schemes for basic health services and health promotion. Despite the fact that health care differentiated citizens according to their *hukou* characteristics, the system proved efficient in bringing down high mortality rates and improving population health in China promptly in the first three decades since liberation. However, drastic economic reform since late 1970s has had a profound impact on many aspects of society, including the medical care system, and commercialization and privatization have permeated both rural and urban medical care systems ever since.

In the 1980s, with the dismantling of its fiscal base, the old rural cooperative medical system virtually collapsed, while the urban medical care system was also increasingly challenged by rapid urbanization and commercialization. Along with dramatic economic development, socioeconomic stratification and polarization between the rich and the poor rocketed during the reform era, while social health insurance remained underdeveloped in both rural and urban areas. This made health care unaffordable for many (Barber & Yao 2011; Eggleston 2010).

In the early 2000s, the government renewed its role in financing health care provision. The new cooperative medical schemes (NCMS) began to be established from 2002, with direct budgetary support from central government and matching contributions from local government and households. Meanwhile, in urban areas, the Urban Employees' Basic Medical Insurance system (UEBMI) was established in 1998 to replace work-unit-based coverage in municipal areas (Liu 2010) and the Urban Residents' Basic Medical Insurance program (URBMI) was developed later on to cover other urban populations not enrolled in the employee insurance program. This has been a significant new development in the financing and service provision of medical care, but great challenges remain in terms of providing sufficient and affordable health care.

First, health insurance in China features wide but shallow coverage. For instance, in 2008 the yearly premium subsidy was 80 RMB per capita in rural areas (Wang 2009). Second, health insurance has limited portability. Health insurance programs limit coverage for providers outside the given locality (county or municipality). This has created great difficulties for migrants in accessing the system. Lastly, great regional disparities persist in the health care system. Like many other public services, the health care system is quite

decentralized in financing and to the extent that the current system relies on local government capacity, health care provision varies greatly from one locale to another (Barber and Yao 2011; Bloom 2011; Wang et al. 2011; Lin, Liu & Chen 2009).

For various reasons, including the continuing segregation related to *hukou* status, these challenges are especially severe for rural-urban labor migrants. Table 1 lists some city-specific regulations regarding medical insurance for migrants who have not changed their *hukou* status. This gives an idea of the great regional heterogeneity in institutional arrangements, especially those targeting rural-urban migrants.

Table 1 Examples of medical insurance practices for migrants

	Beijing	Shanghai	Shenzhen	Chengdu
Insurance coverage	In patient & serious diseases	In patient	In patient & out patient	In patient
Deductible	CNY 1300 for the 1 st settlement cycle, CNY 650 for each addition settlement cycle within a year	10% of average annual salary the preceding year (e.g. , around CNY 4675 in 2011) until 2011; CNY 1500 since July 2011	HC: CNY 300, HB: CNY 400, HA: CNY 500, Others: CNY 600	
Upper limit	CNY 50000	1-4 times of average annual salary until 2011; CNY 70000 since 2011	0.5-2 times of average annual salary	
Co-pay rate for hospitalization	HC:3% (<CNY 10000) ~ 15% (>CNY 40000) HB: 4% ~ 18% ; HA: 5% ~ 20%	20% before 2011; 15% since 2011	HC: 10% , HB: 20% , HA: 30% ; Others: 40%	25%
Insurance base	-60% of the mean monthly salary for all the workers in preceding year; -not fixed over time	-60% of the mean monthly salary for all the workers in preceding year -not fixed over time	-fixed (CNY 12/month)	
Insurance initiation	Upon enrollment	3 months after enrollment before 2011 Upon enrollment since 2011	Upon enrollment	6 months after enrollment
Insurance level	same as native employees		different from native employees	
Responsibility of payment	Employer	Employer, before 2011; Both employer and migrants since 2011	migrants themselves	
Reimbursement in case of arrearage	reimbursed by employer		no reimbursement	

Note: HC = Hospital of Class C, HB = Hospital of Class B, HA = Hospital of Class A

Empirical analysis

Population profiles of research areas: Shenzhen & Beijing

Shenzhen and Beijing are both major migrant-receiving cities, with millions of migrants from all around the country. Yet, in addition to different geographic locations and economic structures, these two cities have different migration histories and migrant-related policies. Beijing has employed rather strict restrictions on population migration, and according to the 2000 census, inter-county migrants in Beijing accounted for less than 20 percent of its residents in 2000 (Table 2), which was about 3.3 percent of all internal migrants in China. Compared with Beijing, Shenzhen had much looser restrictions on migration during the 1980s and 1990s. As a result, the number of inter-county migrants in Shenzhen in 2000 was more than twice that of Beijing. And for a long time, migrants in Shenzhen accounted for more than 80 percent of the city's residents. Since 2000, Beijing has observed a more rapid increase in migrants and by 2010, inter-county migrants in Beijing were 45.5 percent of residents and 5.2 percent of all migrants nationally. Over the same period, Shenzhen's migrant population has experienced a relatively slower increase, and in 2010 accounted for about 4.8 percent of migrants nationally.

