RESEARCH ARTICLE

JOB-HOUSING BALANCEAN EMPIRICAL ANALYSIS OF MUSLIM MIGRANTS IN LANZHOU CITY, CHINA

*Xiang Gao, Xiaoting Mi, Kuanmei Liu and Pingting Huang

College of Earth Environmental Sciences, Lanzhou University, Lanzhou 730000, Gansu, China

ABSTRACT

Housing and job adaptability are two crucial themes for the adaptability of the urban migrant population. The purpose of this paper is to assess the status and influencing factors of the job-housing balance of Muslim migrants in Lanzhou city of China in order to serve as a guide for their management of housing and employment as well as the planning and development of mixed-use neighborhoods that integrate both labor productivity and residential living. Based on 2009 and 2018 surveys as well as the big data statistics of the Lanzhou migrant population, this paper studied the job-housing balance relationship under the influence of commuting and the distribution of mosques through GIS kernel density and spatial analysis, Manhattan Distance and Inverse Distance Weighting (IDW) interpolation. The study found that: 1) Lanzhou Muslim migrants tend to be concentrated in two residential zones (the areas around Xiaoxihu and Miaotanzi), forming a relatively concentrated employment zone at Xiaoxihu-Yiwu Trade Centre and its neighboring areas. There was an increasing trend in the overall job-housing balance from 2009 to 2018, whereby the job-housing balance was rather high at the Xiaoxihu-Xiguanshizi stretch and the Yantan-Dongbushichang stretch in 2009 while the job-housing balance was rather high at the Xiaoxihu-Xiguanshizi stretch in 2018. 2) job-housing balance of Muslim Migrants under regular commuting conditions is met whereby there is a 2 km (or less) job-housing Manhattan Distance or a 20 minute (or less) walking commute from one's residence to workplace. 3) With regards to the distribution of mosques, job-housing balance is met with any one of the following conditions: The job-housing balance index is between 0.8-1.0 whereby the residence, workplace and mosque are within a 500m distance (or less) from each other; the residence, workplace and mosque are between a 501-5000m distance from each other;the job-housing balance index is both between 0.8-1.0 whereby the residence, workplace and mosque are within a 20 to 30 minute commute from each other.

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INTRODUCTION

Residence and employment are two major themes related to the living quality of urban residents. As early as the 1960s, John kain raised the issue of "Spatial Mismatch". Since then, the concept of job-housing balance has gradually become clear in the new town development movement. In the general balance of space, the spatial relationship between the work place and residence place is determined endogenously by the system under the independent choice of enterprises and residents, such as AMM model (Alonso, 1964; Mills, 1972; Muth,1969）. In real life, however, it is difficult to achieve the job-housing balance in a short period, and the performance is dynamic and changeable (Hanson, 1988;Giuliano, 1991;Crane, 1996）. Most scholars agreed that the allocation of land market resources (Knaap, 2005), housing market and price (Levine, 1998) and transportation system allocation have a significant impact on the job-housing balance.

Corresponding author: **Xiang Gao,**
College of Earth Environmental Sciences, Lanzhou University, Lanzhou 730000, Gansu, China.

In terms of the relationship between job-housing balance and commute, the more balanced the job-housing in a region, the closer to their working place the workers can live and the shorter their commuting traffic will be (Cervero, 1989;Horner, 2004）. In empirical research, Cervero (1989), Nowlan and Stewart (1991) and Levinson (1998) believed that job-housing balance leads to traffic congestion and deterioration of urban environment, while Giuliano (1991), Small (1994), Wachs (1993) and Scott (1997) believed that the impact on travel is not significant or can only be explained partially. In view of the residence and employment of vulnerable groups, Richard (2001), Ong and Miller (2005) put forward some improvement suggestions, especially the three general suggestions summarized by Gobillon *et al.* (2007), after researching the relationship between traffic accessibility and employment rate of low-income groups. However, Rosenbaum (1995), Katz *et al.* (2001), Mendenhall (2006) confirmed that the employment environment of black people was not improved after they moved to white communities with intensive jobs in the suburbs. Since the 1980s, with the reform of urban housing and employment system and urban development, the freedom of

