Research on the Characteristics of the Population Flow Network of the Main Ethnic Minorities in Northwest China

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Abstract: In the context of the development of the western region and the new situation of population mobility, the role of the minority floating population, who bear the dual attributes of national culture and floating personnel, has become increasingly prominent. Based on the national floating population dynamic monitoring data, this paper examines the floating scale and network characteristics of the main ethnic minorities (Hui, Uyghur, and Tibetan) in Northwest China. The results show that there are commonalities and differences among the three main ethnic groups, and the commonality is manifested in the preference for inflows to provincial capital cities and ethnic autonomous regions, with typical economic orientation and homogenous source orientation.

Keywords: Ethnic minorities, Population mobility, Temporal and spatial characteristics, Northwest China.

1. Introduction

As one of the largest and most far-reaching geographic processes since the reform and opening up [1], the flow and migration of population has always been an important concern and key influencing factor for the development of population. According to the "Report on the Development of China's Floating Population" (2020) issued by the National Family Planning Commission, in 2016, China's floating population reached 247 million. Paying attention to the population movement of ethnic minorities is related to the smooth realization of ethnic equality and ethnic unity [2]. The ethnic minority floating population with the dual attributes of national culture and floating personnel is of great significance for activating the economy[3].

Most of the literature starts from the unique identity, relationship, culture and other aspects of ethnic minorities[4]. Individual ethnic factors have a greater impact on urban integration and social adaptation[5]. Due to differences in language and customs, ethnic minorities have lost high-skilled, high-paying jobs[6], more than 70% of the minority migrants work much more than the standard working hours per week[7]. Xin-Zhe Zheng expounded the correlation between the migration of ethnic minorities and the relationship between urban ethnic groups[8]. The research on ethnic minority floating population in Northwest China mainly focuses on reasons for migration, characteristics of migration[9]. Most of them are young and middle-aged men; more are married; there is a tendency of family mobility[10]. Affected by differences in ethnic culture, religion, psychology, the ethnic minority floating population has differences compared with the Han floating population[11]. It is a gradual and dynamic process from social migration, social integration to social integration of minority migrants[12]. The overall situation of the floating population of ethnic minorities in the northwest is not optimistic, and it is difficult to guarantee their rights and interests[13]. Due to their uniqueness, ethnic minorities are quite different from the Han people in the direction and reasons of migration. In terms of the characteristics of ethnic minorities' migration, on the whole, most of the ethnic minorities live in the west, mainly in the province[14], the migration of ethnic populations to the eastern region is remarkable, and inter-ethnic exchanges are becoming more frequent[15]. At the same time, the trend of ethnic mobility and migration based on policy orientation is becoming more and more obvious[16].

Historically, due to the combined effects of famine, war, and economic factors, the ethnic minorities in the northwest often migrated abnormally[17].

2. Study Area and Data Sources

2.1. Study area

Northwest China is located between 73°E~110°E and 30°N~48°N. It covers five provincial-level regions of Gansu, Ningxia, Xinjiang, Qinghai and Shaanxi administrative district.

2.2. Data sources

The population data in this paper are mainly from the China Migrants Dynamic Survey conducted by the National Health Commission. The research scope of this paper is Gansu, Ningxia, Xinjiang, Qinghai, and Shaanxi administrative district.

3. Research Methods

3.1. Geographic Concentration Index

The geographic concentration index is an important geographic index used to measure the balance of the distribution of things. The formula[18] is:

\[ G = 100 \times \sqrt{\frac{1}{n} \sum_{i=1}^{n} \left(\frac{X_i}{T}\right)^2} \] (1)

G is the geographic concentration index; n is the total...
number of regions; \( X_i \) is the size of the floating population in the region; \( T \) is the total size of the floating population.

### 3.2. Social Network Analysis

The degree of network connectivity is used to measure the possibility of direct connection between node \( i \) and other nodes \( j \) in the floating population contact network\[^{19}\].

\[
I_{ij} = K_{ij} + K_{ji}, \quad (i, j = 1, 2, 3, 4, \ldots) \tag{2}
\]

In the formula, \( I_{ij} \) is the number of edges connecting the \( i \) node and the \( j \) node; \( K_{ij} \) and \( K_{ji} \) respectively represent the number of paths of the floating population starting from the \( i \) node (\( j \) node) and finally reaching the \( j \) node (\( i \) node). Proximity centrality is used to describe the position of a node in the population flow network. Formula \[^{19}\] is

\[
CC = \frac{n-1}{\sum_{j \neq i} d_{ij}} \tag{3}
\]

where \( CC \) is the proximity centrality of city \( i \); \( d_{ij} \) is the path length between node \( i \) and node \( j \); \( n \) is the number of nodes.