Table 2 Population size and composition in Beijing and Shenzhen, 2000 and 2010

Year	Indicators	Beijing	Shenzhen
2000	population size	13569194	7008831
	% migrant	19.2	83.5
	% inter-provincial migrants	18.2	57.9
	% of all migrants nationally	3.31	7.43
2010	population size	19612368	10358381
	% migrant	45.5	79.9
	% inter-provincial migrant	35.9	56.0
	% of all migrants nationally	5.19	4.82

Data source: the 2000 and 2010 population censuses

Note: "migrants" here refers to the inter-county migrants, who have left their place of *hukou* registration for at least 6 months.

Migrants to the two cities also have different socioeconomic characteristics. Although the majority of migrants in both cities have no more than a middle school education, the percentage of migrants with middle or low educational attainment is even higher in Shenzhen. According to the 2005 mini-census, around three quarters of the migrants in Shenzhen have middle school education and only 11.8 percent of them have higher education (see Table 3), compared with 59.3% and 25.1% respectively for migrants in Beijing. As in many cities, migrants in both Beijing and Shenzhen are most likely to have industrial or service occupations, but migrants in Shenzhen are more likely to be employed in manufacturing or other types of industrial occupation, and those in Beijing are more concentrated in service occupations.

Table 3 Main socioeconomic traits of the population in Beijing & Shenzhen in 2005

	Beijing			Shenzhen		
	non-migrants	migrants	Total	non-migrants	migrants	Total
Educational attainment						
Primary school or lower	19.08	15.62	18.04	14.17	12.83	13.08
Junior middle school	30.32	37.63	32.52	13.50	49.62	43.13
Senior middle school	26.59	21.63	25.09	27.88	25.71	26.10
College	10.92	11.37	11.05	21.42	7.54	10.03
University and above	13.10	13.74	13.29	23.03	4.30	7.67
Occupation						
Cadre	6.44	6.05	6.29	16.89	4.11	5.74
Professional/technician	22.02	15.45	19.46	33.29	6.55	9.94
Clerical	13.54	7.40	11.15	21.29	7.92	9.61
Service	21.78	44.66	30.70	20.05	29.26	28.09
Agricultural	12.34	1.23	8.01	0.12	0.31	0.28
Industrial	23.71	24.99	24.21	8.36	51.86	46.33
Others	0.17	0.21	0.19	0	0	0

Data source: one percent mini-census in 2005.

In addition to the demographic and socioeconomic features of the two cities, Beijing and Shenzhen also differ substantially in their medical insurance provision for labor migrants. From 2004, Beijing began to implement the *Interim Regulation on Migrants' Basic Medical Insurance*. According to the Regulation, labor migrants in Beijing are insured for serious diseases and inpatient medical expenditures when they are working in Beijing (also see Table 1). Outpatient medical costs are not covered by insurance. The insurance base is set as 60 percent of the mean annual salary for all the workers in the preceding year, and migrant workers are covered at the same level as the native urban employees for inpatient and serious disease-related medical expenditures. Under this regulation, employers are responsible for paying insurance fees for their employees (Huang et al. 2007; Lin & Jiao 2012; Xu et al. 2011).

In contrast, Shenzhen started its cooperative medical system in 2005 and it developed into the current social insurance system in 2008. Under this insurance scheme, migrant workers are covered for both inpatient and outpatient medical expenses. But the insurance base is fixed at a relatively lower level and migrants are responsible for paying the insurance premium themselves.

If the insurance fee has not been paid properly, the Regulation in Beijing stipulates that employers are responsible for reimbursing their employees (migrant or native) for medical costs for inpatient and serious diseases to the same level as the insurance would have reimbursed. But in Shenzhen, migrants are responsible for paying their own insurance fees in order to be covered.

Overall, the level of insurance is higher for migrant workers in Beijing compared with Shenzhen, even though only inpatient and serious diseases are covered in Beijing. For inpatient and serious disease-related medical costs, migrant workers in Beijing are equally treated with local urban workers. In contrast, the medical insurance system in Shenzhen distinguishes migrant workers from local urban workers. And the system, in spite of its broader

coverage, may not benefit migrants adequately.

Due to socioeconomic and institutional differences, migrants in the different destinations are likely to fare differently in their personal wellbeing. Different destinations are therefore important settings in which we can analyze the relationship between migration and health in the context of the *hukou* registration system and related health policies.