residents to choose their residence and work has been greatly improved. The problem of the relationship between residence and employment has attracted more and more attention from scholars. The job-housing balance is one of the concerns, and the research perspective is also different. Some of them are the empirical research on job-housing balance by constructing different job-housing balance index, residence and employment attraction index and job-housing index, such as Beijing (Zheng Siqi et al., 2015), Shanghai (Gu Cuihong *et al.*, 2008; Sun Bindong et al., 2008), Guangzhou (Zhou Suhong *et al.*, 2010), Nanjing (Xu Bianrong *et al.*, 2010), Zhengzhou (Guo Li, 2018) and Shenyang (Zhang Linjing, 2012); Some analyzed the relationship between residence and employment place by discussing the commuting introduction, for example, Liu Zhilin et al. (2011) thought that it was the job-housing balance if the commuting time in Beijing was less than 30min and the median distance was less than 4km; Wang Xingping *et al.* (2014) divided the job-housing balance into four types according to commuting distance: ideal type (less than 2,500m), realistic type (less than 4,500m), acceptable type (less than 6,000m) and endurance type (more than 6,000m); Zhang Yinling (2014) found that the average commuting time of urban residents in Xi'an was about 35 minutes, and the commuting distance mainly concentrated on 6 - 20km, which indirectly indicated that there was a certain spatial mismatch in the job-housing areas of urban residents in Xi'an. In recent years, with the advent of the big data era, some research on urban job-housing relationship by using the data of bus card swiping and cell phone signaling has also received extensive attention, which greatly expands the depth and breadth of research on the job-housing relationship.

There are about 20 million Muslims from 10 ethnic minorities in China, and as many as 3 million of those people (Jinze and Qiu Yonghui, 2009) are flowing into cities, most of which are distributed in northwest provincial capitals such as Lanzhou. At present, the research on the job-housing relationship of this group is insufficient, and the Muslim migrants have the tradition of "living and working around mosque", which makes the problem of job-housing balance more complex than that of the general migrant population, and needs to be studied with more efforts. Therefore, this paper adds the third-party factors of mosques based on the routine analysis of the relationship between job-housing and commute of Muslim migrants, so as to comprehensively judge the job-housing balance and its changes, and provide reference and guidance for the management of residence and employment service for the migrant population of ethnic minorities.

METHOD AND DATA

Coverage

Definition of research area: Lanzhou is one of the most important ethnic minorities-inhabited cities in Northwest China, with the resident population of 3.6161 million and the minority population of 159.3 thousand, wherein 127.9 thousand are Muslims, accounting for 80.22% of the minority population (according to the sixth national census data). Lanzhou City has the migrant population of ethnic minorities about 60 - 80 thousand, wherein nearly 50 thousand people live in four urban districts (Chengguan, Qilihe, Anning and Xigu) (Migrant Population Management Brigade of Lanzhou Public Security Bureau, 2016), while about 30 thousand

Muslim migrants are gathered in several zones such as Xiaoxihu, Baishuxiang, Gonglinlu, Hualinping and Wuxingping Ping (National Religious Affairs Committee in Lanzhou City, 2016). Therefore, the research area mainly includes four districts of Lanzhou City: Chengguan, Qilihe, Anning and Xigu, which are also the areas with high population density (Figure 1).

Definition of the surveyed region: Job-housing spatial balance mainly refers that the number of practitioners is roughly equal to the number of jobs within a city or given geographical space, and most of them can be employed near their residence, the main commuting vehicle is non-motor vehicles, the commuting distance or commuting time is controlled within a reasonable range even if they use motor vehicles; if not, it belongs to the job-housing spatial imbalance. "Job-housing spatial balance" is also called "job-housing balance" (Cervero, 1991; Giuliano, 1991). Commuting time/distance is closely related to the scale of the measured geographical range, and the results may vary greatly with different scales. In general the larger the geographical scope is, the higher the balance and self-sufficiency get; the smaller the scope is, the lower the balance and self-sufficiency get. As for the most appropriate scale, scholars have not got a unified answer yet. Zhongren Peng (1997) classified thegeographical range into three different levels: macro, meso and micro. The macro level refers to the larger administrative units, such as counties or municipalities, which generally have a high degree of balance, but the actual commuting distance may also be very large due to the large geographical range, even if balanced.

The micro level refers to the community, neighborhood or census area which has a small geographical area. Although the balance on this level can reduce the commuting distance to a great extent, and the commute across this area may not be very far, so the measurement results at macro and micro levels have great limitations for the formulation of measurement. Therefore, most studies focus on the meso level, namely a given residence or employment center and an area formed by a reasonable commuting radius around it. Levingston (1989) believed that the distance of 9.7km - 12.9km to working place was reasonable, Deakin (1989) believed that it should be 4.8km - 16.1km, and Zhongren Peng (1997) believed that average or moderate commuting distance should be regarded as a reasonable commuting distance, since the commuting distance reflected the formation of employment and residential location under the influence of the market.

Historically, migrant Muslims in Lanzhou are mainly concentrated in several areas of downtown, including Xiguanshizi and Dongbushichang in Chengguan district, Xiaoxihu and Shangxiyuan in Qilihe district, Peiliguangchang in Anning district and Fulilu in Xigu distirct. Thus, the migrant Muslims found in these six areas were selected for the detailed survey (Figure 1).

