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Spatial deprivation of urban public services in migrant enclaves under the context of a rapidly urbanizing China: An evaluation based on suburban Shanghai

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ABSTRACT

The rapid economic growth of Chinese cities has attracted an increasingly migrant population. Faced with institutionalized discrimination caused by the *Hukou* system, however, rural migrants are excluded from local welfare, including certain types of urban public services. By taking suburban Shanghai as a case study, this research adopts the theoretical framework of urban deprivation and evaluates the deprivation level of migrant enclaves in terms of the provisions of public service, including educational, cultural, park, sports, healthcare, public transit, and postal service facilities through a combination of population census data, online and survey data. We then conducted questionnaire surveys and interviews in 14 migrant and local communities in order to acquire detailed socioeconomic information of residents and to understand their degree of satisfaction and information on how often they utilize public services. A multilevel regression model is run to examine the influence of indicators, including the socioeconomic status of respondents and provision of public services, on the degree of satisfaction. The paper concludes with policy implications needed to make spaces more socially equitable and inclusive in the rapidly urbanizing Chinese landscape.

1. Introduction

With China's rapid economic growth, income disparity between urban and rural residents increased from 2.57% in 1978 to 3.03% in 2013, resulting in large-scale migration from rural to urban areas. While the urbanization rate reached 53.73% in 2013, only 35.88% of the urban population owned *Hukou* (the household registration system), meaning 16.85% of the total population, around 240 million migrants, had left rural areas and stayed in the cities. This large influx of migrants to urban areas has caused housing, healthcare, and education needs to go unmet, leading to problems of social separation (Tian, 2015).

Deprivation is defined as having limited access to the social world due to low socioeconomic status or poor education (Bassouk & Donelan, 2003). Since the introduction of the term "deprivation" by Townsend (1987), we have witnessed a wealth of literature on social deprivation, most of it originating from rapidly developing or already developed countries (Arbaci & Rae, 2013; Bailey & Livingston, 2008; Bassouk & Donelan, 2003; Gangopadhyay & Nath, 2001; He, Wu, Webster, & Liu, 2010; Kearns, Gibb, & Mackay, 2000; Langlois & Kitchen, 2001; Ley & Smith, 2000; Liu, He, & Wu, 2008; Wu, He, & Webster, 2010). Recently, in the UK, there has been a growing concern by government that the poorest neighborhoods often receive the poorest services (SEU, 2000). At the turn of the last century, a new agenda was developed in which core, mainstream public services are identified as the 'main weapons' for tackling neighborhoods-level disadvantages and socio-spatial polarization (Hastings, 2007; SEU, 2000).

In China, social deprivation has one fundamental institutional reason for its existence, namely, the *Hukou* system, a household registration system and an important institution of social control in post-1949 China. One of its major functions is migration control and management (Zhang, 2001), and by nature, *Hukou* is exclusive. The lack of local *Hukou* deprives migrants opportunities to access affordable housing, healthcare, and education. Over the past several years, there has been a surge of literature documenting migrant enclaves in China (Huang & Yi, 2014; Liu, Dijst, & Geertman, 2015; Liu et al., 2008; Tian, 2008; Yuan, Wu, & Xu, 2011). The most significant of these were the study on *Chengzhongcun* (Village in cities) (Lin, Meulder, Cai, Hu, & Lai, 2014; Tian, 2008; Zhang, Zhao, & Tian, 2003). Nevertheless, the evaluation of spatial deprivation of public services at the city level in China has been relatively limited. The spatial planning system in China mainly addresses the needs of local residents with *Hukou*, and the needs of migrants have not been on the agenda of urban planning professionals,

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aggravating the inequity of public services between migrant and local communities. This research is an attempt to fill the gap of spatial deprivation evaluation, taking the periphery of Shanghai as a case study, and we address three major research questions: (1) To what extent have the migrant enclaves of Shanghai been deprived of public services? (2) What are the major factors affecting the degree of satisfaction of residents in the migrant enclaves? (3) Is the provision of public services related to the satisfaction of the residents?

This paper focuses on how a set of urban public services, including educational, cultural, park, healthcare, public transit, and postal services, have been distributed among migrant enclaves and more affluent local communities. By taking 23 migrant enclaves and 25 local communities in the periphery of Shanghai as case studies, this research adopts the theoretical framework of spatial deprivation and evaluates the deprivation level of migrant enclaves in terms of public services through the combination of population census data and questionnaire surveys. The following section identifies the factors affecting degrees of satisfaction of residents and examines the influence of provision of public services on satisfaction through a random effect regression. The research concludes with policy implications to alleviate spatial deprivation and ways to make spaces more socially equitable in the rapidly urbanizing Chinese landscape.

2. Urban deprivation: its measurement, characteristics, and causes

2.1. The measurement and characteristics of urban deprivation

In the urban context, deprivation describes a condition of relative poverty, which is a reflection of social exclusion and spatial inequity (Kearns et al., 2000). Townsend (1987) defines it as an "observable and demonstrable disadvantage" related to diverse conditions experienced by materially poor people (Kearns et al., 2000). Individuals who lack material goods and social opportunities, such as access to employment and social activities, can be identified as in a condition of multiple deprivation (Broadway & Jesty, 1998). Typically, deprivation can be measured based on a multiple index or a specific index, such as the Index of Multiple Deprivation (IMD) in the UK and the New Zealand Deprivation Index (NZDep). These indices consist of several domains with specific indicators, for instance, income, employment, education, health, housing and services, living environment and crime. During recent decades, attempts have been made to optimize the overall indicator system (Kearns et al., 2000; Langlois & Kitchen, 2001; Rae, 2009). Additionally, there has also been a growing concern about some specific deprivation patterns, such as the relative accessibility deprivation to grocers and deprivation of local goods (Gangopadhyay & Nath, 2001; Páez, Mercado, Farber, Morency, & Roorda, 2010).

Recently, focus has shifted toward deprivation of public services in the deprived neighborhoods. It is widely accepted that public services in deprived areas are less suited to meet the needs of residents (Duffy, 2000; Hastings, 2007; SEU, 2000). Due to socio-spatial variations in residents' expectations, the extent to which deprived neighborhoods receive poor public services and how the residents in these areas think of the services vary. For instance, an analysis presented in Duffy (2000) suggests that residents in deprived neighborhoods are more satisfied with services they use frequently, but less satisfied with services they may not use as often like public parks or services they deem to not be very important such as street cleaning. The study of He et al. (2010) reveals there has been a disparity between the actual hardship rural migrants endure and their perceived sense of deprivation. They often make positive comparisons with their former rural situation and their anticipated future, tending to understate their hardships. Overall, whether the residents feel deprived or not depends on both the physical condition and their characteristics and expectations.

