

Empirical Study on the Measurement of High-quality Development of Population Urbanization

-- A Case Study of Anhui Province

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Abstract

The high-quality development of population urbanization is not only a manifestation of the high-quality development of China's economy, but also an important part of it. This paper constructs an index system to measure the quality of population urbanization from three dimensions of life quality, population quality and urban environment quality, and conducts an empirical study on the quality of population urbanization in Anhui Province through setting grade standards and factor analysis. The results show that, firstly, the overall quality of population urbanization in Anhui Province is low, which is in the middle and low quality grade. Second, regional development is unbalanced. Hefei is still the city with the highest urbanization quality, and the overall quality of urbanization is higher in southern cities than in northern cities. Currently, Anhui Province is in a period of development opportunities where the quality of urbanization has the potential to improve at a fast speed. Therefore, the concept of "people-centered and market-supported" must be upheld to effectively improve the happiness brought by urbanization to people.

Keywords

Population urbanization; Urbanization quality; High quality development.

1. Introduction

The seventh census shows that China's total population has reached 1.412 billion, accounting for about 18 percent of the world's total population, and remains the world's most populous country. The urbanization rate of permanent residents on the mainland reached 63.89 percent, an increase of 14.21 percentage points over the sixth census. The permanent resident population of Anhui Province is 61,027,200, accounting for 4.32% of the total population in China and ranking ninth in the country. The urbanization rate of the province's permanent resident population was 58.33%, 15.34 percentage points higher than the sixth census and 5.56 percentage points lower than the national urbanization rate of the permanent resident population, ranking the fifth among the six central provinces. Among the 16 prefecture-level cities in Anhui, Hefei and Fuyang took the top two spots, each with more than 8 million residents. In the process of urbanization, Hefei, Wuhu and Ma'anshan ranked the top three cities with more than 70% of their permanent resident population [1].

The essence of urbanization is the population orientation movement, that is, from rural to urban; High-quality urbanization can translate into a better life for the people. Population urbanization is a process, which means that the population of a country (or a region) transfers

from rural to urban areas, and the rural areas gradually evolve into urban areas, and the urban population keeps growing. In 2011, urban residents of China's permanent resident population exceeded 50% for the first time (up to 51.27%), realizing the historic transformation from rural population to urban population. In Anhui Province, the urbanization rate of permanent resident population exceeded 50% for the first time in 2015, reaching 50.50% [2]. In the new era of socialism with Chinese characteristics, the economy is shifting from high-speed growth to high-quality development. The high-quality development of population urbanization is not only the external manifestation of high-quality development of economy, but also the internal driving force and an important part of it.

Since the 18th CPC National Congress, the CPC Central Committee and the State Council have issued the National New Urbanization Plan (2014-2020), which clearly puts forward the implementation of a new urbanization strategy that focuses on people-oriented urbanization and focuses on improving the quality of urbanization. On the basis of grasping the connotation of population urbanization, this paper measures the comprehensive development index of population urbanization quality in Anhui province and other cities by setting the grade standard and calculating the weight of indexes. This study reveals the quality of population urbanization in Anhui Province in recent years and the development of the quality of urbanization in 16 prefecture-level cities in Anhui Province, and provides a realistic basis for improving the quality of population urbanization and high-quality economic development in Anhui Province.

2. Literature Review

With the acceleration of China's urbanization process and the continuous improvement of urbanization quality, the research on population urbanization has a considerable scale in the academic circle. This paper introduces the current research status from two aspects: "connotation of urbanization quality" and "measurement method of urbanization quality".

As for "the quality of urbanization connotation", Liu Sudong (2006) pointed out that quality of urbanization connotation includes three aspects: "urbanization level and city level and at the same time improve", "the elements of urban harmonious development", "the quality of the urban-rural integration", urbanization quality is without sacrificing resources form the ultimate goal of urban-rural integration development in the process of urbanization [3]; NiuWenyuan (2010) explained the connotation of the concept of urbanization quality from the perspectives of dynamic representation, quality representation and fair representation [4]. Guo Yebo (2013) divided "urbanization quality" into "urbanization" and "quality". He believed that urbanization quality refers to a comprehensive concept that reflects the advantages and disadvantages of urbanization relative to the quantity of urbanization in the process of urbanization, and emphasized the development quality, coordination degree and promotion efficiency of components of urbanization [5].