Definition of research time: The research on the job-housing balance needs a two-stage state comparison，the corresponding survey from 2009 to 2018, the time span of nearly 10 years, can reflect the job-housing change process and trend of migrant Muslims. The research object, Muslim migrants, refers to the migrant population of ethnic minorities who have lived in Lanzhou City for more than three months, mainly from rural and town areas across the county-level

administrative divisions into Lanzhou City, without changing their household registration, with the main aim of obtaining certain income through various economic activities and adhering to Islamic culture.

RESEARCH METHOD

Kernel density analysis: Kernel density analytical method is based on a finite data sample. Each grid point to be calculated is taken as the center to search for a circular area. The points near the center of the grid search area will be given a larger weight. With the increase of the distance between them and the center of the grid, the weight will be reduced, so that the data aggregation in the whole area can be calculated. (Tang Guo'an et.al, 2012) . Kernel density analytical method is a non-parametric estimation method widely applied in spatial analysis. It is assumed that $x_1, x_2 \cdots x_n$ is an independent and identically-distributed sample extracted from the population with a distributed density function. The estimated value of f at the point x is $f(x)$. The calculation expression is as follows (Zhang Xun et al., 2013; Yang Ying et al., 2015; Guo Jie et al., 2015) :

$$f_n(x) = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right)$$

Wherein: is the kernel function; h is the bandwidth; $x\text{-}x_l$ is the distance from the estimation point x to the sample x_i. Considering the regional scope of the investigation area and the accurately reflecting the spatial distribution of Muslim migrants, this paper takes 0.5km as the distance threshold to analyze the kernel density of Muslim migrants' residence.

Inverse distance weighted r method

Inverse distance weighted r method is a weighted average with the distance between the difference point and the sample point as a weight, the greater the weight given by the sample point is. Suppose that a series of discrete points be distributed on the plane, and the given coordinate and values are X_i, Y_i, Z_i (i =1, 2 …, n), calculate the value of Z point based on the values of surrounding discrete points and the distance weight.The calculation expression is as follows: (Tang Guo'an and Yang Xin, 2012; Zhu He et.al, 2015) :

$$Z = \left[\sum_{i=1}^{n} \frac{z_i}{d_i^2}\right] \Big/ \left[\sum_{i=1}^{n} \frac{1}{d_i^2}\right]$$

Where: $d_i^2 = (X - X_i)^2 + (Y - Y_i)^2$

Manhattan Distance: Manhattan Distance can be defined as the distance between urban blocks to indicate the sum of absolute axle distances between two points in the standard coordinate system. The Manhattan distance between point i of coordinates (x₁, y₁) and the point j of coordinates (x₂, y₂) is:

$$d(i, j) = |x_1 - x_2| + |y_1 - y_2|$$

Data Source and Basic Features of Samples

Data source: The macro data comes from the sixth population census of Lanzhou City. The sample data mainly comes from questionnaire survey. The distribution methods include random questionnaire and semi-structured interview. On the one hand, random survey was conducted on shop owners, vendors and migrant workers along the street. On the other hand, primary and secondary schools in the concentrated areas of Muslim migrants assisted to distribute questionnaires to students, and their parents were required to fill in the questionnaires. Since the school is the stakeholder, parents are willing to cooperate actively, and the effect of questionnaire collection is better. The above survey was carried out in two phases: The first phase was from June to September of 2009, and 917 valid questionnaires were collected; the second phase was from June to October of 2018, and 866 valid questionnaires with unified sample were obtained after the elimination of individuals who were no longer resident or employed in the research region. The content of the questionnaire mainly covers the basic information of migrant Muslims (age, gender, ethnicity, inflow time, etc.), residence information (residence, housing type, rent, etc.), employment information (employment place, occupation, monthly income, etc.), replacement information of residence and employment. (Number of replacements, reasons for replacement, etc.)

Basic features of samples: The survey samplesare dominated by the male Muslims, accounting for 63.5% of the total samples; the respondents aged 20-50 accounted for 73.3%of the total; In terms of ethnic composition, the Hui nationality and Dongxiang nationality account for the vast majority, up to 99.1% of the total; the education background is mainly junior high school or below, accounting for 65.6% of the total; most of the respondents are married, accounting for 85.3%; most of the samples were rural households, accounting for 82.7% of the total; the migration range belongs to inter-city migration within the province; the main purpose of migration is to work and do business, accounting for 76.3% of the total; the samples with the monthly income of below RMB 3,000 account for 66.5% of the total. The overall characteristics of the samples can be summarized as follows: the samples are dominated by married young and middle-aged men with rural household registration of Hui nationality and Dongxiang nationality. The purpose of migration is mainly to work and do business, and their educational level and income are relatively low (Table 1).