2.2. Impact factors of deprivation

Due to distinct economic backgrounds, social structures, and policy discourse, the root of urban deprivation can be very complex. Generally, mainstream European research finds that deprived areas are primarily caused by global and local economic restructuring as well as labor market changes, which are also the general processes of social segregation, exclusion, and poverty (Andersen, 2002). Due to budgetary restraints, the rules and procedures that work to include some groups while excluding others emerged (Judge, 1978; Hastings, 2009), leading to bias in resource allocation, and an under-provision of public services (Hastings, 2009).

Moreover, there exists a path dependency in the interaction between deprivation and residential mobility. Clark and Morrison (2012) explore the relationship between residential mobility and degree of deprivation based on a survey of migration and New Zealand's deprivation index, and they demonstrate that where residents previously lived will influence their socio-spatial mobility and neighborhood outcomes. This is similar to the "spatial mismatch hypothesis," which states that minorities in the inner-city are more easily deprived of appropriate suburban job opportunities due to limited residential mobility (Kain, 1968). This process also results in employment barriers such as high unemployment, low wages, and long commutes (Abramson, Tobin, & VanderGoot, 1995; Kain, 1968). Generally speaking, when we analyze the source of deprivation, a cumulative effect of a residents' migration behavior needs to be considered.

2.3. Urban deprivation and its characteristics in China

In China, a long-standing urban–rural dualism makes the background and factors of deprivation more distinct from those in Western countries. Although an official measurement of multiple deprivation is absent, migrant enclaves have a high possibility of being deprived (He et al., 2010; Wu, 2004). Under the planned economy, farmers were institutionally inferior against the background of emphasizing city-based industrialization. With the market reform, pressures from large-scale unemployment and the lack of urban public goods and services forced urban governments to retain the *Hukou* system (Liu et al., 2008). In recent decades, with the relaxation of the *Hukou* system, there has been an influx of migrants into Chinese cities.

Generally, faced with institutionalized discrimination caused by the *Hukou* system, rural migrants are excluded from formal employment and urban services resulting in their becoming a marginal group within the urban landscape. Deprived of access to formal subsidized housing and other welfare benefits, migrants have to reside in informal houses on the periphery of the city (Zhang, 2001). Social inequalities in relation to quality of life between local people and migrants have been increasing since the 1990s (Zhao, 2013). In other words, a two-class urban society with inferior migrants and privileged urban residents has been created (Chan, 2009). Moreover, migrants living on the periphery of cities are more likely to be deprived than local residents. For instance, migrants usually obtain a job at the cost of living environment, resulting in a noticeable higher level of job-housing spatial mismatch than those of the local population. (Fan, Allen, & Sun, 2014). The local fiscal system is another cause which ignores the needs of migrants. Since the 1994 tax-sharing fiscal decentralization system was instituted, tax revenue has been shared among local and central governments, with the central government taking the largest share. Meanwhile, local governments have had to take responsibility for their own expenditures (Tian, 2015). The reduction of financial burdens incurred by subsidies promised to urban residents is a matter of great concern (Zhang, 2014). Saving money by refusing to take responsibility for the migrant's welfare becomes a choice often taken by local governments. Therefore, Huang and Yi (2014) argue that the process of excluding migrants in Chinese cities is a deliberate process by defining differences to delineate migrants as "other" and denying their rights and entitlements.

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To some extent, providing public services is a planning issue in China. Until recently, city planning has been done with little regard to the needs of migrants in China. While the criteria for evaluating the performance of both leadership and local officials have been economic growth and city image, city planning has become an instrument to justify the legitimacy and interests of the state. Planning lacks the experience of dealing with informal settlements, and social justice is not a planning priority (Wu, 2015). Similar to exactions in the USA and planning gains in the UK, developers are asked to pay rental in-kind, i.e., building on-site or off-site infrastructure or social projects, which would otherwise be the responsibility of the local government. In July 1993, the Ministry of Construction issued "Criteria of Planning and Design in Urban Residential Areas" (revised in 2002, hereafter the Criteria), which lists public facilities required to be built in residential areas, for example, school sites, open spaces, parking spaces, and cultural and medical facilities. The number and area of public facilities vary according to the size of the site, i.e., the larger the site, the greater amount of facilities provided. However, the Criteria are largely influenced by the legacy of the planned economy: the future population size is projected based on floor space per capita. In reality, the Criteria does not take the demands or needs of residents into account. Therefore, it is easy to understand how provision of public facilities is far from sufficient in migrant enclaves with much lower living space standards than those of the local community.

Overall, in the Chinese context, the combination of institutional, fiscal, economic, and planning arrangements contributes to urban deprivation of migrant enclaves. Existing literature has pointed out the general factors contributing to this process, and this paper will carry on further analysis to explore the factors of the deprivation of public services in migrant enclaves.

3. Study area, data source, and research methods

3.1. Study area

Shanghai, the Chinese city with the largest population and most developed economy, has witnessed a rapid increase in its migrant population. From 2000 to 2014, its migrant population increased from 26.22% to 41.08% (Shanghai Statistics Bureau, 2015). Most migrants living in Shanghai are workers with low levels of education, skills and income. Their communities are characterized by poor living conditions, environmental problems, and a lack of public services. The inner suburban Shanghai, when compared with the central city and the outer suburban area, has experienced the fastest growth in migrant population. From 2000 to 2013, the percentage of migrants in the inner suburban area increased from 47.59% to 54.21% (Table 1). Due to its location, fairly low housing prices, and job opportunities, the periphery of Shanghai[1] has been filled with many new migrant worker communities.

Based on 2010 population census data, we calculate the percentage of migrants in total population in all census divisions in the periphery of Shanghai and then identify 23 migrant enclaves where the percentage of migrants is >80% and use them as case studies. In order to evaluate the spatial deprivation level of public services in migrant enclaves, we identify 25 local communities where the percentage of the local *Hukou* population is >80% and use them as reference groups. In order to be comparable, all selected communities have a population size of >8000, which is close to the population size of a basic spatial unit (in Chinese, *Juzhu Xiaoqu*) to arrange public facilities. Moreover, in order to acquire more detailed and updated first-hand data, we select 7 migrant enclaves and 7 local communities to carry out questionnaire surveys and interviews. The selection is designed to ensure the variety of communities (Fig. 1).

[1] In this research, the periphery of Shanghai is identified as the area between the inner ring road and the outer ring road of Shanghai.

Table 1
Migrant population change and its distribution in Shanghai (unit: 1000).