As for "urbanization quality measurement method", Ye Yumin (2001) measured the quality of urbanization by constructing an index system including 12 indicators from two aspects of urban modernization and urban-rural integration, and adopted entropy method to give weight [6]. United Nations Habitat (2002) proposed the urban development index from five aspects: production capacity, infrastructure, waste disposal, health and education. HanZenglin et al. (2009) measured the quality of urbanization from 10 aspects: economic development, infrastructure, employment, residents' life, social development, ecological environment, quality of land use, quality of education, quality of innovation and urban-rural coordination [7]. Wang Yirui et al. (2017) reflect the quality of urbanization mainly from the three system levels of urban development quality, sustainable development quality and urban-rural coordination quality [8].

Based on the above research results, this paper combines qualitative and quantitative analysis to better reveal the quality development of population urbanization in Anhui Province. In this paper, the corresponding indicators are selected from three dimensions of life quality, population quality and urban environment quality [9], and the factor analysis method is used to measure the comprehensive development index of population urbanization quality. Based on the sectional data of prefecture-level cities in Anhui Province, this paper analyzes the spatial and temporal pattern of urbanization quality index.

3. The Construction of Index System

High-quality development of population urbanization is the unity of quantity and quality of population urbanization. Referring to the existing studies [9], this paper selects the urbanization rate to reflect the urbanization amount of population. The high quality of population urbanization means the pursuit of "better life", which consists of the quality of life, the quality of population and the quality of urban environment. Among them, the quality of life is the core goal, the quality of population plays a decisive role, and the quality of urban environment is an important condition.

Therefore, the comprehensive index of population urbanization quality consists of living standard index, population quality index and urban environment quality index. See Table 1 for details:

Table 1. Quality evaluation index system of population urbanization

Target layer	criterion layer	index layer	
Comprehensive index of the quality of population urbanization	Living standard index	Income level	Per Capita Disposable Income of Urban Permanent Residents (Yuan)
		Food spending	Engel's coefficient of urban permanent residents (%)
		Employment structure	Proportion of Employed Persons in Tertiary Industry (%)
	Population quality index	Fixed number of year of the education	Average Years of Education (Years)
		The independent innovation	Number of patents granted by ten thousand people (pieces/ten thousand people)
		Degree of citizenization	Difference between the urbanization rate of permanent population and registered population (%)
	Urban environmental quality index	Gap between urban and rural areas	Income ratio between urban and rural residents
		Education investment	Ratio of Educational Expenditure to GDP (%)
		Medical resources	Number of medical practitioners (per thousand)
	Population urbanization index	The ecological environment	Green Coverage Rate of Built Area (%)
		Level of population urbanization	Urbanization rate (%)

The table 1 shows that the standard of living index by income level, food spending, the measure on the level of employment structure, population quality indices by education age, level of independent innovation, by the degree of urbanization, the urban environment quality index gap between urban and rural areas, investment in education, health resources and the ecological environment level indicators.

Based on existing research [10] [11], the score of population urbanization quality evaluation index set in this paper is shown in Table 2:

Table 2. The grade of population urbanization quality evaluation index

Indicators	low quality	medium low quality	medium quality	medium high quality	high quality
Per Capita Disposable Income of Urban Permanent Residents (positive)	0-2w	2-3w	3-4w	4-5w	5-20w
Engel's coefficient of urban permanent residents (inverse)	50-100	40-50	30-40	20-30	0-20
Proportion of Employed Persons in Tertiary Industry (moderate)	0-45 or 80-100	45-50 or 75-80	50-55 or 70-75	55-60 or 65-70	60-65
Average Years of Education (positive)	0-6	6-9	9-12	12-16	16-22
Number of patents granted by ten thousand people (positive)	0-10	10-25	25-40	40-55	55-150
Difference between the urbanization rate of permanent population and registered population (inverse)	20-40	15-20	10-15	5-10	0-5
Income ratio between urban and rural residents (inverse)	3-6	2.5-3	2-2.5	1.5-2	1-1.5
Ratio of Educational Expenditure to GDP (moderate)	0-4	4-4.5	4.5-5	5-5.5	5.5-11
Number of medical practitioners (moderate)	0-2	2-2.5	2.5-3	3-4	4-5
Green Coverage Rate of Built Area (positive)	0-25	25-30	30-35	35-40	40-100
Urbanization rate (moderate)	0-40 or 95-100	40-45 or 90-95	45-55 or 85-90	55-60 or 80-85	60-80

In addition, the original data used in this paper are from Anhui Statistical Yearbook (2020), National Bureau of Statistics, Government Work Report, and the statistics bureaus of prefecture-level cities in Anhui Province.