RESULTS AND ANALYSIS

Spatial Agglomeration Characteristics of Residential and Employment Places

Spatial analysis of residential agglomeration: From 2009 to 2017, the settlement concentration of Muslim migrants has gradually increased, and the distribution of residential areas has become more concentrated. In 2018 the highest residential density appeared in Shangxiyuan, Luotuoxiang, Baishuxiang and Gonglinlu of Qilihe district, while the residential density of places near Miaotanzi of Caochang Street and Kongjiaya was higher (Figure 2). This will determine the two relative residential agglomeration areas of Muslim migrants

The traditional living characteristics of localized Muslimsin China's big cities are "a large mixed living and small gatherings", and most of them take the "mosques" as the center to form their own community.

Table 1 Basic Information of Muslim migrants

| Category	Proportion（%）	Category	Proportion（%）	Category	Proportion（%）
Gender		Educational level		Flow range	
Male	63.5	Illiteracy	23.0	Cross-provincial	1
Female	36.5	Primary school	40.5		99
Nationality		Junior high school	25.1	Purpose of migration	
Hui	66.3	High school	9.5	Work or do business	76.2
Dongxiang	32.8	College or above	1.9	Accompanied migration	12.5
Uyghur	0.9	Marital status		Others	11.7
Age		Married	85.3	Monthly income	
20yr and below	10.1	Unmarried	14.7	Less thn1000 yuan	5.9
21-30yr	37.6	Household registration type		1001-3000 yuan	60.6
31-40yr	35.7	Rural	96.3	3001-5000yuan	26.9
41-50yr	14.6	Urban	3.7	More than 5000yuan	6.6
51-60 yr	2.0				
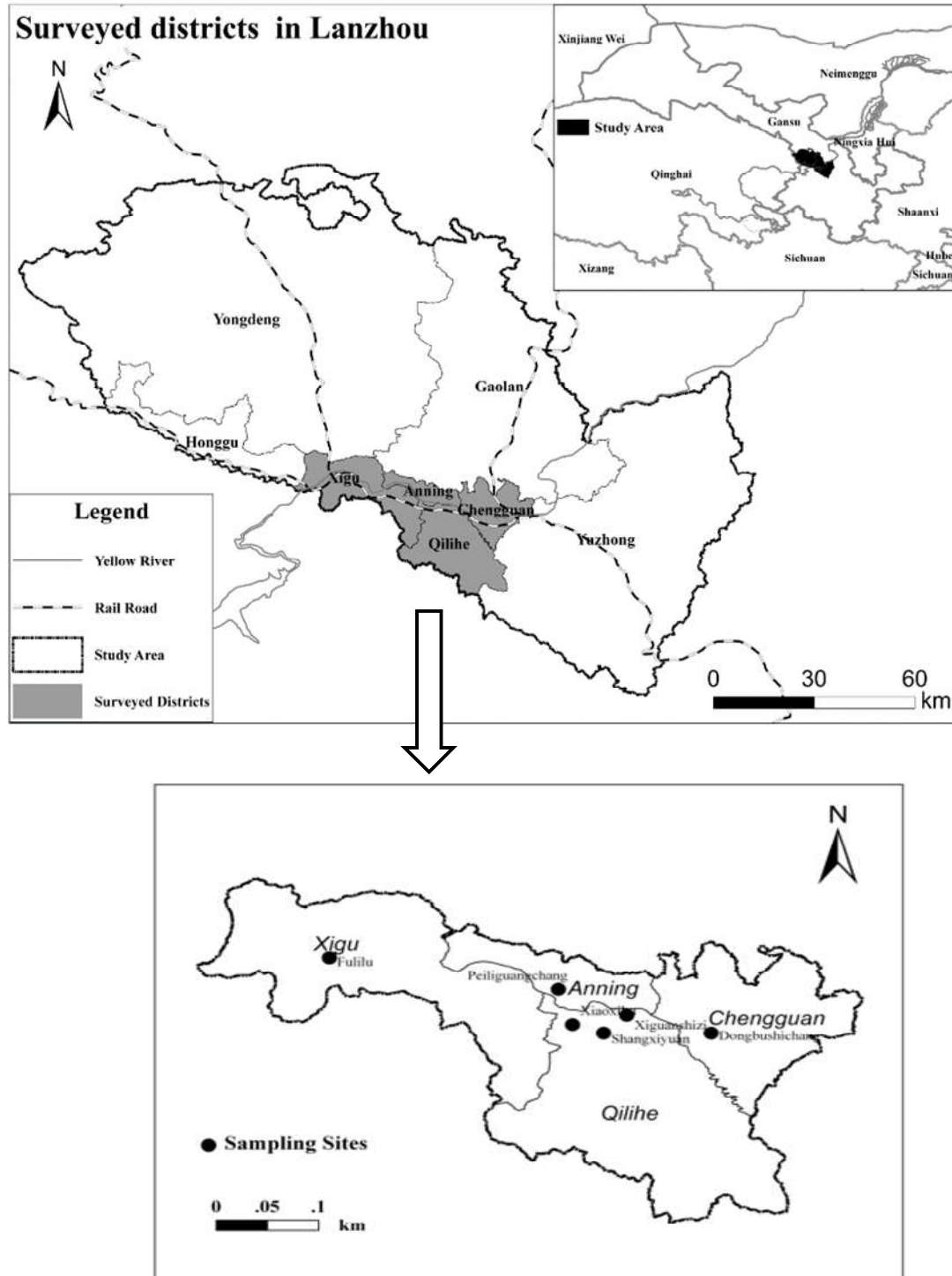
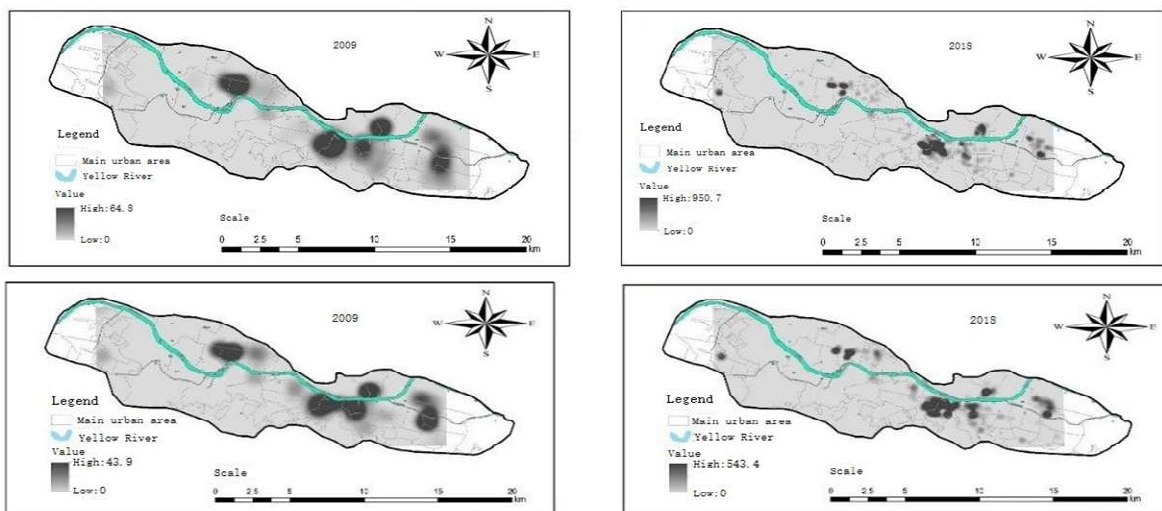**Figure 1. The sketch map of study**