Data

The data used in this study were collected through surveys of rural-urban migrant workers in Shenzhen and Beijing, aged between 16 and 60 at the time of survey and had have left their place of *hukou* residence for at least six months. Multi-stage stratified quota sampling is used in both surveys. We first selected districts with high percentages of migrant workers.¹ Then, in the selected districts, we stratified the target population by age, sex, occupation, and resident communities (or enterprises) based on their distribution in the 2005 mini-census. Communities and enterprises are selected according to the distribution of migrants in sampled districts, and migrants are then selected from the sampled communities and enterprises using quota sampling. In total, 1025 migrants in Shenzhen and 3007 migrants in Beijing were surveyed. Fieldwork was conducted from 2010 to 2011.

We used the same core questions in both cities and collected information on migrants' socio-demographic traits, migration history, physical and psychological wellbeing, health service needs and usage, and environmental conditions in their places of work and housing. The use of similar surveys with the same wording on key questions makes the surveys highly comparable.

Table 4 presents the profile of the sample respondents in these two cities. Simple tests of the sample distributions show that the respondents in these two cities are different in many ways. This is not surprising as the choice of migration destination is usually not random, and migrants choose the place to migrate with their knowledge about promising destinations, local migration traditions, existing social networks, family structure (or stage of the life course), and so on.

Compared with the migrants in Beijing, the respondents in Shenzhen are younger, although more than half of the respondents in both samples are "second-generation" migrants, i.e., born in the 1980s or 1990s. A higher proportion of men are observed in the Shenzhen survey. Most migrants in Shenzhen have secondary education (83.2%), with fewer having either lower (primary school or less) or higher (postsecondary) education. In addition, a higher proportion of the respondents in Shenzhen are single or migrate without their spouse if married, and fewer of them migrate with kids.

Around 41% of the respondents in Shenzhen have no prior migration experience, while the corresponding figure in Beijing is 77.4%. This gives

¹ In Shenzhen survey, *Futian*, *Baoan* and *Longgang* are selected from the total six districts. In Beijing survey, all the migrants are selected in *Fengtai* district.

some idea about relative fluidity of the migrants in these two different destinations. On average, more respondents in Shenzhen work as industrial workers, and fewer of them work in services compared with those in Beijing. This partly reflects structural differences in the economy and labor market of these two cities. The migrants in Shenzhen report lower personal annual income and longer working hours on average as compared with those in Beijing. In addition, fewer respondents in Shenzhen live in private housing, owned or rented, and a higher proportion of them live in dormitories provided by their employers. Although the respondents in both cities are from more than 20 provinces of the country, those in Shenzhen are less likely to come from the Northeast or Eastern part of China than migrants to Beijing.

Table 4 Profile of respondents in Shenzhen and Beijing

	BEIJING	SHENZHEN	χ^2 test
N	3007	1025	
Birth cohort			
1990s	14.07	11.12	$\chi^2(3) = 33.14$
1980s	39.28	46.83	$P < 0.001$
1970s	32.86	25.46	
1960s or older	13.80	16.59	
Gender			
Male	48.52	56.84	$\chi^2(1) = 21.13$
Female	51.48	43.16	$P < 0.001$
Education			
Primary or lower	7.51	5.58	$\chi^2(3) = 75.16$
Junior middle school	43.43	41.14	$P < 0.001$
Senior middle school or equivalent	29.21	42.02	
College and above	19.85	11.26	
Marital status#			
Married, and accompanied by spouse	61.03	38.03	$\chi^2(3) = 196.4$
Married, but not accompanied by spouse	8.32	16.52	$P < 0.001$
Single	29.91	41.94	
Widowed/divorced/separated	0.74	3.52	
Migrating with kids			
Yes	42.14	16.49	$\chi^2(1) = 219.28$
No	57.86	83.51	$P < 0.001$
Having other prior migration experiences			
Yes	22.60	59.02	$\chi^2(1) = 456.95$
No	77.40	40.98	$P < 0.001$
Occupation			
Cadres (government or institution)	1.77	1.19	$\chi^2(5) = 707.45$
Professional/technicians	11.38	12.57	$P < 0.001$
Clerical	7.12	6.83	
Services	67.47	36.53	
Industrial worker	3.32	31.58	
Others	8.93	11.29	
Personal income last year (CNY)			
< = 10 thousand	21.60	39.67	$\chi^2(3) = 146.65$

	BEIJING	SHENZHEN	Continued χ^2 test
10-30 thousand	52.69	46.43	$P < 0.001$
30-50 thousand	18.57	9.99	
> 50 thousand	7.14	3.92	
Weekly working hours	49.18	58.08	
Ownership of current lodging			
Own/parents'	11.74	9.49	$\chi^2(3) = 301.73$
Rental	67.24	45.89	$P < 0.001$
Provided by employer	16.77	43.15	
Other	4.26	1.47	
Region of <i>hukou</i> registration			
East China	43.13	28.29	$\chi^2(3) = 302.58$
Middle China	33.56	39.32	$P < 0.001$
West China	12.44	31.51	
Northeast China	10.87	0.88	

Note: # married respondents are further divided into two groups according to their current spousal living arrangement.

