

## **Pandemic and Population Dynamics: The Impact of COVID-19 on China's Population Structure and Migration Patterns**

**Научный руководитель – Шагенович Александр**

*Ань Эньжуй*

*Postgraduate*

Московский государственный университет имени М.В.Ломоносова, Социологический факультет, Кафедра социальных технологий, Москва, Россия

*E-mail: enrui8585@gmail.com*

Since the outbreak of the novel coronavirus (COVID-19) at the end of 2019, the socio-economic structures and population dynamics of many countries and regions around the world have undergone unprecedented changes. China, as one of the first countries to experience the outbreak, has seen significant impacts on its population structure and migration patterns. This article explores how COVID-19 has altered China's population structure and migration patterns.

### **The Impact of the Pandemic on Population Structure**

The novel coronavirus pneumonia (COVID-19) can spread rapidly through human contact and movement, making population migration a critical medium for the spread of the epidemic. Sudden, large-scale, and dispersed human migrations can transform localized outbreaks into widespread epidemics. On one hand, frequent population movements create conditions for the long-distance and large-scale spread of the virus. On the other hand, the back-and-forth activities of people between different regions greatly facilitate the full contact and transmission between potential infectees and susceptible populations. As COVID-19 can continue to spread from person to person, China implemented strict population mobility control measures to contain the spread of the epidemic, including locking down cities and provinces and restricting cross-border travel. These effective measures reduced population movement. Using big data on population movement, studies on the lockdown of Wuhan have shown its effectiveness in blocking the epidemic, significantly reducing the number of cases imported into and infections in other provinces. The results indicated that before the lockdown, the number of infected individuals was highly correlated with population movements from Hubei. Large-scale population movements are an important medium through which the epidemic rapidly spreads, and dense population migrations between cities play a significant role in promoting the outward spread of the epidemic from affected areas.

According to the preliminary summary results of China's seventh national population census, the birth population in 2020 was 12 million, an 18% decline from 2019. The significant decrease in birth population cannot overlook the COVID-19 pandemic as a crucial factor. As the most severe global pandemic in a century, the COVID-19 pandemic has not only affected human mortality levels and reduced life expectancy but also had a profound impact on fertility. Before the outbreak of COVID-19, the size of the childbearing-age female population had already begun to shrink continuously, with a low desire for childbirth, high costs of childbirth and upbringing, and structural factors such as the "three big mountains" of housing, education, and healthcare impacting fertility, leading to a decline in China's birth population and fertility level. The prolonged duration and unprecedented difficulty in responding to the COVID-19 pandemic have had a wide-ranging impact on all aspects of people's lives. The pandemic caused a global economic recession, with a sharp rise in the unemployment and poverty rates among women, and a general increase in income uncertainty and unemployment levels. Consequently, the associated risks of unemployment, income reduction, and other factors have led to a more negative attitude

towards marriage and childbirth. These factors combined have led people to delay marriage, suppress the desire for childbirth, and postpone or cancel childbirth plans, all of which will lead to changes in the birth population. China's rapid and effective control of the epidemic, with limited areas severely affected and lower levels of public panic, ensured strong support for people's lives and employment. Some studies suggest that the impact of the pandemic on fertility may be confined to certain regions. However, data shows that the pandemic's impact on China's socio-economic conditions is comprehensive. Affected by the pandemic, from February to May 2020, China's unemployment rate reached around 6%, severely impacting residents' employment and income. In the first quarter of 2020, the number of marriage registrations decreased by 45% year-on-year, with an annual decrease of 12.2%, hitting a recent low. The significant reduction in the number of marriages has led to a shrinkage in the size of the potential one-child birth population in the short term, pushing the rapid decline of the birth population in 2020 and negatively affecting the birth rate in 2021. The societal lockdown caused by the pandemic, such as the widespread closure of childcare institutions, general suspension of kindergartens, and schools, has significantly increased the burden on women, with surveys showing that more than half of the respondents reported an increase in caregiving labor during the pandemic. The exacerbated dilemma of childbirth and upbringing for women may further lower their willingness to have children.