4. Comprehensive Measurement of High-quality Development of Population Urbanization in Anhui Province

4.1. Transfer the Evaluation Index Value to the Score

Referred to the existing quality level setting standards [12], this paper divides the quality level of population urbanization in Anhui Province into five grades: low quality, medium low quality, medium high quality and high quality. The corresponding score ranges for the five grades are defined as [0,20], [20-40], [40-60], [60-80] and [80-100] (see Table 3).

Table 3. Quality grade and fractional value of indicators

Level	low quality	medium low quality	medium quality	medium high quality	high quality
Score	0-20	20-40	40-60	60-80	80-100

Before calculating the weight of evaluation indexes, it is necessary to conduct unified processing on the original data, the specific method is as follows.

Positive Indicator: The smaller the original value of the indicator, the smaller the score value and the lower the grade. According to formula 1, the original value of the index is mapped to the corresponding score.

Inverse index: the smaller the original value of the index, the larger the score value and the higher the grade. According to formula 2, the original value of the index is mapped to the corresponding score.

$$x_i = \text{score lower limit} + (\text{index original value} - \text{alarm lower limit}) \times \frac{\text{score upper limit} - \text{score lower limit}}{\text{alarm upper limit} - \text{alarm lower limit}} \quad (1)$$

$$x_i = \text{score upper limit} - (\text{index original value} - \text{alarm lower limit}) \times \frac{\text{score upper limit} - \text{score lower limit}}{\text{alarm upper limit} - \text{alarm lower limit}} \quad (2)$$

In the formula, X_i is the fractional value of the original value of the index; The upper and lower scores are the upper and lower scores of the quality level of the indicator, as shown in Table 3. The upper and lower limits of the alarm limit are the upper and lower limits of the quality grade in which the index is located, as shown in Table 2.

Adaptability index: the original value of the index in the quality level is different, the conversion formula is different. The observed value of the index is less than the moderate value, and the higher the observed value, the higher the quality grade is. Above the moderate value, the smaller the quality grade will be higher. The original value of the index is mapped to the corresponding score in two cases:

When the original value of the index is in the "high quality" level, the fraction value is converted according to Formula 3.

When the original value of the index is in other quality levels, if the original value of the index is less than the moderate value, the higher the original value of the index is, the higher the quality level will be. Formula 1 is used. If the original value of the index is greater than the moderate value, the smaller the original value of the index is, the higher the quality grade will be. Equation 2 is used.

$$x_i = 100 - 2 \times \left| \text{index original value} - \frac{\text{alarm upper limit} + \text{alarm lower limit}}{2} \right| \times \frac{\text{score upper limit} - \text{score lower limit}}{\text{alarm upper limit} - \text{alarm lower limit}} \quad (3)$$

The index score values selected for population urbanization in Anhui Province were calculated by corresponding to the original value of the index in Formula 1, Formula 2 and Formula 3, as shown in Table 4.

Table 4. Score value of population urbanization index

Year	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11
2008	12.99	38.00	15.38	32.27	1.42	26.92	19.40	15.05	12.00	63.88	22.00
2009	14.09	40.80	15.91	32.40	2.80	20.92	19.13	14.90	12.90	68.64	28.40
2010	15.79	44.00	15.91	34.13	5.38	19.51	20.40	14.60	13.60	70.00	32.04
2011	18.61	40.40	16.00	34.93	10.96	18.13	20.40	17.35	14.20	77.88	39.20
2012	22.05	42.60	16.58	36.13	14.46	16.39	22.40	19.55	15.40	75.20	45.72
2013	26.23	41.80	17.02	36.93	16.20	15.06	26.00	17.90	16.40	79.40	48.30
2014	29.68	53.40	17.38	37.93	15.90	13.54	40.00	16.50	17.10	80.39	51.00
2015	33.87	52.60	17.56	40.40	19.22	17.08	40.40	17.95	17.50	80.39	53.98
2016	38.31	55.00	17.64	41.53	19.68	17.53	40.40	17.30	18.40	80.57	56.98
2017	43.28	55.72	17.82	41.80	18.62	17.58	40.80	17.10	19.30	80.72	59.38
2018	48.79	58.00	17.91	42.00	23.48	17.96	41.60	16.35	20.00	80.83	61.62
2019	55.08	57.60	18.00	42.13	23.95	18.84	42.40	16.45	26.80	80.91	63.24