Year	2000	2005	2010	2013
Central city	1300.7/33.60%[a]	971.2/22.15%	1733.5/19.31%	1741.2/17.59%
Inner suburban area	1842.2/47.59%	2242.7/51.16%	4823.5/53.72%	5367.2/54.21%
outer suburban area	728.3/18.81%	1170.1/26.69%	2422.4/26.98%	2791.7/28.20%
Total	3871.2	4384	8979.4	9900.1

Source: Shanghai Statistics Yearbook (2001–2014).
[a] The percentage of migrants of this area out of all migrants in Shanghai.

The social–economic information of migrants and local residents demonstrates distinct patterns (Table 2). In the migrant enclave, 93% of residents are from areas outside Shanghai, and the remaining 7% are Shanghai natives with local *Hukou*. While in the local community, only 18% of residents were migrants. The age distribution of residents from the migrant enclave trends younger than that of the local community. In the migrant enclave, the proportion of residents 30–50 years old and below 30 years old are 47.6% and 43%, respectively. In the local community, the main age group of local residents is over 50 years old, accounting for about 41.5%. Residents below 30 years of age are 29.4% and 29.2% of all residents are between 30 and 50 years old.

We also see that education levels among these two groups are closely related to their wages. In the migrant enclave, 79.5% of migrants have only a junior school degree which largely surpasses the proportion of other degrees; while local residents with high school and higher education degrees account for 59.3%. Meanwhile, the income gap between migrants and local residents is prominent, where about 58.9% migrants only earn 2000–5000 Yuan per month, but approximately 46.3% of local residents' incomes surpass 8000 Yuan per month.

In terms of occupation, the most common jobs of migrants are in the commerce and manufacturing/transportation (68.3%) industries. By contrast, this number is only 20.2% in the local community. The percentage of government employees and professionals is much higher in the local community (23.2%) than in the migrant enclaves (8.4%). Generally speaking, compared with local residents, the average age of migrants is younger, but their education and income levels are much lower and many of them are engaged in exhausting and low-paid jobs such as commerce, manufacturing, and transportation.

3.2. Data source

The Sixth National Population Census of the People's Republic of China, also referred to as the 2010 Chinese Census, was conducted by the National Bureau of Statistics of the People's Republic of China with a zero hour of November 1, 2010. This data includes demographic information, such as age, education, employment, and housing conditions of local *Hukou* residents and the migrant population, and the spatial unit is the "community" (*Jiedao* in Chinese). This data is applied to analyze the social–economic characteristics of migrants and local residents, and is used to identify the selected communities in Shanghai (Fig. 2).

The information on public services comes from the *Baidu* online map, a popular website in China, showing the location of all facilities. The research team collects the name and location of public facilities and proceeds to get detailed information such as size and quality through the websites of these facilities. We also conducted site surveys in nearly 20 communities to make sure that the information on the public services was accurate.

In order to obtain information from the residents in migrant enclaves, we conducted questionnaire surveys and interviews in the 7 local communities and 7 migrant enclaves, and 313 effective questionnaires were collected from migrant enclaves (195) and reference groups (118). The questionnaires include the following three types of information: (1) basic information such as age, education, occupation, and income; (2) children's education; (3) degree of satisfaction with

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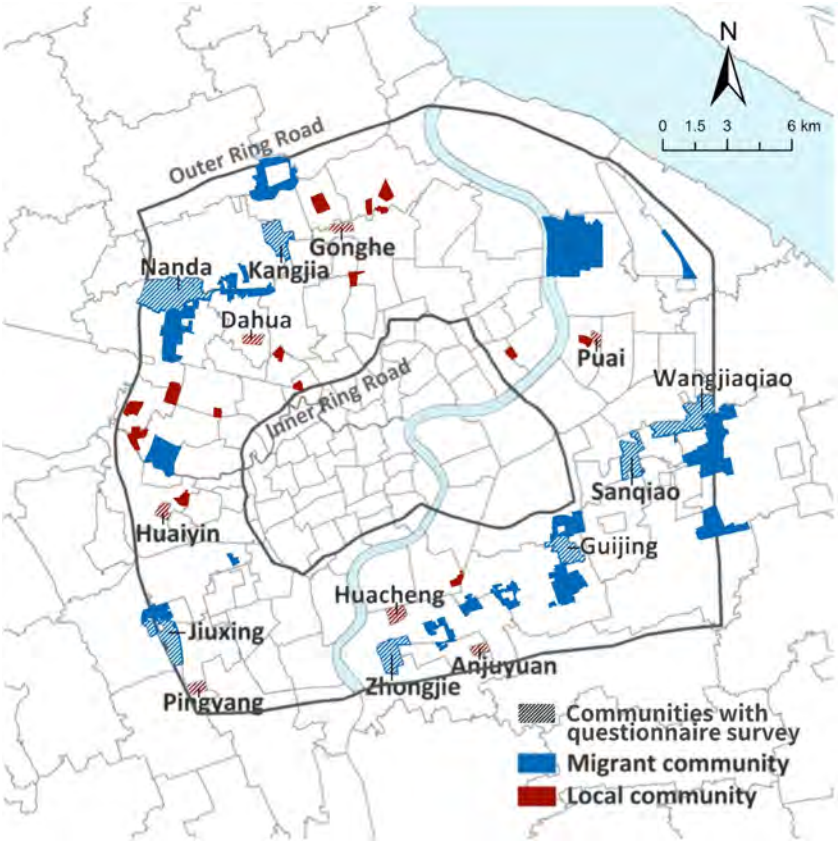

Fig. 1. Spatial layout of migrant and local community cases in the periphery of Shanghai.

public facilities. As some migrants may have difficulties in understanding the content, the questionnaire survey was conducted in person. In order to examine the reasons for social deprivation, semi-structured interviews were conducted with 112 residents, and the interviews focused on the following questions: (1) the reason of residence in the enclaves; (2) future plans to return to their hometown or continue staying in Shanghai; (3) the way they spent their weekends; (4) the reason they are unsatisfied with or seldom utilize public services; (5) whether the lack of local *Hukou* has restricted their children from utilizing educational facilities and the migrants from utilizing local healthcare services.

Table 2
Comparison of social–economic status of the migrant and local communities.

Type of information		Migrant community	Local community
Registered *Hukou* place	Shanghai local	7.0%	82.0%
	Yangtze River Delta (exclusive of Shanghai)	50.0%	12.0%
	Other cities	43.0%	6.0%
Age	>50	9.5%	41.5%
	30–50	47.6%	29.4%
	<30	43.0%	29.2%
Education	No school education	1.8%	2.0%
	Primary and junior schools	79.5%	36.0%
	High school	10.9%	29.2%
	>College	3.3%	29.2%
	Unknown	4.5%	3.6%
Income (yuan/month)	<2000	16.7%	10.5%
	2000–5000	58.9%	14.7%
	5000–8000	16.3%	28.4%
	>8000	8.1%	46.3%
Occupation	Government employees and professionals	8.4%	23.2%
	Commerce, manufacturing, and transportation	68.3%	20.2%
	Primary industry	0.4%	0.2%
	Unknown	22.9%	56.4%

Source: the sixth population census of Shanghai (2010) and questionnaire survey results.

