

The Development Process, Current Status, and Prospects of Population Geography in China

Zhiying Yang^{1, *}, Zhen Su², Wanru Wang³

¹ School of Tourism, Xi'an International Studies University, Xi'an, China

² School of Tourism, Xi'an International Studies University, Xi'an, China

³ School of Tourism, Xi'an International Studies University, Xi'an, China

*Corresponding Author: Zhiying Yang

ABSTRACT

Human geography in China has a long history, but its substantial development began after the founding of the People's Republic of China and accelerated significantly following the Reform and Opening-Up. Population geography, as an interdisciplinary field integrating demography, geography, sociology, and quantitative methods, has evolved to address national population policies and emerging challenges. Modern research focuses on population distribution, migration, urbanization, and contemporary issues such as aging populations, counter-urbanization, declining birth rates, and the impact of the COVID-19 pandemic. These studies aim to optimize China's population structure and spatial patterns. With the gradual disappearance of the demographic dividend and increasing regional disparities, population geography has become a critical discipline for guiding sustainable development. This paper reviews the historical trajectory, key research themes, and future directions of population geography in China, highlighting its role in addressing complex socio-demographic challenges and informing policy-making.

KEYWORDS

Population Geography; Population Distribution; Population Migration; Population Urbanization.

1. INTRODUCTION

Population geography is a branch of human geography. It fully draws on the research results of many disciplines such as geography, demography, sociology, anthropology and economics, and has become one of the important interdisciplinary research directions from the perspective of geography. Population geography is a cross-scale discipline that focuses on population changes, population distribution, population growth and other content closely related to population phenomena and patterns from the perspective of geography research, in order to solve population problems and achieve sustainable development of natural environment, population and social economy. It emphasizes the role of geographical factors in population analysis, focuses on the relationship between population and geographical environment, and analyzes the mechanism of the generation, evolution and formation of population phenomena from the perspective of space, so as to fully show the shaping of population phenomena by geographical environment under the relationship between human and environment.

Population geography has a long history of development. It can be traced back to Ratzel's discussion of the basic theory of population geography in 'Human Geography' in the 19th century, which made population geography have the most basic theoretical framework^[2]. At the beginning of the 20th century, France's Blache revised Ratzel's "environmental determinism" and affirmed the initiative of

human beings in the natural environment^[3]. In 1922, he discussed the differences in world population distribution and its influencing mechanism in his posthumous book "Principles of Human Geography", and roughly introduced the types of population migration, which further enriched the theory of population geography. Unfortunately, until the end of the Second World War, population geography did not develop further, but only retained the theoretical framework of 2 foundations, and had not yet become an independent discipline. With the end of World War II, Trewartha first proposed at the annual meeting of the American Geographical Society in 1953 that population geography should be developed into an independent branch of geography, and the population elements should be linked to other geographical elements to deepen, reflecting the importance of population to the development of all aspects of society, and expounding the definition and research content of population geography at the annual meeting^[3]. With the end of the war, the number of the world's population began to grow rapidly, and the population problem has increasingly become an important direction of research in various fields. The research content and research methods of population geography have been further developed and improved. More and more scholars have begun to pay attention to the interrelationship between population and geographical environment, making population geography eventually become an independent discipline. Since then, population geography has begun to develop rapidly. With the trend of economic globalization and international migration of population in the 21st century, its research paradigm and content have been continuously improved, and its social value and economic value have been fully certified^[4]. At present, population geography has become an important subject for social development in multi-scale, multi-disciplinary and multi-aspect^[5]. China's population geography developed later than the West. With the introduction of Western population geography related theories, China began to study the localization of population geography^[1]. However, with the restriction and suppression of policy, the development of China's population geography has stagnated in a certain period of time, seriously lagging behind the world. With the implementation of the reform and opening up policy, China's population geography has been able to start and develop again^[7].

As the most populous country, China's population problem has always existed in all stages of national development. As of the seventh national census in 2020, China's current population is 1.411 billion^[19]. Although the population growth rate has slowed significantly and began to grow negatively during the '14th Five-Year Plan' period, the current contradiction between people and land in China is still prominent. The total grain output per capita is tight; the contradiction between natural resources and economic growth intensified; the problems of aging, non-marriage and low birth rate are becoming more and more obvious, and the population problem in China is complex and severe. In the face of the constantly updated population problem in China, many scholars have devoted themselves to the study of population geography in order to alleviate and solve the contradiction between human and environment in China and realize the sustainable development of population, nature and economy^[1].