Methods

In this study, we are interested to investigate the role of institutional and structural factors in shaping differences in migrants' health status and use of health services in the two destination cities. This can potentially be confounded by the significant socioeconomic differences in the two samples. More importantly, some socioeconomic differences may be relevant in self-selection of migrants' destination. To remove potential self-selective bias, we use propensity score matching strategy to make the two samples more comparable first. Then using the matched samples, we examine destination-related differences in migrants' health status and accessible health resources.

To examine the effect of destination-specific institutional arrangements on migrants' health outcomes, we consider one of these cities (Shenzhen) as the treated group, and the other as the control. Any differences in *hukou*-related policy and regulation (including detailed differences in policy implementation) between these two cities are then regarded as treatment. We use a variety of matching schemes to identify best matches between the two samples. The details of the matching procedure are discussed in the following section.

Our focal outcome variables include migrants' health status and health service use. Three indicators for health status are examined in the analysis: psychological wellbeing (“*psycho*”), pressure (“*pressure*”) ¹, and chronic

1 This indicator is constructed based on the Perceived Stress Scale (Chinese 14-item PSS) and it has been used broadly in health studies. Related details about this and similar measures can be referred to: <http://www.psy.cmu.edu/~scohen/scales.html>, also see (Cohen & Janicki-Deverts, 2012).

conditions (“*n_chronic*”). The first two (*psycho* and *pressure*)¹ are scales constructed using categorical principal component analysis based on the following two sets of variables.

1) “How often during the last 30 days did you feel ... (anxious or fretful/lonely/ nervous/ depressed and nothing can cheer you up/ worthless/ everything was an effort/ hopeless)?” Response categories are 0 = “never”, 1 = “rarely”, 2 = “sometimes” and 3 = “frequently/always”;

2) “How often during the last 30 days did you feel ... (anxious about unexpected things/ unable to control important things in life/ nervous and under pressure/ unable to handle difficulties successfully/ can deal with life changes efficiently/ confident in handling personal issues/ satisfied with things/ cannot complete all that should be completed/ capable of handling boring things in life/ capable of controlling personal life/ angry about many things out of control/ always reflect that something need to do in person/ capable to control time use schedule/ many difficulties out of control)?” Response categories are 0 = “never”, 1 = “rarely”, 2 = “sometimes”, 3 = “frequently”, and 4 = “always/all the time”.

The third health indicator (“*n_chronic*”) is constructed based on positive responses to the questions “Have doctors ever told you that you have ... (bronchitis, pneumonia, asthma/ high blood pressure, high cholesterol, heart disease/ diabetes/ gastrointestinal diseases/ nephritis/ hepatitis A & B/ anemia/ arthritis/ stroke)?” The scale is to denote the number of known chronic conditions, and it ranges from 0 to 5 with a mean of 0.19 and a standard deviation of 0.47.

In addition to the indicators measuring health status, three indicators for health service use are included to indicate the situation regarding regular health checks (“*check2yr*”), experience of visiting a doctor last year (“*see_doc*”), and experience of not seeing a doctor when needed (“*notsdoc*”). The original questions used to collect information for these three variables are:

1) “When was your latest regular health check?” (1 = “had regular health check within the past 2 years”, 0 = “had no health check within the past 2 years”). 2) “Have you ever seen a doctor during the last 12 months?” And 3) “Have you had not seen a doctor when you needed to during the last 12 months?” Binary responses are used for these variables, 1 “Yes” and 0 “No”.

Using these indicators, we investigate health-related differences of migrants in the two matched samples and explore relevance of the institutional arrangements therein. Our detailed analysis includes the following steps: First, we use logit regression model to determine and predict the likelihood of choosing one destination (Beijing or Shenzhen) instead of the other. Second, using the propensity score generated from the first step, we perform one-to-one propensity score matching by using a series of matching schemes. Third, multivariate analysis is conducted to examine net effect of the migration

1 Cronbach’s α is 0.857 for *psycho* and 0.875 for *pressure*. These two scales range from -1.76 to 6.28 (*psycho*), and -4.18 to 3.05 (*pressure*) respectively, with mean of -0.2 (*psycho*) and -0.08 (*pressure*) respectively.

destination on migrants' health status and health service use in these two cities, based on the matched samples. These results are compared with the pre-matching modeling results for the purpose of sensitive test.