Figure 2. Agglomeration of Residence (left) and Employment (right) of Muslim migrants in Lanzhou City

Table 2. Commuting Distance Pixel Statistics of Muslim migrants in Lanzhou City

| Commuting distance （m）	From residential distribution				From employment distribution			
	2009yr		2018yr		2009yr		2018	
Category	Number	Proportion %	Number	Proportion %	Number	Proportion %	Number	Proportion %
Less than1000	74074	61.54	89618	71.10	66973	52.77	91886	62.38
1001-2000	32468	26.97	22477	17.83	35414	27.90	20092	26.93
2001-3000	7228	6.00	10381	8.24	21628	17.04	10661	9.58
3001-5000	5865	4.87	3175	2.52	2275	1.79	3077	0.94
More than 5000	733	0.61	392	0.31	624	0.49	126	0.17
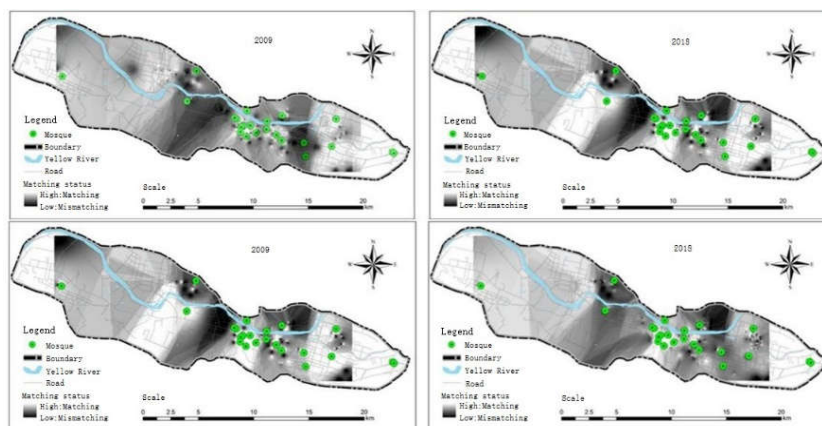
Figure 3. Job-housing Balance based on precedence (above) and Employment (below) Distribution
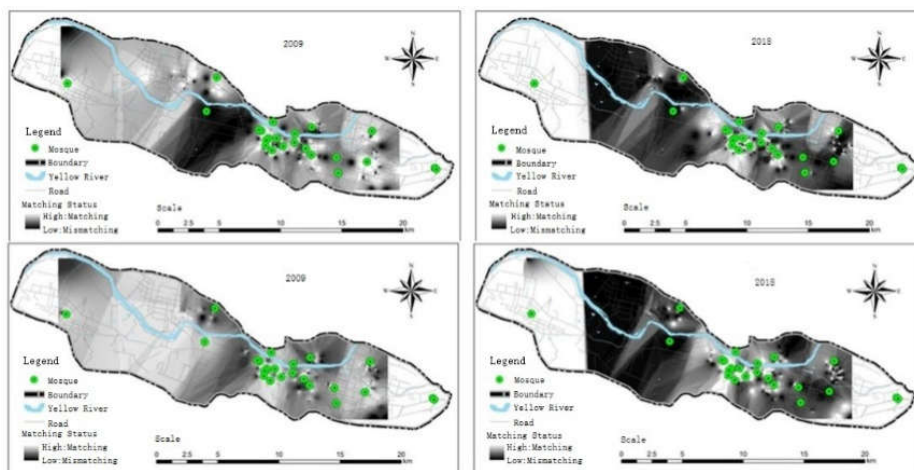

Figure 4. Job housing time matching base on Residence (above) and Employment (below) Distribution

The triple identities of Muslim migrants (migrant population, ethnic minority population and religious groups) make them more willing to associate with the people that share similar identities and common beliefs. The convenience of intra-ethnic mutual assistance makes Muslim migrants tend to live together in a relatively concentrated way, thus forming the characteristics of "little gathering". Such small settlement often turns into a pattern of "living around mosque" in space. In this pattern, the national labor market is easy to form and develop, which is not only beneficial to entrepreneurs, but also beneficial to migrant workers. (Tang Duoxian, 2008).

Spatial analysis of employment agglomeration: From 2009 to 2018, the concentration of employment places of Muslim migrants has gradually increased, and the distribution of employment places has become more concentrated. In 2017 it was the most obvious that Muslim migrants employment gathered near Yiwu Trade Market, covering Labor Market and Baishuxiang; The density was also higher in Taohai Market and Miaotanzi area, but the polar nucleus region could not be formed yet (Figure 2). Therefore, it can be determined that there is an obvious relative agglomeration employment region for Muslim migrants in Lanzhou city. Since most migrant Muslims are low-educated and have no skills,, their employment preferences are mainly concentrated in construction sites, Muslim restaurants, human resources market, trade wholesale market and the retail outlets of ethnic and religious sacrificial articles (Zhang Zhibin, 2013). After all, the demand for these workers in the surrounding areas of mosques is limited, the construction projects have a development cycle, and the halal restaurants tend to be decentralized due to competition. Sothe tradition of "working surround the mosques" is also changing to some extent.

Job-housing Balance Analysis Based on Commute

Job-housing balance analysis based on Manhattan distance: In 2009, the Manhattan distance between the residence and employment place of Muslim migrants accounted for 45.43% within 0.5km, 60.22% within 1km, 81.36% within 2km and 88.21% within 5km. In 2018, it accounted for 57.00% within 0.5km, 80.58% within 1km, 91.12% within 2km and 94.08% within 5km. From 2009 to 2018, the average Manhattan distance was decreased from 1.21km to 0.79km, indicating that the relative commuting distance between the residence and employment place decreased gradually. According to the statistical results of inverse distance interpolation pixel (Table2), from residential perspective the proportion of the job-housing Manhattan distance of Muslim migrantswithin 1km increased from 61.54% to 71.10%; from the perspective of employment place, the proportion of the job-housing Manhattan distance of migrant Muslim within 1km increased from 52.77% to 62.38%. Compared with Liu Dinghui's opinion(2012)that the average distance between the residence and employment place of Lanzhou residents was 2.34km, and compared with the Cervero's survey results that thecommuting distance of half of the residents is 1km (Cervero, 1989), it is obvious that the job-housing distance of Muslim migrants is shorter, and more than 60% of them live within 1km. Further, the scope of the job-housing balance area can be judged comprehensively according to the job-housing balance index of different radius (the ratio of the number of people living and working in the region to the total sample number, the closer to 1 the ratio is, the higher the job-housing balance degree is, and the split value of balance and decentralization is 0.8).