This paper attempts to review the development process and research results of population geography in China from three aspects: development context, main issues and future prospects, in order to look forward to the new trend of future development of population geography in China.

2. DEVELOPMENT CONTEXT

2.1. The Ups and Downs from the 1920s to the 1970s

From the 1920s to 1957, it was the initial development stage of population geography in China. During this period, Chinese scholars were mainly influenced by western population theory. Under the guidance of Western Malthusian theory, Mr. Zhu Kezhen used scientific methods to discuss the population density of Jiangsu and Zhejiang provinces in 1926^[6]. Mr. Weng Wenhao published "Population Distribution and Land Use in the Three Countries" in 1932; the first contour map of China's population density, the Hu Line, which divides China into two halves of southeast and

northwest by the Heihe-Tengchong Line, was compiled in the 1935 article "The Distribution of China's Population". It is the first time to visually show the regular distribution of China's population affected by the geographical environment, which has had a profound impact on China's economic construction, transportation planning and other aspects. The Hu Line was also elected in 2009 as "China's National Geographic Centennial Discovery"^[8]. However, due to the devastating impact of the war on the whole country, the lack of data and the shortage of research funds, it was difficult for wartime geographers to carry out research, and the development of disciplines before the 1930s and 1950s was almost non-existent.

With the victory and end of World War II, the founding of the People's Republic of China, and the country's hundreds of waste, population geography has been restored and developed rapidly. At this time, China ushered in the baby boom, the contradiction between the rapid growth of the birth rate and food production has become an urgent problem to be solved. China carried out the first national census in 1953, and the total population of China was as high as 600 million. In 1956, under the leadership of Mr. Hu, East China Normal University established the 'Population Geography Research Office', which became the first population research institution in China, marking that China's population geography as an independent discipline opened its development path^[12].

However, it is very regrettable that at the time when China's population geography sprouted and developed alone, due to the influence of 'leftist thinking', population geography, as the intersection of two sensitive disciplines of geography and human geography, has been criticized and suppressed nationwide. In the 20 years from 1957 to the Reform and Opening-up, the development of population geography has completely stagnated, and the research results have become a restricted area in the academic field^[1]. With the implementation of the reform and opening up policy, population geography has been able to usher in its own development spring again.

2.2. The Vigorous Development after the Reform and Opening-up

At the Third Plenary Session of the Eleventh Central Committee of the Communist Party of China, Mr. Ma Yinchu's "New Population Theory" was rehabilitated, and the Population Geography Research Office of East China Normal University was restored and renamed "Population Research Institute"^[13]. Since then, more and more universities such as Lanzhou University and Xinjiang University have established population research institutions. Influenced by the problem of overpopulation in China at that time, population geography has been able to obtain a large number of national funds and research funds, and has entered a period of vigorous development. In 1982, China officially began to implement a strict family planning system, which provided new research questions and contents for population geographers to a certain extent, and promoted the development of population geography. The 1980s and 1990s can be said to be the golden age of the development of population geography in China. During this period, various works and papers emerged in an endless stream, which quickly filled the research gap in the stagnation period of the previous 20 years^[16]. According to Zhu Yuncheng's statistics, more than 40 papers on population geography were published in domestic journals from 1979 to 1983. According to Ding Jinhong's statistics, from 1983 to 1985, there were as many as 241 papers on population geography published in domestic newspapers and magazines. Influenced by the wave of national urbanization, 'population urbanization' and 'population distribution' became the research hotspots at that time^[14]. Thanks to the increasing maturity of related technologies such as econometric modeling, GIS spatial analysis, remote sensing technology and geographic computing, China's population distribution research has made remarkable progress, from the initial simple descriptive study of population distribution to the prediction of spatial-temporal evolution model and its determinants and formation mechanism analysis. Population geographers use new theories, new technologies and new methods to reveal the characteristics of China's population, so as to serve the whole country in the new period of China's reform and opening up, and make suggestions for population issues. However, it is worth noting that at this stage, population geography gradually broke the discipline restrictions, and the research direction and content began to be biased

towards demography, while the traces in geography gradually decreased, which can also be reflected from the renaming of the Population Geography Research Office of East China Normal University.

In general, the development of population geography in China during this period was deeply influenced by the overall environment of Chinese society. Rapid urbanization, family planning system and other national policies have opened up a way for the study of population geography, and also reflected the force of China's unique national conditions on the independent discipline of population geography.