3.3. Research methods

We identify seven major types of public facilities, namely, educational, cultural, park, sports, healthcare, public transit, and postal service facilities as the subjects of study. Services provided by the private sector, such as the cinema, gymnasiums, and hospitals are not included in this research. Fig. 3 illustrates an example of the spatial layout of public services in the *Sanqiao* community. While ranking the provision of public services in migrant and local communities, we use a weight analysis method. This evaluation standard is based on the indicators of accessibility, grade, and quantity of public service, and the principle is as follows: (1) the more accessible the service is, the higher the score. We assign a facility within the community boundary the highest score, 3, a facility within the buffer zone of 500 m of the community the score of 2, and a facility within a buffer zone of 1000 m of the community the score of 1. Facilities beyond the 1000 m buffer zone is regarded as inaccessible by walking; (2) The grade score is based on the class of facilities. For instance, the first class of general hospital is the municipal-level and assigned a score of "3," the second class of hospital is the district-level with an assigned score of "2," and the third class is the community-level hospital (*Jiedao* hospital) with a score of "1." In the domain of public transit, scores are given for the number of bus routes which pass through a specified area, i.e. a "1" for one route and a "2" for two routes; (3) The quantity of a facility is calculated within the community and its buffer zone of 1000 m. In each domain, the weight is based upon the demand of respondents from the questionnaire surveys, the larger the demand, the higher the weight. For instance, in the domain of cultural facilities, around 60% of respondents show more interest for libraries than for cultural centers, therefore, the library

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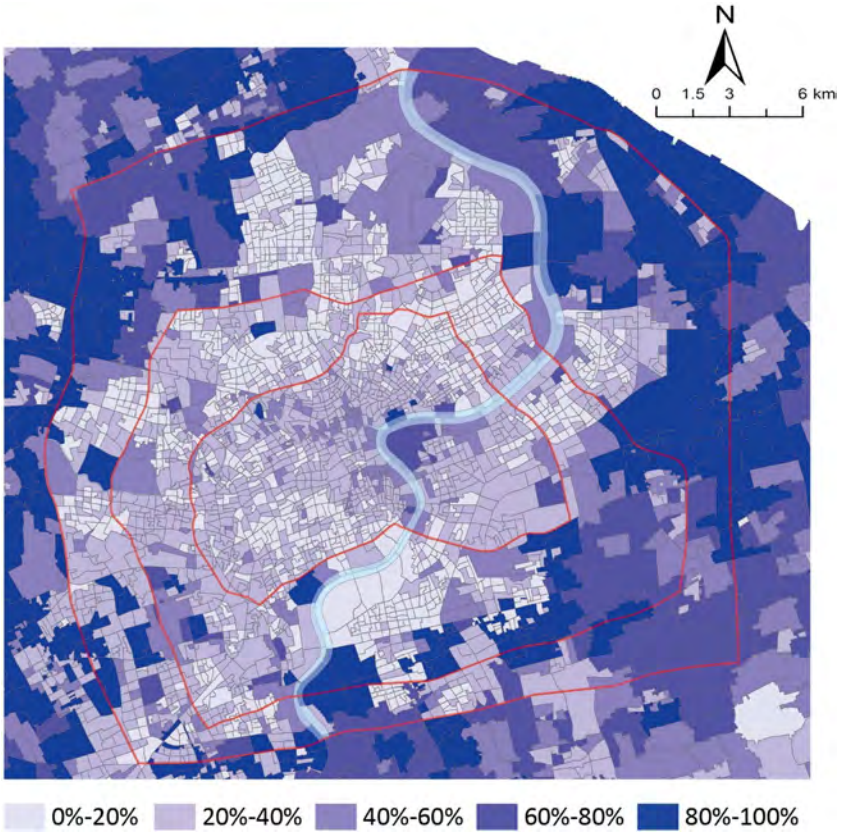

Fig. 2. Percentage of migrants in total population in the community level of Shanghai in 2010. *Source*: The population census of Shanghai (2010).

is given a weight of 60%. A score sheet is produced with a weighted index (Table 3).

It is equally essential to understand people's sense of deprivation/perception in utilizing these services besides simply looking at the deprivation of supply. The proxy we adopt in this research is the degree of satisfaction of respondents. The utilization frequency is also used based on questionnaire surveys from 14 migrant and local communities. The degree of satisfaction scores range from 1 to 5. Classifications are very dissatisfied, dissatisfied, intermediate, satisfied, and very satisfied, respectively. Similarly, the utilization frequency ranges from 1 to 5: rarely used (<2 per month), occasionally used (2 per month), intermediate (3 per month), frequently used (4 per month) and very frequently used (≥5 per month). Although these indicators might suffer from potential bias due to limited samples, they can provide useful information for understanding respondents' perceptions of deprivation.

Based on the evaluation results of deprivation, we examine the factors contributing to the sense of deprivation through establishing a multilevel regression model in which the degree of satisfaction is identified as a dependent variable. The independent variables are categorized as follows: (1) socioeconomic status of respondents including gender, age, income, and education; (2) length of residence; (3) utilization frequency of public services; (4) provision of public services. The first three variables derive from the questionnaire survey, and the provision of public services is based on the score of the community where the respondent resides.

Behavioral and social data commonly have a nested structure, meaning that individuals within a community are more alike than individuals living in different communities. Therefore, analyzing individual-level data alone without considering the community context may lead to an underestimation of standard errors or an overstatement of statistical significance (Santana & Santos, 2009). To better analyze the factors affecting degree of satisfaction, we apply a multilevel modeling approach which avoids this bias by isolating the effects of community-level variables from individual attributes (Antipova, Wang, & Wilmot, 2011). The data structure consists of individual-level (level 1) and community-level variables (level 2). Variability of satisfaction with different services is explained by combining both fixed and random effects in the multilevel model. The fixed element consists of the overall association between the dependent variable and the two-level factors, while the random element measures variations between communities that cannot be considered by the included factors (Santana & Santos, 2009).