Major findings

Propensity of migration destination choice and sample matching

We use a set of variables that are found relevant to the destination selection in the literature to examine the propensity of migrants' destination choice (e.g., Zheng and Xie 2004). These variables include personal, familial, and regional traits in the origin. We find that migrants of earlier birth cohorts, with middle school education, or from middle or west part of China, are more likely to choose Shenzhen as their migration destination. This partly reflects the relatively longer history of Shenzhen in hosting rural migrants, as compared with other cities in China, in debt to its relative advantage as a Special Economic Zone and booming manufacture industries of “*Sanlai Yibu*” (i.e., processing with materials or given samples, assembling supplied components) since 1980s. During the past three decades, Shenzhen has been leading in providing industrial working positions for migrants. As a result, migrants with moderate education or skills, from undeveloped rural areas in the middle or west part of China, are more likely to be attracted to and absorbed in this labor market. Compared with the migrants in Beijing, those in Shenzhen are more likely to be industrial workers, technicians or staffs. Moreover, migrants to Shenzhen are more likely to be single and less likely to be accompanied by family members (spouse if married, or children) during their migration, and they are also more fluid as telling from their prior migration experience.

The model results for migrants' destination selection are shown in Table 5. Telling from the model test statistics, the model fits well and gives a sound prediction on migrants' propensity of choosing migration destination.

Table 5 Logit regression results on migrants' destination selection

	coefficient
Region of origin (ref. = East)	
Middle	0.460 **
West	1.063 **
Northeast	-2.375 **
Female (ref. = Male)	0.063
Birth cohort (ref. = 1990s)	
1980s	1.181 **
1970s	1.292 **
1960s or older	2.001 **
Education (ref. = Primary school or less)	
Junior middle school	0.278
Senior middle school	0.592 **
College and above	-0.223

	Continued coefficient
Occupation (ref. = Other)	
Cadre	0.481
Professional/technician	0.723 **
Clerical	0.743 **
Services	-0.144
Industrial worker	2.640 **
Marital status (ref. = Married, spouse accompanied)	
Married, but spouse not accompanied in this migration	0.484 **
Single	0.926 **
Widowed / divorced / separated	1.699 **
Migrating with kids	-0.995 **
Having other prior migration experiences	1.530 **
Constant	-3.982 **
<i>Pseudo-R Square</i>	0.323
<i>N</i>	3816

* $p < 0.05$; ** $p < 0.01$ DV: 1 “Shenzhen”, 0 “Beijing”

Based on the prediction results, we use one-to-one matching procedure to balance the sample in Beijing with that in Shenzhen. Three different matching schemes are used respectively. We compare the sample profiles pre- and post-matching, and the test statistics show that all the three matching schemes perform well in removing observable differences in the key covariates between the two samples. Table 6 presents a summary of the three matching schemes and corresponding average treatment effects for pre- and post-matching data.

The lower panel of Table 6 shows the mean health related differences, as measured in the three health outcomes and three health service use indicators, between the migrants in Beijing and those in Shenzhen. The results suggest that, no matter pre-matching or post-matching samples are concerned, migrants in Shenzhen report poorer health conditions, more health service usage, and also more unmet health needs on average as compared with their counterparts in Beijing. After conducting propensity score matching, the average treatment effects (i.e., the average difference between the matched migrants in the two cities) decline slightly. Therefore, even when the observable selection effect is removed and respondents with comparable traits are examined solely, migrating to Shenzhen still pertains to higher health risks and more unmet health needs on average. To further explore the possible mechanism that determines the destination-health relationship, we fit multivariate models for the selected health condition and service use indicators by using matched samples. And we choose to use the matched data from Scheme 1 hereafter in order to minimize the loss of sample respondents and achieve acceptable level of matches.¹

1 Matches from scheme 1 remove the significant differences in all the covariates but one (occupation). However, the difference in occupation is only significant at a 0.05 level. To minimize the loss of cases, we use this scheme as the best match in the following analysis, and compare its results with those using matched samples from other schemes. The results are very similar. Details about these matching procedures are referred to Guo and Fraser (2010).