2.3. The Development of Population Geography in China Since the 21st Century

After entering the new century, under the influence of economic globalization, new population problems have followed. The problem of international population migration and the problem of population flow in the process of rapid urbanization in China have become the research hotspots in the early 21st century. The flow rate of population migration in China has increased from 142 million in the 1990s to 221 million^[19]. The scientific method of sampling survey to obtain data is becoming more and more popular in the study of population migration flow, and the availability of individual data at the micro level has also been improved, which greatly promotes the spatial pattern of population migration flow and its differentiation among different migration groups. More detailed and in-depth research. The research results of this period from 2000 to 2010 include the research and analysis of the influencing factors and spatial distribution of the floating population in China by Zhu Chuangeng and others, and Gu Chaolin's discussion on the migration law of the floating population in large and medium-sized cities in China^[10].

Since 2010, it has been a new period for the development of population geography in China. During this period, many new research topics have emerged. Population geography has further integrated with other disciplines and achieved a high degree of interdisciplinary development. For example, scholars have turned their attention to the study of the migration law of female floating population, which has filled the scale gap in the study of floating population to a certain extent. In addition, after the millennium, China is facing the trend of demographic dividend disappearance, low birth rate, unmarried and aging. The decline of the two-child policy and the impact of the new Coronavirus epidemic have led to the continuous decline of China's birth rate^[26]. Scholars also pay more attention to the population structure and regional spatial population pattern, so as to rationalize China's population structure and cope with the challenges of population problems in the new era.

3. MAIN THEMES OF POPULATION GEOGRAPHY

3.1. Population Geography and Population Distribution

The study of population distribution is an important issue throughout the history of population geography in China. Since the 1920s, many scholars have devoted themselves to the study of China's complex population distribution. In the 1980s, when China's population geography revived and developed, population distribution, as the main research field at that time, gave birth to many pioneering research results^[21]. Based on the results of the fourth national census in 1982, the Census Office of the State Council compiled the "China National Population Atlas", which is the first time in China to visually display the spatial distribution of China's population and composition. The introduction of quantitative analysis methods also provides a scientific guide for in-depth study of population distribution^[22].

Generally speaking, the general law of population distribution in China still follows the 'Heihe-Tengchongm' population distribution line, which shows the scientific and pioneering nature of Mr. Hu's population research a hundred years ago^[9]. At the same time, thanks to the rapid development of scientific methods, new indicators and quantitative technologies, Chinese scholars have been able

to carry out more refined population distribution research, and the research scale has been continuously diversified, resulting in numerous valuable research results, which provides scientific suggestions for China's economic development, transportation planning and other macro-construction layout^[11].

3.2. Population Geography and Population Migration

Population migration refers to the flow change of population distribution in position, which is a long-term change of residence, with time attribute, spatial attribute and clear purpose attribute. Population migration has always been the traditional focus of geography, and it is one of the important ways to study the interaction and connection between cities.

The research on population migration has developed rapidly with China's economic development and policy changes. With the promulgation of the "Allow rural population to enter the city to work and do business" regulations in China in 1984, there has been a large flow of rural labor force; after the 1990s, the rapid take-off of the market economy and the acceleration of urbanization have further promoted the nationwide population flow^[1]. Based on this, the research content of population migration is constantly enriched, and the research results are springing up in large numbers. In recent years, population geography scholars have used the data of the national census to analyze the population migration and mobility in China, focusing on the social characteristics of the migrant population, the spatial pattern of population migration and the factors affecting population migration. For example, Liu Yanling drew the following conclusions based on the sixth census data: the income of urban residents in the destination is positively correlated with the migration rate, while the income of urban residents in the destination, the level of scientific and cultural development in the destination, the migration distance and the rural income in the destination are negatively correlated^[19].

However, it is worth noting that population migration and floating population are sometimes conceptually different, and many studies on population migration in China include the part of floating population, and the research results need to be classified and refined; due to the limitation of statistical data, some influencing factors such as education level, national policy and detailed values are difficult to quantify accurately. Therefore, China's population migration needs to be further improved in future research.

3.3. Population Geography and Population Urbanization

Population urbanization refers to the process of the transfer of population and other economic factors from rural to urban areas caused by the progress of productivity. With the progress of industrialization, a large number of supporting employment opportunities in the secondary industry and the tertiary industry have emerged in cities, so that a large number of rural laborers have begun to turn to cities to seek job opportunities, which has led to the urbanization of the population^[15]. Since China's reform and opening up, there has been a new form of mechanism to replace the previous unitary and binary urbanization power with multiple urbanization power^[20]. Population migration, industrialization, market economy and national policies have become the main influencing factors of China's population urbanization.