Statistical results: The job-housing balance index of samples within 5km in 2009 and 2018 were 0.88 and 0.94 respectively; the balance index of 2009 and 2018 within 2km were 0.81 and 0.91 respectively. Therefore, 2km Manhattan distance can be identified as the critical distance of job-housing for changing from balance to decentralization.

Job-housing balance analysis based on commuting time: The speed of general transportation means is defined as: Walking 5km/h; Bicycle 10km/h; Electric vehicles and motorcycles 15km/h; Bus 20km/h; Self-driving 25km/h. Since Lanzhou is a valley-type city, with a large population and building density and relatively congested traffic, the way of traveling between the residence and employment place of Muslim migrants is mostly walking. According to the statistics: In 2009, the job-housing commuting time of Muslim migrants accounts for 47.88% within 5min, 74.35% within 10min, 82.36% within 20min and 86.64% within 30min; In 2018, the job-housing commuting time of Muslim migrants accounted for 66.99% within 5min, 83.91% within 10min, 90.54% within 20min and 97.64% within 30min. From 2009 to 2018, the average commuting time decreased from 6.52min to 5.78min gradually. The commuting time of more than 60% of Muslim migrants is less than 5min. According to the statistical results of inverse distance interpolation pixels, the proportion of job-housing commuting time of Muslim migrants within 5min increased from 67.51% to 73.02%in view of residence place and from 68.00% to 70.95%in view of employment place. Similarly the proportion within 10min increased from 65.71% to 71.10% in view of residence place and from 68.0% to 70.95%in view of employment place (Table 2). The job-housing self-sufficiency of Muslim migrants in Lanzhou City in 2009 and 2018 was calculated respectively based on the commuting time. When the commuting time was less than 30min, the job-housing balance degrees were 0.86 and 0.97 respectively; when the commuting time was less than 20min, the corresponding indexes were 0.82 and 0.90. Therefore, the commuting time of 20min can be identified as the critical time of job-housing for changing balance to decentralization.

Analysis of job-housing balance on the basis of the spatial relationship with mosque: At present, there are 83 religious sites such as mosques and Gongbei in Lanzhou City, among which, 66 are mainly distributed in Chengguan District and Qilihe District (Lanzhou Islamic Association). The job-housing spatial relationship ofMuslim migrants in Lanzhou Citycan also be reflected by their relationship with the mosque. If the commuting distance and commuting time between residence or employment place and the same mosque are within limits, even though the two are distributed in the opposite direction to the mosque, the occupation and residence can also be considered balanced. The specific criteria are: 1) The distance between residence or employment place and the mosque is within 500m; 2) The distance between residence or employment place and the mosque is 501-5000m, and the job-housing balance index is between 0.8 and 1.0; 3) The commuting time of residence, employment place and the mosque is 20-30min and the job-housing balance index is between 0.8 and 1.0. According to the spatial statistics: In 2009 and 2018, the average distance between residence place of Muslim migrants and the nearest mosque was 877.07m and 593.32m respectively; the average distance between employment place of Muslim migrants and the nearest mosque was 901.93m and 633.22m respectively; In 2009, there were 246 job-housing matching samples, with the job-housing balance index of 0.72;

and in 2018, there were 563 job-housing matching samples, with the job-housing balance index of 0.78, reflecting that job-housingof the Muslim migrantsmatching degree isgenerally getting higher and higher, and to a certain extent, it still remains the preference of living around mosque. From the perspective of residence distribution, the job-housing balance degree in the area from Xiaoxihu to Xiguan, Yantan to eastern market and Feijiaying is relatively higher; from the perspective of employment place distribution, the job-housing balance degree in the area from Xiaoxihu to Xiguan is relatively higher (Figure 3). Since the Ming Dynasty, Lanzhou City has formed the spatial pattern of "living around mosque", and still maintains the special relationship between man and land that "no one lives far away from mosque and no mosque is away from people". The geographical structure of living around mosque is the basis for maintaining the traditional culture of the Hui Community (Gao Yuan, 2009); In recent years, the residential pattern of Muslim Community of Lanzhou has developed from "living around mosque" to "living near mosque and living far from mosque" (Ma Jingjin, 2013). Zhang Zhibin et al. (2013) used census data to discuss the spatial distance between "living around mosque" and "living near mosque" of Muslims living in Lanzhou City from the street scale, and considered that it is "living around mosque" when the average distance between residents and the nearest mosque is about 1km.