4. Results analysis

4.1. Measuring spatial deprivation of urban public services in migrant enclaves

Since population sizes vary from community to community, the comparison among scores of public service provisions per 1000 population (in Chinese, *Qianren Zhibiao*), rather than the overall score of public services of migrant and local communities, is more rational. Table 4 shows the descriptive statistic results of public services provided in migrant and local communities. *t*-test results indicate that spatial deprivation of educational, cultural facilities, park, healthcare facilities, and postal service in migrant enclaves is significant and the relative rate of mean of local community to migrant enclaves ranges from 1.31 (park) to 1.67 (educational facilities). Sports facilities ($P = 0.058$) and public transit ($P = 0.124$) do not pass the *t*-test. By further investigating the *Baidu* maps, we find that the public transit network is relatively balanced in suburban Shanghai, and deprivation of public transit is not significant. Due to the large size of outdoor/indoor stadiums, they are usually located in periphery/suburban areas. In total, there are 5 outdoor/indoor stadiums located within the 1000 m radius of 5 migrant enclaves and 4 stadiums

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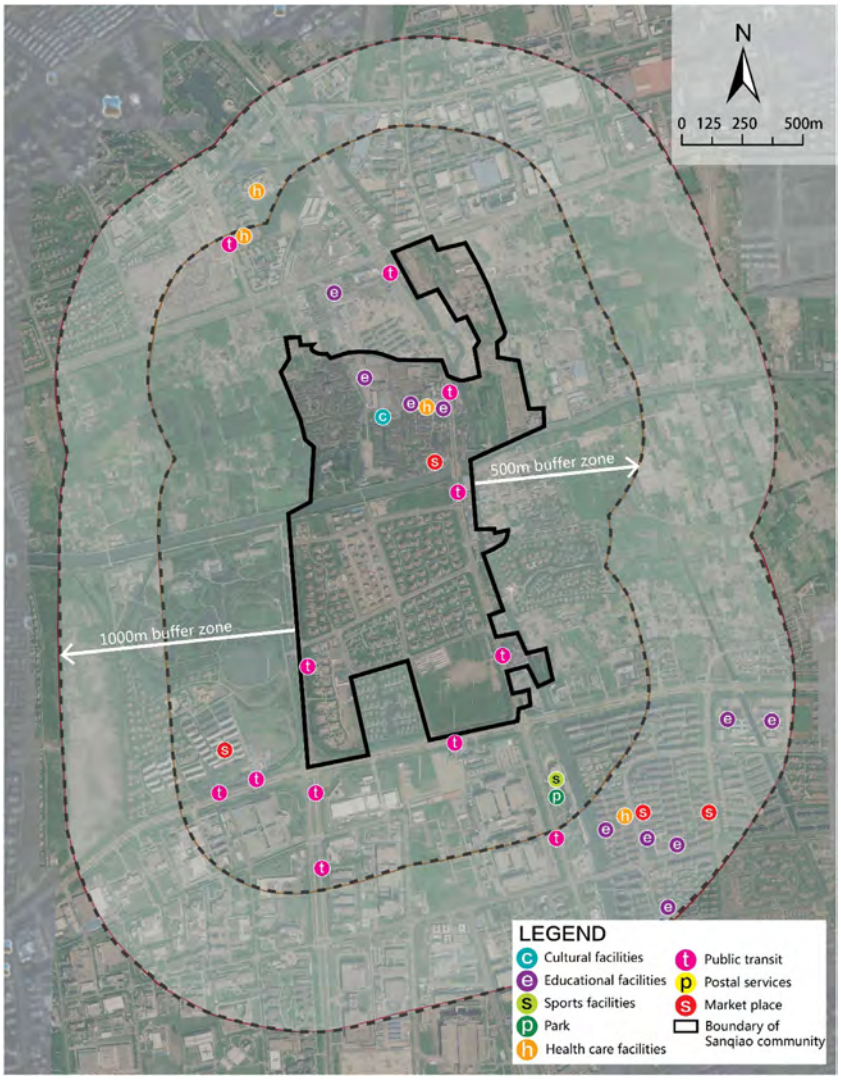

Fig. 3. Spatial layout of public facilities in *Sanqiao* community. *Source*: drawn by the authors.

within local communities. Therefore, migrant enclaves obtain a higher score in the provision of stadiums. However, there is a high disparity in community-level sports facilities between migrant and local communities.

After nondimensionalizing the score of the seven types of public service, we map the supply of public services for 48 migrant and local communities. By taking park and educational facilities as examples, Fig. 4 shows that in general, the supply scores in migrant enclaves are lower than those for local communities. The results demonstrate that spatial deprivation of five types of public services, including cultural, educational, park, healthcare, and postal service, is common in migrant enclaves.

While evaluating the sense of deprivation, we find the disparity between migrant and local communities is significant in all seven types of public service. Table 5 presents the results of utilization frequency and degree of satisfaction of public services in the 14 migrant and local communities where our questionnaire survey was conducted. As for degree of satisfaction, the relative rate of mean of local community to migrant enclaves ranges from 1.24 (postal service) to 1.72 (park); as for the utilization, the relative rate of mean of local community to migrant enclaves ranges from 1.21 (educational facilities) to 1.56 (healthcare facilities). Fig. 5 maps these disparities by taking the park and educational facilities as examples.

4.2. Examining the factors of spatial deprivation in migrant enclaves

As mentioned above, we apply a multilevel regression model to identify which factors have contributed to the sense of deprivation. In each type of test, we first develop a null model with only intercept and a corresponding variance term in order to see whether the degree of satisfaction varies significantly at the community level, then we add the level 1 and level 2 variances to examine their effects on the dependent variable. To test the model performance, an Akaike's information criterion (AIC) is used, where a lower AIC value means a better data fit. Meanwhile, the intra-class correlation (ICC) is calculated to measure the similarity of individual variables within the same community. When the ICC is equal to 0, the individual samples can be seen as randomly collected regardless of site level effect (Joo, Gage, & Kasten, 2011).

Table 6 illustrates the analytical results of regression, and the findings can be summarized as: (1) the statistically significant relationship between degree of satisfaction and utilization frequency can be found in all seven types of facilities. It is consistent with our observation that the more the respondents use a public service, the more satisfied they are with said service; (2) The degree of satisfaction is positively associated with the supply of educational facilities and parks. In other words, more educational facilities and parks contribute to a higher satisfaction

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Table 3
Score criteria of public services.