The level of population urbanization in China is characterized by spatial imbalance. For example, the level of population urbanization in the eastern region is significantly higher than that in the central and western regions. There is also a large gap in the level of population urbanization between provincial administrative regions^[11]. Cities with high levels of population urbanization are mainly distributed in the areas east of the Hu Line. The process of population urbanization in independent cities is not closed, but has a mutual driving relationship with the surrounding urban agglomerations. The flow of labor force is not only limited to the inner city, but also the short-term flow between cities^[16]. Therefore, the improvement of population urbanization level can not only consider a single factor, but also consider the development trend of population urbanization in adjacent cities. Under

the circumstance that China's economic growth rate has slowed down, how to develop population urbanization has become one of the most important issues in population geography^[17].

3.4. Population Geography and the Problem of Newborn Population

After entering the 21st century, with the further acceleration of China's urbanization level and economic development, population research is facing new problems and challenges. For example, the continuous decline in the urban fertility rate across the country has further aggravated the trend of low birth rate in China; at the same time, the problem of population aging is becoming more and more serious^[23]. On the one hand, the neonatal population has continued to decline since 2018. On the other hand, with the continuous surge in the number of elderly people, China's population structure is undergoing earth-shaking changes. This has had a profound impact on China's economic structure, consumption structure, social demographic composition and development level. The demographic dividend has gradually faded^[18]. At present, how to improve the overall quality of the labor force and the level of productivity has become the main research focus.

China's birth rate has the characteristics of inter-provincial imbalance^[20]. For example, in the three northeastern provinces, the birth rate has been in a state of 7 downturn and continues to decline; in Guangdong Province, Fujian Province and other southern provinces and ethnic minority areas, the fertility rate remains at a high level. This fully illustrates the impact of economic development level, regional culture, geographical environment and other factors on the birth rate of newborns^[24]. At present, how to alleviate the problem of population aging and low birth rate has become an urgent problem for population researchers. In addition, the new population problem affected by the new Coronavirus epidemic is also worthy of in-depth study by scholars.

4. CONCLUSION AND DISCUSSION

4.1. Summary

At present, China's population geography has formed unique academic characteristics after decades of precipitation and development, which is closely related to China's unique national conditions, policies and social culture. With the continuous popularization of big data and the improvement of remote sensing technology, the research methods of population geography in China will be further scientific, quantitative and accurate in the future. With the continuous emergence of new population problems, the research topics of population geography will also be enriched, especially the research on future population growth and migration trends^[27]. All in all, China's population geography research still has a bright development prospect, which requires the joint efforts of population geography scholars and interdisciplinary scholars. Population geography is related to the formulation of national government's population policy and even economic policy. Therefore, strengthening the discipline construction of population geography is the focus of future geography research.

The discipline of population geography in China has developed over a century to form a unique academic system rooted in local national conditions, policy guidance, and interdisciplinary integration^[25]. Its research closely aligns with the national population strategy needs, from the early 'Hu Line' revealing population distribution patterns, to the deepening of urbanization and migration studies after the reform and opening up, and addressing new challenges such as aging and declining birth rates. The discipline has continually served national sustainable development goals. By integrating tools from geography, sociology, and quantitative methods, population geography plays a crucial role in revealing human-environment relationships and optimizing population structure and spatial patterns.

4.2. Prospect

Future research should focus on technology-driven methodological innovations, deeply integrating artificial intelligence, GIS, and spatial-temporal big data to construct high-precision population dynamic monitoring models, while developing a comprehensive evaluation framework from a 'social-ecological' system perspective. At the same time, it is necessary to strengthen policy-oriented interdisciplinary research, explore 'human-centered' urban-rural integration pathways, address the challenges posed by the household registration system and the equalization of public services, and carry out spatial-temporal heterogeneity analysis of fertility intentions regarding the implementation effects of the 'three-child policy'. Furthermore, it is crucial to deepen the analysis of globalization and regional differences, paying attention to new patterns of international population migration under the 'Belt and Road' initiative and the population shrinkage issues in ecologically fragile areas west of the Hu line. Strengthening gender perspectives and 'spatial justice' studies in the context of an aging society, promoting the construction of localized theoretical models (such as the 'institution-space-population' interaction framework), and enhancing the global influence of Chinese population geography are also vital. In summary, at the intersection of the 'Data Revolution' and 'Policy Transformation,' it is only by adhering to a problem-oriented approach, technological innovation, and interdisciplinary integration that we can solve complex population issues and contribute Chinese wisdom to global population governance.