In the table, a1, a2, a3, a4, a5, a6, a7, a8, a9 a10, a11 represent urban per capita disposable income, urban residents engel's coefficient, the proportion of the tertiary industry practitioners, population mean by education period, ten thousand patent grant, permanent population and the population urbanization rate difference, the ratio of the income of urban and rural residents, the budget for education spending The proportion of GDP, the number of medical practitioners per thousand, the green coverage rate of built-up areas, and the urbanization rate of population.

4.2. Determine the Weight of the Index Value

The score values of the selected indicators in Table 4 to measure the quality of population urbanization were input into SPSS software, and the principal component analysis was performed to obtain Table 5 and Table 6.

Table 5. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.735	79.409	79.409	8.735	79.409	79.409
2	1.446	13.142	92.551	1.446	13.142	92.551
3	0.443	4.030	96.581			
4	0.219	1.987	98.568			
5	0.069	0.627	99.195			
6	0.040	0.364	99.560			
7	0.025	0.226	99.785			
8	0.015	0.135	99.920			
9	0.007	0.067	99.987			
10	0.001	0.012	100.000			
11	3.364E-5	0.000	100.000			

Extraction Method: Principal Component Analysis.

As can be seen from Table 5, the characteristic root >1 corresponding to the first two principal components was extracted, and the cumulative variance contribution rate of the first two principal components reached 92.551%, more than 80%. Therefore, the first two principal components can basically reflect the information of all indicators and can replace the original 11 indicators.

It can be seen from Table 6 that the load of the first principal component and the second principal component on the original index. Divide it by the square root of the corresponding principal component characteristic root to get the coefficient of each index in the linear combination of principal components, and compare it with the standardized value Z_{xi} ($i = 1, 2, \dots, 11$) Multiply and sum to get the expressions of principal components F1 and F2:

$$F_1 = 0.319ZX_1 + 0.311ZX_2 + 0.335ZX_3 + 0.331ZX_4 + 0.332ZX_5 - 0.211ZX_6 + 0.316ZX_7 \\ + 0.154ZX_8 + 0.299ZX_9 + 0.314ZX_{10} + 0.337ZX_{11}$$

$$F_2 = 0.237ZX_1 + 0.265ZX_2 + 0.039ZX_3 + 0.095ZX_4 - 0.075ZX_5 + 0.531ZX_6 + 0.190ZX_7 \\ - 0.654ZX_8 + 0.223ZX_9 - 0.244ZX_{10} - 0.044ZX_{11}$$

Taking the ratio of the variance contribution rates corresponding to the principal components F1 and F2 to the sum of the total variance contribution rates of the extracted principal components as the weight, the comprehensive model of the principal components was obtained:

$$F = \frac{T_1}{T_1+T_2} F_1 + \frac{T_2}{T_1+T_2} F_2 \quad (4)$$

Among them, T1 and T2 are the variance contribution rates of the first and second principal components respectively (see Table 5).

Thus,

$$F = 0.308ZX_1 + 0.304ZX_2 + 0.293ZX_3 + 0.297ZX_4 + 0.274ZX_5 - 0.106ZX_6 + 0.298ZX_7 + 0.039ZX_8 + 0.288ZX_9 + 0.235ZX_{10} + 0.283ZX_{11}$$

The weight of each index is obtained by normalization, as shown in Table 7.

Table 6. Component Matrix

	Component	
	1	2
a1	0.944	0.285
a2	0.918	0.319
a3	0.989	0.047
a4	0.978	0.114
a5	0.982	-0.090
a6	-0.625	0.639
a7	0.934	0.229
a8	0.456	-0.787
a9	0.884	0.268
a10	0.927	-0.293
a11	0.996	-0.053

Table 7. Evaluation index value weights

Indicators	weight
Per Capita Disposable Income of Urban Permanent Residents	0.113
Engel's coefficient of urban permanent residents	0.112
Proportion of Employed Persons in Tertiary Industry	0.107
Average Years of Education	0.109
Number of patents granted by ten thousand people	0.101
Difference between the urbanization rate of permanent population and registered population	0.039
Income ratio between urban and rural residents	0.109
Ratio of Educational Expenditure to GDP	0.014
Number of medical practitioners	0.106
Green Coverage Rate of Built Area	0.086
Urbanization rate	0.104