Type	Grade	Distance	Weight
Domain 1. Cultural facilities			
1.1 Library	/	Within community/500 m/1000 m	60%
1.2 Cultural center	1,2	Within community/500 m/1000 m	40%
Domain 2. Educational facilities			
2.1 Kindergarten	1,2,3	Within community/500 m/1000 m	30%
2.2 Primary school	/	Within community/500 m/1000 m	40%
2.3 Junior school	/	Within community/500 m/1000 m	30%
Domain 3. Sports facilities			
3.1 Indoor and outdoor stadium	1,2,3	Within community/500 m/1000 m	50%
3.2 Community sports facility	/	Within community/500 m/1000 m	50%
Domain 4. Park			
4.1 Park	1,2	Within community/500 m/1000 m	100%
Domain 5. Health facilities			
5.1 General hospital	1,2,3	Within community/500 m/1000 m	50%
5.2 Specialized hospital	1,2,3	Within community/500 m/1000 m	15%
5.3 Clinic	1,2	Within community/500 m/1000 m	35%
Domain 6. Public transit			
6.1 Metro station	1, 2, …,3	Within community/500 m/1000 m	50%
6.2 Bus stop	1,2,3	Within community/500 m	50%
Domain 7. Postal services			
7.1 Post office	1,2	Within community/500 m/1000 m	100%

rate among residents; (3) *Hukou* matters in the satisfaction rate for sports and healthcare facility use where local respondents are more satisfied than migrants; (4) Education has a significant correlation in the degree of satisfaction of cultural, educational, and sports facilities use. Respondents with higher education are more satisfied with these three types of facilities; (5) There is no statistically significant relationship between degree of satisfaction and gender, age, income, and length of residence. Since the use of most public services is free of charge, income does not affect the degree of satisfaction.

According to our original hypothesis, the provision of public services might dramatically affect the degree of satisfaction of our respondents. The analytical results, however, are not entirely consistent with this hypothesis. In the use of cultural, healthcare, sports, public transit, and postal services, the supply of such services does not significantly influence the degree of satisfaction among respondents. Based on our semi-structured interviews, 78% of interviewees said they do not have time to use cultural or sports facilities due to their long work hours, and the travel cost is another factor to use these facilities. Few interviewees (<20%) go to public hospitals, and around 80% of respondents choose small unlicensed clinics because price is much lower in these clinics than that of public hospitals. Among the respondents, >80% of them use non-motorized vehicles instead of public transit to save time and travel cost, and 82% of respondents choose their residence because of its proximity to their job. Around 60% of interviewees expressed their preference for private courier service instead of postal service owing to its higher perceived value. In China, private courier services have been growing very quickly, and this market competition has dramatically reduced the price of mailing services. Taking express mail as an example, the average price of the private courier is only around 60% of the postal office (Development and Research Center of State Post Bureau of China, 2014).

Besides quantified indicators, policy plays a key role in urban deprivation. In the seven types of public services studied, the use of educational and healthcare facilities have both spatial barriers and policy barriers. Shanghai has been implementing the "Residence Permit System" to limit its booming population expansion since 2002. This permit is divided into three types: talent, employment, and temporary. Only the children of those migrants holding talent residence permits can be admitted into public kindergartens and high schools. For most migrant workers with employment residence permits and temporary residence permits, their children can only study in the primary and junior schools which still have vacancies after the enrollment of children of local *Hukou* residents is completed. Without local *Hukou*, migrants have very few choices when compared with residents who have local *Hukou*. In our survey, only 58% of migrant children can be admitted to nearby schools and others have to study in primary schools which are much further from their home (2.29 km) compared with local children (0.76 km). Therefore, the provision of educational facilities is associated with the degree of satisfaction. Moreover, off-site health insurance across provinces and cities has long been a policy issue, and only local *Hukou* people are qualified for public healthcare insurance, causing migrants to endure low quality health service or no health service reimbursement at all. As a result, migrants are more dissatisfied with healthcare than local residents.

Generally speaking, the influence factors for a sense of deprivation are more complex than we expect, and the impact of various types of

Table 4
Provision of public services in migrant and local communities and comparison using *t*-test.

Dimension		Min	Max	Mean	SD	Range	Relative rate of mean	*t*	*P*
Cultural facilities	ME	0.00	32.91	10.88	7.94	32.91	1.55	−2.264	0.028*
	LC	0.00	39.74	16.85	10.09	39.74			
Educational facilities	ME	1.08	89.65	39.29	30.47	88.57	1.67	−2.886	0.006**
	LC	14.94	130.56	65.58	32.65	115.63			
Sports facilities	ME	0.27	10.31	4.68	2.42	10.04	1.43	−1.955	0.058
	LC	1.18	19.25	6.69	4.47	18.07			
Park	ME	0.00	17.34	5.82	4.20	17.34	1.41	−2.103	0.041*
	LC	2.36	18.63	8.22	3.70	16.26			
Healthcare facilities	ME	1.63	43.12	17.56	12.27	41.50	1.55	−2.418	0.020*
	LC	7.31	78.58	27.28	15.50	71.27			
Public transit	ME	7.62	96.91	47.02	26.05	89.29	1.31	−1.566	0.124
	LC	24.78	199.65	61.59	36.98	174.87			
Postal service	ME	0.00	9.77	4.45	3.18	9.77	1.81	−2.131	0.039*
	LC	0.00	32.01	8.03	7.47	32.01			

Note: ME = migrant community, LC = local community; SD = std. deviation.
* $P < 0.001$.
** $P < 0.05$.

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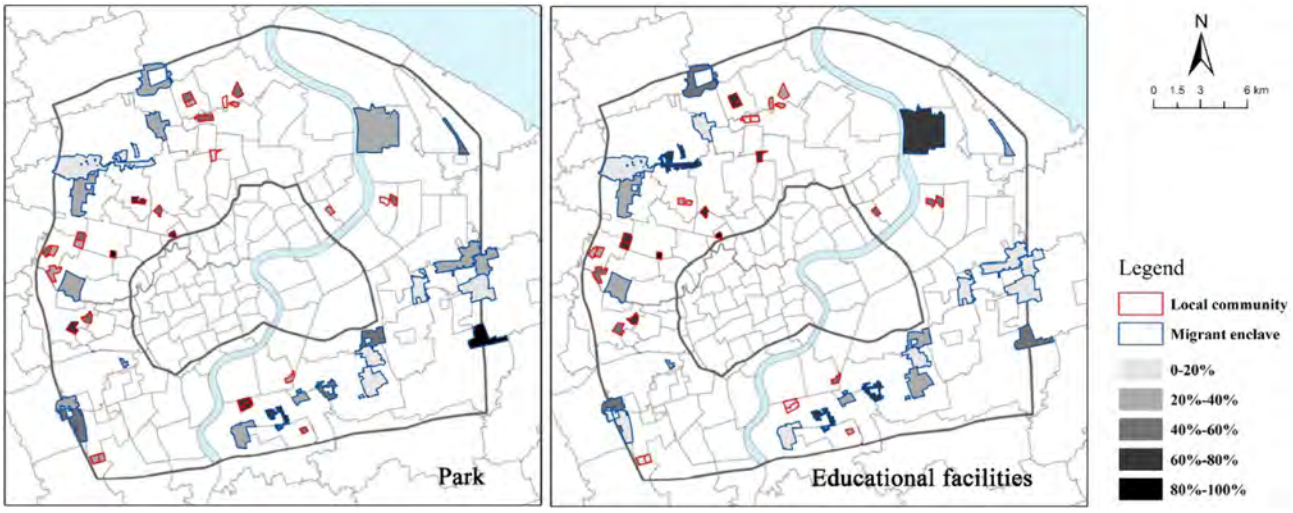

Fig. 4. Comparison of the score of public service supply in migrant and local communities.

public service on degree of satisfaction are different,and are not limited to the socioeconomic status of migrants, but also include market forces and informal sectors. Further detailed study targeting certain types of public services is needed using a larger-scale survey.