Survey results indicate that the number of births in each month of 2016 and 2017 was higher than in 2015, showing an overall increasing trend. The rapid growth in 2016 was more pronounced in the second half of the year, while the average fertility level in 2017 was reflected across all months. Compared to this, the decline in monthly birth numbers during 2018 to 2019 was relatively mild, about 10% to 15%. However, the decline in monthly birth population in 2020 accelerated sharply, with a decrease of 20% to 30% from January to September, and due to the impact of the pandemic, the number of births in November and December decreased by more than 45% compared to the same period in 2015. This indicates that the outbreak of the pandemic at the beginning of 2020 severely suppressed people's fertility plans, leading to a significant decline in the birth population by the end of 2020.

The pandemic has accelerated the trend of population aging in China. Since the elderly are a high-risk group for COVID-19, their mortality rate during the pandemic was higher, while the fertility willingness and capacity of younger people were also affected, further exacerbating the aging problem. Aging has profound impacts on society and the economy, including the tightening of the labor market, increased pressure on the pension insurance system, and a rise in demand for medical and health resources.

### **The Impact of COVID-19 on Migration Patterns in China**

The COVID-19 pandemic has had multifaceted impacts on China's population migration patterns, affecting not only people's daily lives and work routines but also having a significant influence on long-term population migration trends. The effects of the pandemic on China's migration patterns are profound and widespread, touching upon urban-rural migration, domestic inter-provincial mobility, and international population movements. Lockdown measures and travel restrictions have notably slowed the flow of labor towards urban areas, impacting the urbanization process in the short term, while simultaneously triggering a wave of return migration as some urban workers chose to go back to their rural homes. Although this phenomenon temporarily increased the labor supply in rural areas and promoted the diversified development of the rural economy, it might alter the trend of rapid urbanization seen over the past few decades in the long term, potentially narrowing the development gap between urban and rural areas. Domestic inter-provincial mobility was also restricted due to concerns over the pandemic or to avoid quarantine, changing people's residential and employment choices towards regions closer to home or with more relaxed pandemic control measures. Additionally, international

travel restrictions and border closures have reduced the inflow of foreign populations and the opportunities for Chinese citizens to go abroad, impacting China's international migration patterns and having a minor effect on the internationalization of education and employment, as well as on future population exchanges between China and other countries.

Despite the challenges brought by the pandemic to China's migration patterns, it has also led to a series of positive effects, particularly in promoting balanced regional development, accelerating the cultivation of new economic forms, and driving innovation in social governance. As the patterns of population movement have changed, some returnees have started businesses in rural areas or participated in local industry upgrades, injecting new vitality and innovative capabilities into the rural economy, promoting digital transformation, and the rapid development of e-commerce in rural areas. This has not only increased the income of rural residents but also promoted the branding and marketing of agricultural products, narrowing the urban-rural development gap. The widespread adoption of remote work and online education during the pandemic has accelerated the development of the digital economy, fostering new business models and providing more diversified employment and learning opportunities for urban and rural residents alike. This shift in work and education models also offers new ideas for solving urban congestion and reducing environmental pollution. Furthermore, the pandemic has improved social governance capabilities and the public health system, strengthened community management and emergency response abilities, and raised public health awareness, laying a foundation for China's long-term social development and the improvement of people's welfare. In summary, while the pandemic has presented numerous challenges, it has also opened new pathways for the sustainable development of China's socio-economic landscape through promoting balanced regional economic development, accelerating technological innovation, and improving social governance.

COVID-19 has profoundly impacted China's population structure and migration patterns. These changes are not only reflected in the short-term demographic data but may also have far-reaching effects on China's social structure, economic development, and international standing. Addressing these challenges requires joint efforts from the government, society, and individuals. Through scientific pandemic control measures, flexible population policies, and proactive economic adjustments, it is possible to promote the optimization of the population structure and the healthy development of the socio-economy. Additionally, strengthening international cooperation and enhancing the emergency response capacity of the public health system are key to dealing with potential future global public health crises.

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