### 4. Results and Analysis

#### 4.1. Analysis of flow scale characteristics

The flow of the three major ethnic minorities in the northwest region was counted by direction, region and time, and the flow scale in different years was obtained, and analyzed and compared:

The advantages are very prominent. Especially the Hui and Uyghurs, the northwest region is their main migration area, and it is also the main ethnic group participating in the flow of ethnic minorities in the northwest region.

#### 4.2. The temporal and spatial asymmetry of floating population

The geographic concentration index was selected for comparative calculation.

In the Hui population flow, Gansu and Ningxia are important net outflow places. From 2012 to 2018, the changes in the Hui floating population were reflected in the intensification of population loss in Gansu and the weakening of Xinjiang's attractiveness. Tibetans are distributed in Qinghai and Gansu. These two regions also have outstanding performance in terms of the scale of Tibetan population flow. In terms of the distribution of floating population, the Tibetans show a strong concentration. The population flow of the Uyghurs has remained relatively stable.

#### 4.3. Complexity of connections

##### 4.3.1. Integrity

The Hui nationality has the highest network integrity, followed by the Tibetan nationality, and finally the Uyghur nationality (Table 1). The overall network connectivity and integrity of the Hui and Tibetans have improved.

<table>
<thead>
<tr>
<th>Time</th>
<th>Nationality</th>
<th>Gansu</th>
<th>Ningxia</th>
<th>Qinghai</th>
<th>Shaanxi</th>
<th>Xinjiang</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Hui</td>
<td>1.06</td>
<td>1.44</td>
<td>1.62</td>
<td>1.13</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td>Uyghur</td>
<td>0.66</td>
<td>0.5</td>
<td>—</td>
<td>—</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>Tibetan</td>
<td>0.8</td>
<td>—</td>
<td>1.11</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>2018</td>
<td>Hui</td>
<td>1.26</td>
<td>1.3</td>
<td>1.54</td>
<td>1.2</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>Uyghur</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Tibetan</td>
<td>0.86</td>
<td>—</td>
<td>1.2</td>
<td>—</td>
<td>0.75</td>
</tr>
</tbody>
</table>

##### 4.3.2. Network Centrality

The degree centrality of the three major ethnic minorities is shown in Figures 1.

From Figure 1, the areas with high centrality in the Hui population flow network include Haixi Prefecture, Zhongwei. These areas attract Hui people by virtue of their ethnic advantages. Urumqi has always occupied an absolute control position in the Uyghur population flow network. The centrality of Kashgar, Bayingoleng and other places has always remained at the forefront, and Kashgar’s control power has been further strengthened. In the Tibetan mobile network, Xining and Haixi have the strongest control, Lanzhou and Gannan have strong attractiveness to Tibetans.

##### 4.3.3. Approaching centralit

We further analyze the key cities and regions in the mobile...
network. The status of Urumqi, Xi’an, Changji in the Hui mobility network increased significantly. The rise in the rankings of Urumqi and Xi’an reflects the importance of provincial capitals in the Hui mobility network. The places with high closeness centrality are mostly distributed in the center of the province. In the Uyghur mobile network, Aksu has a more prominent position; cities outside the Xinjiang are less close to centrality. There are many high-grade highways running through the whole territory.

5. Discussion and Conclusions

5.1. Discussion

The total number of floating population has remained high in recent years. The population mobility network has been studied, and the problem of network hierarchy has been characterized. This paper finds that the main ethnic minority population flow network in Northwest China is also complex and hierarchical, but compared with developed areas, the network is less complete and less hierarchical. This paper finds that there are commonalities and differences in the three major ethnic minority population flow networks in Northwest China, and the commonalities are manifested in significant economic orientation and homology source orientation.

5.2. Conclusion

Based on the national floating population dynamic monitoring data, this paper systematically examines the temporal and spatial patterns and network characteristics of population flows of major ethnic groups in Northwest China. The result shows: the scale of flow is generally limited, but its importance cannot be underestimated; the time and space of inflow and outflow are asymmetric, the distribution of outflow is more concentrated, and the distribution of inflow is relatively scattered; the complexity of connections, the network integrity of the Uyghur people is the worst, and the network is the most Simple, the Hui people have the best integrity, and the network is the most complex.

References