REFERENCES

- [1] Lao X, Shen T, Gu H. Prospect on China's urban system by 2020: Evidence from the prediction based on internal migration network. *Sustainability*,2018,10(3):654.
- [2] Leach D. Re-evaluation of the logistic curve for human populations. *Journal of the Royal Statistical Society. Series A (General)*,1981,144(1):94-103.
- [3] Matthews S A, Yang T C. Mapping the results of local statistics: Using geographically weighted regression. *Demographic research*, 2012,26:151-166.
- [4] Ortega A A C. Mapping Manila's Mega-Urban region. *Asian Population Studies*, 2014,10(2):208-235.
- [5] Walker K E. Tools for interactive visualization of global demographic concepts in R. *Spatial Demography*,2016:1-14.
- [6] Bian X, Chen H, Cao G. Patterns of regional urbanization and its implications: An empirical study of the Yangtze River Delta region. *Geographical Research*,2013,32(12):2281-2291.
- [7] Cao G, Chen S, Liu T. Changing spatial patterns of internal migration to five major urban agglomerations in China. *Acta Geographica Sinica*,2021,76(06):1334-1349.
- [8] The population distribution and trend of urbanization pattern on two sides of Hu Huanyong population line: A tentative response to Premier Li Keqiang. *Journal of Geographical Sciences*,2016,26(11):1593-1610.
- [9] Feng Z, Li P. Review of Population Geography in the Past Century. *Progress in Geography*,2011,30(02):131-140.
- [10] Gao J, Bao J, Liu Y. Regional disparity and the influencing factors of land urbanization in China at the county level, 2000-2015. *Acta Geographica Sinica*,2018,73(12):2329-2344.
- [11] Gu H, Meng X, Shen T. Spatial variation of the determinants of China's urban floating population's settlement intention. *Acta Geographica Sinica*,2020,75(02):240-254.
- [12] Jin X. Review and Prospect of study on population geography of China. *Human Geography*,1996(S1):112-117+122.
- [13] Liu J. A review of population geography research in China. *Acta Geographica Sinica*,2014,69(08):1177-1189.
- [14] Liu R, Feng Z, Yang Y. Research on the Spatial Pattern of Population Agglomeration and Dispersion in China. *Progress in Geography*,2010,29(10):1171-1177.
- [15] Liu T, Qi Y, Cao G. China's floating population in the 21st century: Uneven landscape, influencing factors, and effects on urbanization. *Acta Geographica Sinica*,2015,70(04):567-581.
- [16] Liu Y, Tang S, Wu K. Hotspots and Prospects of Population Research in China from the Perspective of Economic Geography. *Economic Geography*,2021,41(10):97-105+142.
- [17] Liu N, Liu Q, Li G. Research progress and prospect of population migration in counties, towns and villages in China. *World Regional Studies*,2023,32(02):166-178.

- [18] Liu S, Deng Y, Hu Z. Research on Classification Methods and Spatial Patterns of the Regional Types of China's Floating Population. *Acta Geographica Sinica*,2010,65(10):1187-1197.
- [19] Liu Y, Feng J. Characteristics and impact factors of migration in China: based on the analysis of the sixth census data. *Human Geography*,2014,29(02):129-137.
- [20] Shen T, Gu H, Lao X. Demography toward space: Review, evaluation and prospect of western spatial demography research. *World Regional Studies*,2021,30(02):389-398.
- [21] Wang L, Yang Y, Feng Z. Prediction of China's population in 2020 and 2030 on county scale. *Geographical Research*,2014,33(02):310-322.
- [22] Wang J, Chen W, Yuan F. Human mobility and evolution based on social network: An empirical analysis of Yangtze River Delta. *Geographical Research*,2014,33(02):385-400.
- [23] Wu Y, Liu Y, Li Y. Spatio-temporal coupling of demographic-landscape urbanization and its driving forces in China. *Acta Geographica Sinica*,2018,73(10):1865-1879.
- [24] Xue D, Zeng X. Evaluation of China's urbanization quality and analysis of its spatial pattern transformation based on the modern life index. *Acta Geographica Sinica*,2016,71(02):194-204.
- [25] Yang C, Ning Y. Evolution of spatial pattern of inter-provincial migration and its impacts on urbanization in China. *Geographical Research*,2015,34(08):1492-1506.
- [26] Zhao Z, Han Z, Wei Y. Effect of population flow control in restraining COVID-19 in China. *Acta Geographica Sinica*,2022,77(02):426-442.
- [27] Zhu Y, Ding J, Wang G. Research progress on population geography in China in recent 40 years: Across-disciplinary perspective. *Progress in Geography*,2017,36(04):466-482.