5. Discussion and conclusion: toward a more inclusive urbanization approach

Space is shaped by institutional, economic, and social forces (Huang & Yi, 2014), and is "a tool of thought and of action […] in addition to being a means of production it is also a means of control, and hence of domination, of power" (Lefebvre, 1991:26). In this research, through a comparative study between migrant and local communities, we aim to examine and measure the dimensions of deprivation of urban public services in migrant enclaves from both the supply and demand sides. This paper proposes a weight analysis method to evaluate the deprivation of public services, and it finds that the deprivation of cultural, educational, park, healthcare, and postal services is obvious in migrant enclaves, and both the degree of satisfaction and utilization frequency of migrants are lower than those of local residents. Meanwhile, the supply of public services has significantly influenced the degree of satisfaction in the use of educational and park facilities.

Constrained by the limited number of team members, the questionnaire survey was only conducted in 14 communities. The limited samples might have had some impacts on the analytical results. Future studies targeting different services with larger samples are needed. Moreover, migrants have different expectations for different types of public services, and their demand varies from service to service due to individual differences. The methodological approach outlined in this paper, however, can be modified and used as the basis for further research into the geographical nature of spatial deprivation of urban public services in the entire municipal area of Shanghai and other cities in China, and thus, can be used as a reference tool in city planning and public policy-making.

Due to the long-standing urban–rural income disparity in China, it is inevitable that a large number of migrants will continue living in the mega-cities. According to our interviews, >90% of interviewees expressed their will to stay in Shanghai in the future owing to the large gap of income in Shanghai and their hometowns. With the persistence of the *Hukou* system, the Chinese government continues to deny migrants' rights within the city and exclude them from accessing welfare benefits (Huang & Yi, 2014). *Hukou* reform is necessary to enable rural migrants to build more secure lives for themselves and their families in the cities. The 2014 National Urbanization Plan of China set *Hukou* reform as its top task, along with social welfare provisions such as rights to education, formal employment, subsidized housing, and health care. Gradually opening urban *Hukou* to migrants will boost the economy and establish a fairer society—an indispensable part of the path to fulfilling the 'Chinese dream' (Chan, 2013).

Table 5
Degree of satisfaction and utilization frequency in migrant and local communities and comparison using *t*-test.

		Degree of satisfaction					Utilization frequency				
Dimension		Mean	SD	Relative rate of mean	*t*	*P*	Mean	SD	Relative rate of mean	*t*	*P*
Cultural facilities	ME	1.198	0.653	1.47	−5.905	0.000**	1.470	1.061	1.42	−4.204	0.000**
	LC	1.765	1.026				2.082	1.444			
Educational facilities	ME	1.823	1.126	1.46	−5.661	0.000**	2.242	1.668	1.21	−2.203	0.028*
	LC	2.653	1.236				2.704	1.834			
Sports facilities	ME	1.614	0.806	1.53	−7.154	0.000**	1.540	1.080	1.56	−5.641	0.000**
	LC	2.469	1.286				2.398	1.558			
Park	ME	1.716	1.106	1.72	−8.655	0.000**	2.033	1.344	1.48	−5.667	0.000**
	LC	2.949	1.196				3.010	1.447			
Healthcare facilities	ME	1.547	0.807	1.52	−7.726	0.000**	1.777	1.061	1.45	−5.673	0.000**
	LC	2.347	0.869				2.577	1.198			
Public transit	ME	1.833	1.242	1.56	−6.493	0.000**	2.195	1.522	1.45	−5.227	0.000**
	LC	2.867	1.337				3.184	1.614			
Postal service	ME	1.781	1.224	1.24	−3.053	0.003**	2.065	1.432	1.32	−3.656	0.000**
	LC	2.204	1.093				2.735	1.647			

Note: ME = migrant community, LC = local community; SD = std. deviation.
* $P < 0.001$.
** $P < 0.05$.

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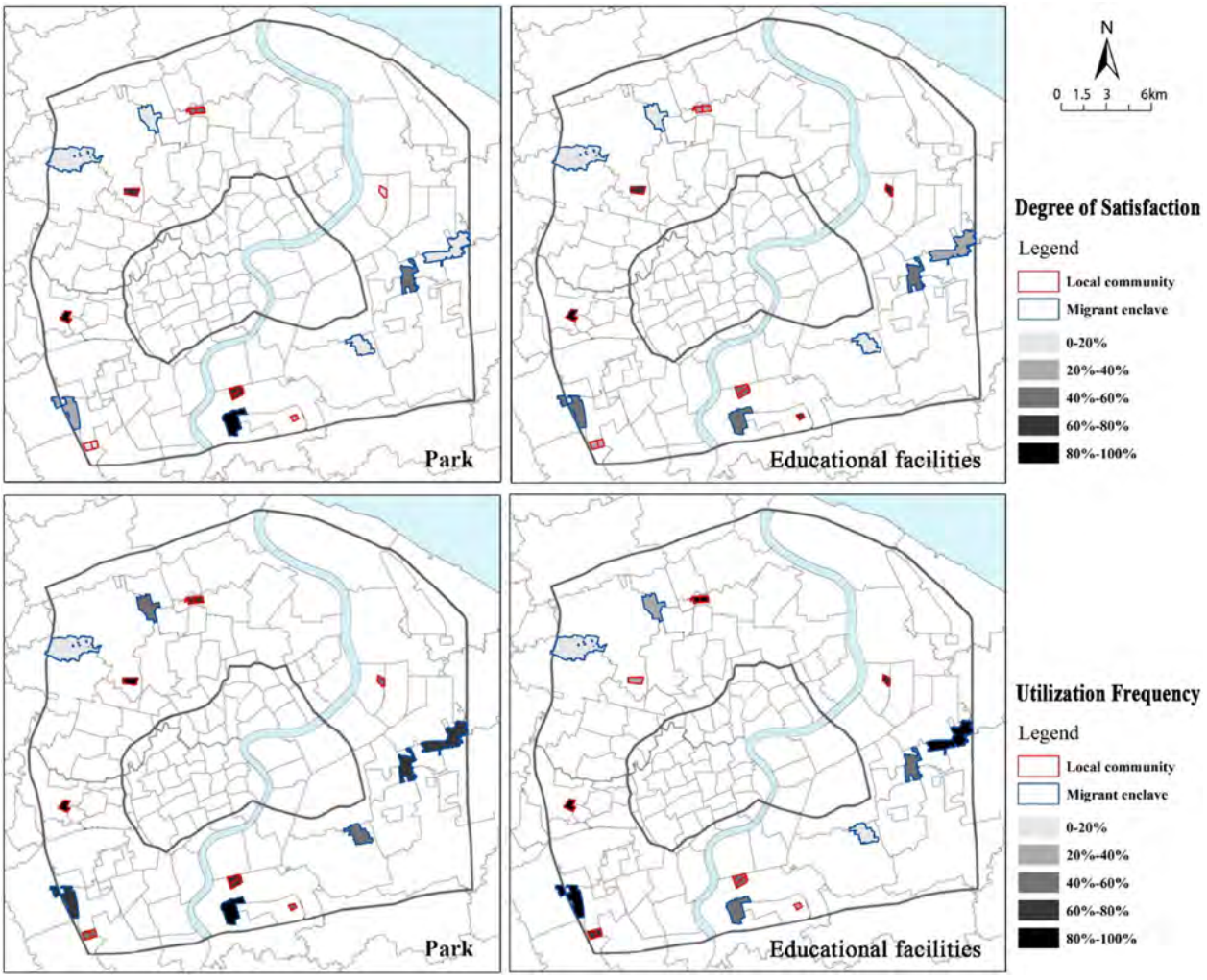