It is "living near mosque" when the average distance between residents and the nearest mosque is 2km. It is within the scope of "living around mosque" when the distance between the residenceplace of migrant Muslim and the nearby mosque in Lanzhou City is basically within the range of 1km. The spatial statistics: In 2009 and 2018, the average commuting time between migrant Muslim residence and the nearest mosque was 7.78min and 5.39min respectively, and the average distance between employment place and the nearest mosque was 7.67min and 5.62min respectively. In 2009, there were 226 job-housing matching samples, with the job-housing balance index of 0.66; in 2018, there were 523 job-housing matching samples, with the job-housing balance index of 0.73. In general, the job-housing matching degree of Muslim migrants tends to increase. From the distribution of residence and employment, in 2009, there was a higher job-housing balance degree in the area from Xiaoxihu to Xiguanand Yantan to the eastern market. In 2018, the area from Xiaoxihu to Xiguan has a higher job-housing balance degree, while the other areas have obvious job-housing decentralization (Figure4).

There are differences in people's choice of living and employment space with different occupations, but scholars generally believe that: In order to reduce the cost of living, the migrant people employed in the commercial service industry in the main urban areas often choose to live in the suburbs, forming "pendulum people" in the city, who go into the city early and leave the city late, and would like to pay the transportation cost and live in low-rent houses in the suburbs. In recent years, most of the Muslim migrants in Lanzhou City have chosen the areas where the Muslimsare concentrated on, without obvious separation of employment and residence, showing that to a large extent the mutual assistance within the ethnic group and "group life" is still a tradition and dependence that the Muslim migrants need to insist on for adapting to the urban life.

CONCLUSION AND DISCUSSION

Between 2009 and 2018, the averagecommuting Manhattan distance of job-housing of Muslim migrantsin Lanzhou City decreased from 1.21 km to 0.79 km, and the average commuting time decreased from 6.52 min to 5.78 min. In general, the Job-housing Balance of Muslim migrants based on commuting conditions tends to increase. Under the commuting conditions, joining the mosque factor, one of the following conditions needs to be met to achieve the Job-housing Balance of Muslim migrants in Lanzhou City: 1) The distance between residence or employment place and the mosque is within 500m; 2) The distance between residence or employment place and the mosque is 501-5,000m, and the job-housing balance index is between 0.8 and 1.0; 3) The commuting time of residence or employment place and the mosque is 20-30min, and the job-housing balance index is between 0.8 and 1.0. To some extent, the study conclusion reflects the Muslim migrants' adherence to the tradition of "living and working around mosque". The distribution of mosques is still an important factor needs to be considered when Muslim migrants choose residence and employment. With the addition of mosque conditions, the judgment of Job-housing Balance of Muslim migrants becomes more complex and flexible than that under the influence of general commuting conditions. This flexibility is reflected in that as long as the distance between the place of residence, the employment place and the mosque is within a certain distance, even though the two are distributed in the opposite direction to the mosque, the job-housing can be considered balanced. Whether the judgment on the conditions for the Job-housing Balance of Muslim migrants is universal, on the one hand, comparative studies between different cities are needed for verification, and on the other hand, the empirical formula for the Job-housing Balance of this group need to be further summarized.

The job-housing spatial distribution correlation reflects the changes of urban living and employment spatial organization, which is the result of urban social economy, institutional transformation and spatial reconstruction, and the product of interaction and balance of multiple factors from macro to micro, from environment to individual. For Muslim migrants, job-housing balance or integration can not only make it convenient for them to achieve intra-ethnic mutual assistance and reduce the cost of living in cities, but also make them share all kinds of information with each other, thereby increasing opportunities for them to improve the quality of their urban life. However, the job-housing balance at a low level is not conducive to the development of migrant Muslim groups. For example, Lanzhou City has also formed "Dongxiang village", "Guanghe village" and other concentration areas where Muslim migrants choose to live and work. Although the living cost is low, the infrastructure is imperfect, the sanitation environment is poor, and the public security environment is not good. Self-sufficient job-housing balance is the direction of ultimate endeavors, so some suggestions are as follows: 1) In the reconstruction of urban villages and the construction of ethnic communities, attention shall be paid to the housing needs of Muslim migrants; there shall be fewer restrictions on the application of small-sized affordable housing for Muslim migrants with family mobility and strong willingness to settle down and stable work; and the threshold of low-rent housing shall be lowered for Muslim migrants with individual mobility and unstable jobs. 2) The wholesale market, halal catering industry, sacrificial supplies service networks and places for religious activities where the

employment of Muslim migrants is concentrated shall be reasonably arranged, and a job-housing integration area for Muslim migrantsshould be planned and constructed appropriately. 3) Lanzhou is a river-valley city, therefore, it is necessary to improve the traffic accessibility between groups, solve the regional traffic obstruction problem, reduce the commuting cost and expand Muslim migrants' career choice space scope. 4) The government shall establish a low-rent and employment information platform for the migrant population, and carry out targeted skills training according to job preferences so as to improve the ability to their job hunting.

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