Table 6 Summary of matching schemes and measures of treatment effects

	Shenzhen	Beijing	ATT
Sample			
Unmatched	1025	3007	
Matches after scheme 1	757	757	
Matches after scheme 2	662	662	
Matches after scheme 3	462	462	
Treatment effect on selected health outcomes			
<i>pressure</i>			
Unmatched	0.32	-0.22	0.54 ***
average treatment effect after scheme 1	0.29	-0.20	0.50 ***
average treatment effect after scheme 2	0.30	-0.22	0.52 ***
average treatment effect after scheme 3	0.32	-0.15	0.47 ***
<i>psycho</i>			
Unmatched	0.10	-0.31	0.41 ***
average treatment effect after scheme 1	0.08	-0.28	0.36 ***
average treatment effect after scheme 2	0.11	-0.30	0.41 ***
average treatment effect after scheme 3	0.10	-0.31	0.41 ***
<i>n_chronic</i>			
Unmatched	0.40	0.12	0.28 ***
average treatment effect after scheme 1	0.37	0.13	0.24 ***
average treatment effect after scheme 2	0.36	0.12	0.24 ***
average treatment effect after scheme 3	0.40	0.14	0.26 ***
Treatment effect on health service uses			
<i>See_doc</i>			
Unmatched	0.71	0.40	0.31 ***
average treatment effect after scheme 1	0.70	0.43	0.27 ***
average treatment effect after scheme 2	0.69	0.43	0.26 ***
average treatment effect after scheme 3	0.70	0.43	0.27 ***
<i>notsdoc</i>			
Unmatched	0.85	0.33	0.52 ***
average treatment effect after scheme 1	0.85	0.33	0.52 ***
average treatment effect after scheme 2	0.84	0.34	0.50 ***
average treatment effect after scheme 3	0.83	0.33	0.50 ***
<i>hchq_2yr</i>			
Unmatched	0.82	0.63	0.19 ***
average treatment effect after scheme 1	0.80	0.65	0.15 ***
average treatment effect after scheme 2	0.79	0.64	0.15 ***
average treatment effect after scheme 3	0.79	0.63	0.16 ***

Note: Scheme 1 refers to the nearest neighbor matching within caliper of $0.4 * SD(\text{pscore})$, scheme 2 uses the nearest neighbor matching within caliper of 0.1, and scheme 3 uses the Mahalanobis distance matching.

Post-matching multivariate analysis

Health conditions

Table 7 presents the post-matching multivariate OLS regression results for the three health outcomes. We include socioeconomic, environmental variables that are theoretically relevant to migrants' health in the model. It shows that after controlling for respondents' socio-demographic and economic traits, migrants in Shenzhen still report significantly higher levels of pressure, poorer psychological health, and greater numbers of chronic conditions. This calls attention to unobserved heterogeneity between cities, including the substantial structural and institutional differences that are relevant to migrants' wellbeing. These factors are not readily observable or measurable, and discussion about them is left until the final discussion section.

Table 7 also shows that migrants' personal traits have a big effect on their health outcomes. Compared with males, female migrants report higher pressure and greater numbers of chronic conditions on average. Middle-aged migrants, particularly those born in 1970s, report lower levels of pressure. Intact marital relationships and the everyday presence of a spouse show an important protective effect on migrants' health. Compared with those who are married and who migrated along with their spouse, single migrants report higher levels of pressure on average, and widowed, divorced and separated migrants report greater numbers of chronic conditions.

Personal income has nonlinear impacts on migrants' health. Income has some protective effect on migrants' psychological wellbeing, when the lower middle income group (i.e., CNY 10 ~ 30 thousand) is compared with the lowest income group. However, the protective impact declines in higher income groups. This possibly indicates cumulative health impacts of greater physical and mental activity needed to achieve higher incomes.

Not surprisingly, an undesirable working environment¹ shows significant negative effects on migrants' health. The more undesirable conditions migrants encounter in their work settings, the poorer their psychological wellbeing and the greater the pressure and the number of chronic conditions they experienced. Longer working hours also have significant negative effects on migrants' psychological wellbeing. Finally, migrants with prior migration experience report significantly greater numbers of chronic conditions compared with first arrivals, but they do not differ significantly in psychological wellbeing or pressure.

1 "Undesirable working environment" is created with the question "Is any of the following description true for your current working station: (very cold/ very hot/ very humid/ very noisy/ very crowded/ very dangerous/ likely to touch solid toxic/ likely to touch liquid or gas toxic/ need to be seated for long time/ need to stand for long time/ need to walk from time to time/ cannot change position freely/ need to carry very extra weight)? The sum of the positive responses is divided by the sum of non-missing responses to standardizing the generated scale. The resulted scale ranges from 0 to 1, with a mean of 0.15 and a standard deviation of 0.12.

Table 7 Post-matching regression results on the selected health outcomes

	pressure	psycho	n_chronic
Destination(ref. = Beijing)			
Shenzhen	0.392 **	0.257 **	0.214 **
Region of origin(ref. = East)			
Middle	-0.075	0.037	0.027
West	-0.111	0.120	0.014
Northeast	-0.174	-0.225	-0.007
Female	0.159 *	0.059	0.134 **
Birth cohort(ref. = 1990s)			
1980s	-0.108	0.030	0.095
1970s	-0.335 *	-0.006	0.097
1960s and older	-0.174	-0.050	0.124
Education(ref. = primary school)			
Junior middle school	0.141	0.043	-0.015
Senior middle school/equivalent	-0.006	0.125	-0.006
College and above	-0.004	-0.022	-0.045
Marital status(ref. = married, accompanied by spouse)			
Married, not accompanied by spouse in this migration	0.162	0.061	0.006
Single	0.234 *	-0.007	-0.014
Widowed/divorced/separated	0.144	0.033	0.255 **
Migrated with kids	0.130	0.090	0.050
Occupation(ref. = other)			
Cadre	-0.514	-0.149	0.010
Technician/professional	0.101	0.116	0.088
Clerical/staff	0.240	0.233	0.088
Servicer	0.042	-0.064	-0.004
Industrial worker	0.126	-0.021	0.075
Personal annual income (ref. = 10 thousand or less)			
CNY 10 ~ 30 thousand	-0.056	-0.272 **	-0.020
CNY 30 ~ 50 thousand	-0.113	-0.217	0.028
> CNY 50 thousand	-0.168	-0.121	0.143 *
Undesirable working environment	0.958 **	0.667 **	0.353 **
Weekly working hours	-0.003	0.008 **	0.0001
Having other prior migrations	-0.076	0.126	0.132 **
Duration of this migration(ref. = 2 yrs or shorter)			
2 ~ 5 yrs	0.037	-0.129	-0.004
> 5 yrs	0.032	-0.092	0.011
Constant	-0.164	-0.748 **	-0.178
R^2	0.10	0.06	0.11
N	1405	1405	1392