Fig. 5. Comparison of degree of satisfaction and utilization frequency in migrant and local communities.

Table 6
A multilevel regression model analysis of degree of satisfaction.

	Cultural facilities		Educational facilities		Sports facilities		Park		Healthcare facilities		Public transit		Postal service	
Dimension	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Fixed effect														
Intercept	8.140	2.627	7.222	3.325	13.672	3.353	7.320	3.301	12.075	2.853	9.280	3.891	13.022	3.921
Level 1 variables														
Gender (female[a])	−0.267	0.705	0.057	1.013	0.548	0.809	0.302	1.049	0.728	0.827	0.165	1.100	0.307	0.996
Hukou (other[a])	1.266	1.133	0.720	1.632	**3.936**[**]	**1.309**	1.485	1.619	**3.581**[**]	**1.310**	−0.205	1.754	2.157	1.630
Age	−0.267	0.578	−1.189	0.833	−0.570	0.673	−0.219	0.863	−0.209	0.680	−1.000	0.906	0.177	0.822
Income	0.382	0.459	1.150	0.667	0.184	0.528	−0.341	0.686	0.763	0.541	0.788	0.719	0.236	0.655
Education	**0.923**[*]	**0.410**	**1.671**[**]	**0.588**	**1.298**[**]	**0.469**	1.132	0.704	0.570	0.476	1.725	0.936	−0.336	0.583
Time of residence	−0.489	0.312	−0.036	0.450	−0.030	0.358	−0.636	0.464	−0.375	0.368	−0.235	0.488	−0.093	0.444
Utilization frequency	**2.812**[**]	**0.320**	**3.184**[**]	**0.305**	**2.567**[**]	**0.349**	**4.278**[**]	**0.388**	**2.121**[**]	**0.430**	**3.967**[**]	**0.377**	**2.780**[**]	**0.408**
Level 2 variables														
Public service score	0.066	0.140	**0.126**[*]	**0.058**	−0.235	0.167	**0.650**[*]	**0.284**	−0.019	0.061	0.002	0.032	−0.008	0.231
Random effect														
Intercept variance														
Level 1	34.950	2.920	73.264	6.102	45.816	3.827	78.352	6.561	48.733	4.078	85.901	7.206	70.341	5.866
Level 2	15.025	6.733	16.527	7.655	28.379	12.207	7.750	4.923	13.381	6.573	24.962	12.660	49.597	20.479
ICC of final model (of null model)	0.301 (0.369)		0.184 (0.293)		0.382 (0.492)		0.090 (0.348)		0.215 (0.339)		0.225 (0.398)		0.414 (0.421)	

Note: bold indicates statistical significance at the 5% level.
[a] Reference group.
[*] 95% confidence interval.
[**] 99% confidence interval.

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Large cities such as Shanghai are economically strong and able to devote financial resources to improving social equality. Local governments should realize that migrants are engaging in jobs which local residents are reluctant to take but are essential for city development. More investment in public services in the migrants' enclaves and a loosening of exclusionary policies are beneficial for social stability and sustainable development. Needless to say, it is unfair to attribute all welfare responsibility to local governments, since the fiscal transfer system of China has allocated more public funds to under-developed areas where most migrants are from than developed areas where migrants are living. The reform of *Hukou* requires the central government to devote more resources to support local governments.

Another interesting finding from this study is that although market forces alone are unlikely to lead to an increase in the supply of public services, they can make some contribution in providing certain types of services more efficiently than the government. Postal service is such an example where market forces make considerable contributions. Furthermore, the role of informal sectors in the everyday life of migrants is worthy of further survey and study. For instance, unlicensed clinics to some extent help migrants meet their healthcare demands at a low cost, although their existence has many potential risks.

The dramatic economic and social transitions since the reform opening have brought Chinese society more diversity, and there is a growing heterogeneity in people's socioeconomic status, life styles, attitudes, values, and activity patterns (Lin, 2007), especially in large cities where migrants make up an increasing proportion of the overall population. As a result, more heterogeneous pursuits for satisfaction in public service have emerged, and this poses challenges to the traditional spatial planning approach, which does not take heterogeneity of people and the growing complexity of their needs into consideration. An adaptive planning strategy would distribute resources more equitably and achieve normative targets of equity and justice (Fainstein, 2010; Liu et al., 2015).

While the over-simplified 2002 Criteria can be modified to meet the demands of the growing migrant population, further actions should be taken to enhance the political capacity of any future Chinese planning system. Recently, there has been a call for a more participatory approach in the city planning process (Wu, 2015). In the context of a rapidly urbanizing China, the participatory approach seems very difficult to implement due to the dominance of state-led growth. The shift from exclusive spatial planning to a more inclusive spatial planning, however, is critical for spatial justice in China to occur, bringing about a more equitable and fair society. The promotion of migrants' access to public goods, basic services, economic opportunities, and healthy environments through fair and inclusive spatial planning, design and management of urban and rural spaces and resources is the most effective way to alleviate spatial deprivation.

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