4.3. Comprehensive Measure of the Quality of Population Urbanization

The comprehensive measurement model of high-quality development of population urbanization in Anhui Province is as follows:

$$S = \sum w_i X_i \quad i = 1, 2, 3, \dots, 11 \quad (5)$$

In the formula, W_i is the weight of each index, X_i is the score value of each index, and S is the comprehensive score, with a value range of $[0,100]$. According to Formula 5, the comprehensive score of high-quality development of population urbanization in Anhui Province from 2008 to 2019 is shown in Table 8.

It can be seen from Table 8 that the comprehensive score of population urbanization quality in Anhui Province increased year by year from 2008 to 2019, rising from 23.46 points in 2008 to 43.56 points in 2019. From 2008 to 2016, the comprehensive score of population urbanization quality in Anhui Province was less than 40 points, ranking in the middle and low quality; Slightly above 40 points in 2017-2019, achieving medium quality grade.

Table 8. Comprehensive score and quality grade of population urbanization quality

year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
score	23.46	25.01	26.65	28.70	30.64	32.38	36.07	37.64	39.01	40.01	41.80	43.56
grade	MLQ	MLQ	MLQ	MLQ	MLQ	MLQ	MLQ	MLQ	MLQ	MQ	MQ	MQ

Notes: MLQ, medium low quality; MQ, medium quality

5. Comparison and Measurement of High-quality Development of Population Urbanization in Prefecture-level Cities of Anhui Province

5.1. Comparative Analysis of Population Urbanization Level

Some researchers believe that "urbanization rate of population" reflects the level of urbanization, while other dimensions (such as "per capita disposable income of permanent urban residents" in this paper) reflect the quality of urbanization. The "population urbanization level" mentioned in this section includes both the population urbanization rate and urbanization quality in a narrow sense.

Table 9. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
b1	16	31788	49010	3.70E4	4989.303
b2	16	18.67	36.01	31.0775	3.83645
b3	16	35.2	53.2	41.625	5.4479
b4	16	8.32	11.29	9.3462	0.71960
b5	16	3.12	36.93	12.1644	9.05879
b6	16	10.99	26.75	18.9831	4.30343
b7	16	1.85	2.51	2.2869	0.19801
b8	16	1.77	5.10	3.1862	0.94632
b9	16	1.59	3.27	2.1581	0.38741
b10	16	37.32	47.91	43.0738	2.83331
b11	16	42.22	76.33	56.5419	9.90677
Valid N (listwise)	16				

By descriptive statistical analysis of the original data of the selected indicators for population urbanization quality measurement of 16 prefecture-level cities in Anhui Province, it can be seen that the mean value of population urbanization rate (B11) is 56.54%, the maximum value is 76.33% (Hefei), and the minimum value is 42.22% (Bozhou). The average per capita disposable

income (B1) of urban residents was 36,969 yuan, the maximum was 49,010 yuan (Hefei), and the minimum was 31,788 yuan (Lu'an). Details are shown in table 9 (b2 in the table for the urban residents' engel coefficient, b3 for the proportion of the tertiary industry practitioners, b4 for population mean by education period, b5 for ten thousand patent grant, b6 for permanent population and the population urbanization rate difference, b7 as the ratio of the income of urban and rural residents, the b8 as fiscal education spending as a share of GDP, the number of b9 practicing doctors for one thousand people, the b 10 is the green coverage rate of the built-up area).

5.2. Comprehensive Measure of the Quality of Population Urbanization

Based on the above comprehensive measure method of population urbanization quality in Anhui Province, when this part measures the population urbanization quality of prefecture-level cities in Anhui Province in 2019, the evaluation index weight is firstly obtained, which is again shown in Table 10:

Table 10. Evaluation index value weights

Indicators	weight
Per Capita Disposable Income of Urban Permanent Residents	0.110
Engel's coefficient of urban permanent residents	0.057
Proportion of Employed Persons in Tertiary Industry	0.101
Average Years of Education	0.132
Number of patents granted by ten thousand people	0.115
Difference between the urbanization rate of permanent population and registered population	0.090
Income ratio between urban and rural residents	0.073
Ratio of Educational Expenditure to GDP	0.113
Number of medical practitioners	0.115
Green Coverage Rate of Built Area	0.094