* $p < 0.05$; ** $p < 0.01$

Health service use

Table 8 presents logit regression results for the three health-related service use indicators using the matched samples. After controlling for the socio-demographic, economic, environmental and health variations examined in the model, migrants in Shenzhen still differ significantly from their counterparts in Beijing in terms of their health related service use and unmet health needs. The model coefficients in Table 8 show that migrants in Shenzhen were more likely to have had health checks during the past 2 years, more likely to have seen a doctor for health reasons during the past 12 months, and also more likely to have had the experience of not seeing a doctor when needed during the past 12 months.

Migrants reporting poor self-reported general health were more likely to have seen a doctor for health reasons, and also more likely to have not seen a doctor when needed during the past 12 months. Migrants' reporting of chronic conditions was also significantly related to their experiences of health service use and unmet service needs. The more chronic conditions a migrant reported, the more likely he/she was both to have seen a doctor and also to have experiences of not seeing a doctor when needed during the past 12 months. These results suggest that even though migrants with poorer self reported health are more likely to see a doctor, these same individuals still have significantly more unmet health service needs. Compared with migrants in Beijing, those in Shenzhen are in inferior health, and therefore face bigger unmet health needs, in spite of the fact that their health service use is comparatively higher.

Net of other related differences examined in the model, female migrants are more likely than males to report having had a health check during the past 2 years and to have seen a doctor during the past 12 months. Older migrants are less likely to have had regular health checks during the past two years, but they are not significantly different from young migrants in their doctor visiting behavior. The effects of marital status and familial accompany from kids or spouse during migration become insignificant for the matched sample.

Differences in migrants' occupations have a big effect on observed difference in health service use. Migrants working as technicians, clerical staff, and industrial workers are more likely to have seen a doctor during the past 12 months, after controlling for differences in self-reported general health and chronic condition, in addition to socioeconomic variation. Those working in "other" occupation are less likely to have had regular health checks during the past two years. This occupational difference is partly a result of the occupation related health requirements. For instance, some service and industrial positions usually require employees to have pre-employment medical screening. Similar effect is observed for undesirable working environment. Migrants' personal income is somewhat related to having seen a doctor in the past 12 months, with high-income migrants significantly less likely to have done so.

Table 8 Post-matching regression results on the health service use indicators

	see_doc	notsdoc	hchq_2yr
Destination(ref. = Beijing)			
Shenzhen	0.787 **	2.142 **	1.104 **
Poor self reported general health(ref. = good)	0.675 **	0.736 **	-0.415 *
Number of chronic conditions	0.458 **	0.701 **	0.181
Region of origin(ref. = East)			
Middle	-0.001	0.128	0.220
West	-0.055	-0.260	0.312
Northeast	-0.052	0.451	0.760
Female	0.338 **	0.116	0.449 **
Birth cohort(ref. = 1990s)			
1980s	-0.232	0.084	-0.374
1970s	-0.271	0.305	-0.763 *
1960s and older	-0.438	0.291	-1.066 **
Education(ref. = primary school)			
Junior middle school	0.356	-0.517	-0.049
Senior middle school/equivalent	0.276	-0.410	-0.052
College and above	0.459	-0.271	-0.010
Marital status(ref. = married, accompanied by spouse)			
Married, not accompanied by spouse in this migration	-0.173	-0.132	-0.072
Single	-0.311	0.214	-0.223
Widowed/divorced/separated	-0.767	-0.442	-0.073
Migrated with kids	-0.108	-0.058	-0.336
Occupation(ref. = other)			
Cadre	0.127	0.380	0.741
Technician/professional	0.607 *	0.173	0.439
Clerical/staff	0.726 *	0.332	0.592
Servicer	0.192	0.200	0.488 *
Industrial worker	0.484 *	0.322	0.561 *
Personal annual income(ref. = 10 thousand or less)			
CNY 10 ~ 30 thousand	-0.521 **	0.202	-0.212
CNY 30 ~ 50 thousand	-0.291	-0.007	0.187
> CNY 50 thousand	-0.524	0.282	0.458
Undesirable working environment	1.435 **	0.943	-1.462 **
Weekly working hours	-0.002	0.006	-0.006
Having other prior migrations	0.469 **	0.418 **	0.263
Duration of this migration(ref. = 2 yrs or shorter)			
2 ~ 5 yrs	-0.021	-0.102	-0.467 **
> 5 yrs	0.065	0.069	-0.515 **
Constant	-0.691	-1.655 **	1.373 *
N	1,391	1,392	1,387