Secondly, the original fractionalized value of the selected evaluation indicators of 16 prefecture-level cities in Anhui Province (see Appendix Table 1) was multiplied by the corresponding index weights (Formula 4) and combined with Table 3 to obtain the comprehensive score and quality grade of population urbanization quality of prefecture-level cities in Anhui Province in 2019, as shown in Table 11:

Table 11. Comprehensive score and quality grade of population urbanization quality

city	score	grade	city	score	grade
Hefei	52.47	MQ	Lu'an	38.31	MLQ
Huaibei	39.04	MLQ	Maanshan	44.54	MQ
Bozhou	33.20	MLQ	Wuhu	46.74	MQ
Suzhou	32.76	MLQ	Xuancheng	36.08	MLQ
Bengbu	37.10	MLQ	Tongling	40.08	MQ
Fuyang	34.62	MLQ	Chizhou	36.43	MLQ
Huainan	34.68	MLQ	Anqing	34.90	MLQ
chuzhou	35.69	MLQ	huangshan	39.71	MLQ

As can be seen from Table 11, the overall score of population urbanization quality in 16 prefecture-level cities in Anhui Province is relatively low, and the overall score is at the middle

and low quality level. Among them, there are 4 cities (Hefei, Maanshan, Wuhu, Tongling) in the middle quality grade; The remaining 12 cities and prefectures are in the middle and low quality grade.

From the comprehensive score, the comprehensive score of 16 cities in Anhui Province is more than 30 points. Among them, the comprehensive score of population urbanization quality of Hefei was the highest, with 52.47 points, and it was the only prefecture-level city in Anhui Province with more than 50 points. It was followed by Wuhu (46.74 points) and Ma 'anshan (44.51 points). Bozhou (33.20 points) and Suzhou (32.76 points) ranked the second in the overall score of population urbanization quality.

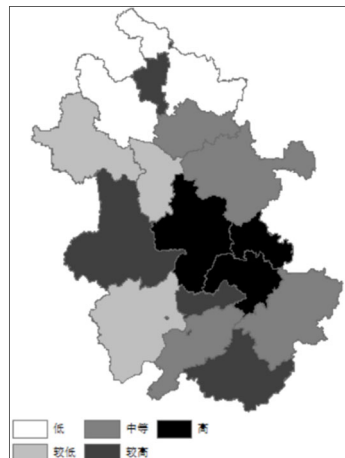
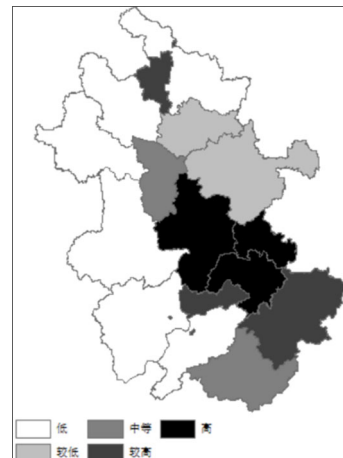
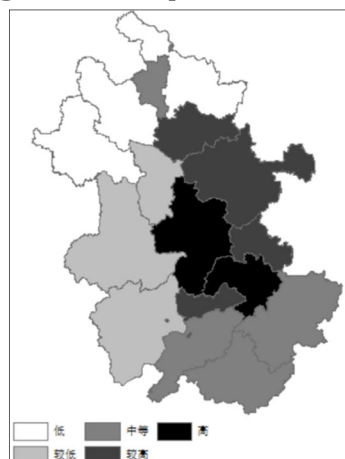
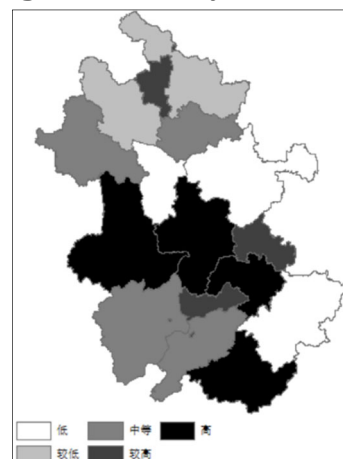
From the perspective of sub-region, the comprehensive score of population urbanization quality in southern Anhui, represented by Ma 'anshan and Wuhu, is the highest, and 3 cities are in the middle quality grade. Except for Hefei, the comprehensive scores of population urbanization quality in central Anhui (Chuzhou, Lu 'an and Anqing) were all close to 40 points, but they were all in the middle or low quality grade. The comprehensive score of population urbanization quality in northern Anhui is the lowest, and all of them are in the middle and low quality grade.

5.3. Analysis of Spatial-temporal Pattern of Population Urbanization Quality

The comprehensive index of population urbanization quality was decomposed into quality of life index, population quality index and urban environment quality index. With the help of ArcGIS Natural Breaks (Jenks), the comprehensive index of population urbanization quality and its decomposed index of 16 prefecture-level cities in Anhui Province were analyzed in spatial visualization. The scores are divided into five types of areas, and different color blocks are used to represent high, high, medium, low and low quality of population urbanization (it should be noted that only the areas with high scores are of medium quality, while the rest are of medium and low quality), as shown in Figure 1, Figure 2, Figure 3 and Figure 4.

As can be seen from Figure 1, the comprehensive score of population urbanization quality presents the characteristics of "high in the middle and low in both sides", and the southern region is higher than the northern region. To be specific, Hefei, Wuhu and Maanshan have the darkest color, that is, their comprehensive score is in the high grade, and the quality of population urbanization is in the medium grade. The two northern regions (Suzhou and Bozhou) have the lightest color, that is, the comprehensive score is in the low grade, and the population urbanization quality is in the middle or low quality grade. As the capital of Anhui Province, with the strong support from the government in recent years, Hefei has been "riding the boat with the current" in its development, and it is natural that the quality of urbanization should be in the first place. Wuhu and Ma 'anshan have been developing well, and the radiation effect of "Nanjing Metropolitan Area" is more conducive to their development. The quality of urbanization also ranks the top three in Anhui Province.

From figure 2, the six cities in anhui province in 2019 the quality of life scores in the lower level, there are four cities and the quality of life scores in high-grade, present the characteristics of "east west high low". As can be seen from Figure 3, the population quality score of prefecture-level cities in Anhui Province in 2019 is the highest in the central and eastern regions and the lowest in the northern regions. As can be seen from Figure 4, the urban environmental quality of prefecture-level cities in Anhui Province in 2019 is the highest in the central and western regions. Hefei and Wuhu are in a high level in terms of quality of life, population quality and urban environment quality.

**Figure 1.** Comprehensive score**Figure 2.** Quality of life score**Figure 3.** Population quality score**Figure 4.** Urban environmental quality score

6. Conclusions and Suggestions

This paper finds that the overall quality of population urbanization in Anhui Province from 2008 to 2019 is relatively low, which is in the middle to low quality grade. In 2019, the population urbanization quality of 16 prefecture-level cities in Anhui Province was significantly different, and the population urbanization quality of Hefei and southern Anhui (Wuhu and Maanshan) was significantly higher than that of other prefecture-level cities. In order to solve the problem of "low quality of urbanization of the whole population" and "obvious differences in urbanization quality among regions", this paper gives the following three suggestions:

Firstly, the human-centered evolution path of urbanization quality should be constructed. Deepen the humanistic concept of urbanization, emphasis on knowledge and skills as an index of population quality in the core position in the urbanization, to enhance the specialization for the gripper, driven by economic benefits, continuously improve the degree of urban economic scale and capital accumulation, urban agglomeration economy effect, only the establishment of endogenous growth model, can truly solve the quality differences of urbanization in anhui province.

Secondly, we should pay attention to the spatial dependence among urban agglomerations and systematically improve the quality of urbanization. In the process of urbanization, cities will be affected by the spillover effects of surrounding cities. When making urbanization policies, governments should not only consider individual cities, but also systematically consider inter-city population movement, market sharing, industrial division of labor and other relations. In other words, full attention should be paid to the externalities of urbanization. The negative

externalities such as technology spillover, talent exchange, mutual market relationship and vicious market competition among urban agglomerations should be utilized as much as possible.

Finally, we should enhance the core competitiveness of the manufacturing industry, develop strategic emerging industries, promote the adjustment and upgrading of industrial structure, accelerate the development of the service industry, accelerate the transformation of economic development mode, and lay a solid foundation for the comprehensive development of the city with a strong economic foundation. We will increase investment in public services, including compulsory education, public health and medical services, social security, public employment services, public culture, public well-being, and the ecological environment.

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