* $p < 0.05$; ** $p < 0.01$

Finally, migrants with no prior migration experiences are more likely to have seen a doctor during the last 12 months, and also more likely to have experiences of not seeing a doctor when they needed to. In addition, duration of migration shows significant effects on migrants' behavior of health checks. The

longer a migrant has been to the destination city, the less likely he/she is to have had regular health checks during the last two years.

Concluding remarks

Using survey data on labor migrants in two major migrant-receiving cities, Beijing and Shenzhen, we have investigated labor migrants' health related differences and their underlying determinants. The special interest of this study lies in discovering the health disparities that are destination-specific, and potentially relevant to institutional or structural factors of a reception society. We removed the observed sample differences that are theoretically relevant to migrants' destination selection using propensity score matching, and then conducted univariate and multivariate analyses on migrants' health-related differences across these two cities. We found that the health-related differences persist between migrants in the two cities even when the samples are balanced properly, and the confounding effects of socioeconomic and environmental factors are controlled. Compared with the migrants in Beijing, migrants in Shenzhen report poorer health conditions and more unmet health needs.

The salient differences in health condition and health service use call for attention to destination-specific policies, institutional arrangements, and other structural factors that might affect migrant workers' socioeconomic wellbeing. Such institutional and structural factors are usually unmeasured or immeasurable, yet they are essential in determining migrants' social inclusion, and socioeconomic, physical and psychological wellbeing. In addition to the health insurance systems in the two cities discussed at the beginning, there are a few other key factors that might also contribute to the observed health disparities between the migrants in the two cities:

First, Shenzhen and Beijing have different economic structures. The importance of economic structure in a city lies partly in its role in determining the structure of labor market and its attraction for various types of migrants, as well as the economic integration of migrants. Although both Beijing and Shenzhen are among the largest migrant-receiving cities in China, these two cities differ substantially in their economic and labor market structures both historically and at present. For instance, Shenzhen has a tradition of developing manufacturing, processing and assembly industries and it has attracted migrants to work in these enterprises. It is common practice for workers in these enterprises to work intensively and also for extended hours in order to remain competitive. In contrast, the economic structure in Beijing is quite different, and it absorbs fewer industrial employees and more service employees. While service positions usually provide more social interactions with local consumers, they are exposed to more public surveillance.

Second, Beijing and Shenzhen have different institutional arrangements, especially those related to migrants. Due to the importance it places on maintaining social harmony, institutional arrangements in Beijing are designed to be more inclusive. Its social policies and regulations, including recent *hukou* reforms, attempt to take into account the welfare of all social classes. In

contrast, although Shenzhen has been in a leading position in institutional reforms, as is evident from its point system for residency reform, its predominant guideline has been to promote economic growth and upgrade its economic structure in recent years. As a result, its institutional arrangements are more favorable to the white-collar class. Migrant workers with low human capital benefit little from these reforms.

Lastly, the implementation of institutional arrangements also differs in the two cities. Although a review of the migrant-related regulations shows that the majority of policy details are similar in the two cities, the quality of policy implementation varies. This is especially crucial for *hukou*-restricted labor migrants' wellbeing. As labor migrants are more likely to work informally in various kinds of enterprises (especially in Shenzhen), the supervision of policy and regulation implementation is insufficient. This situation exposes labor migrants to greater risks. As such, it is important to carry out appropriate institutional reforms, such as fostering labor union among labor migrants, to make supervision feasible and effective.

Above all, we found destination-specific differences in migrants' health conditions and health service use, which are most likely the result of the destination-specific socioeconomic structure, policy and institutional arrangements, as well as policy implementation. Our study still has some limitations. Despite the significance of the two cities in China's internal migration, Beijing and Shenzhen are only two selected cities per se. It should take caution in making further generalization with the results in this study. In addition, we use cross-sectional data in this study, which precludes a dynamic examination on the destination effect on migrants' health. In view of the on-going reforms in *hukou*-related regulations, however, a dynamic viewpoint assumes great significance in fully understanding the relationship under study. Lastly, because the structural and institutional factors were not directly measured, our research findings call for further research to inform policy.

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