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## Abroad

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# The Seventh Population Census in the PRC: Results and Prospects of the Country's Demographic Development

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**Abstract**—This article is dedicated to a comprehensive analysis of the data of the Seventh Census in China, conducted in 2020 and to the identification of the most important demographic and socioeconomic trends in the development of the population of the People's Republic of China. The relevance of this study is due to the impact that demographic changes have on the world's largest economy. Given the current high level of globalization and the scale of the PRC population, any risks and threats of a demographic nature have a direct impact not only on China's security but potentially on the situation in the Asia–Pacific region and the world as a whole. The practical significance of this work for Russia is obvious, in particular, from the point of view of improving the migration policy of the Russian Federation.

This study is based on a large array of statistical data, including from the PRC National Bureau of Statistics. The quantitative and qualitative changes in the Chinese population are analyzed, including the ratio of birth-rates, mortality, natural increase and fertility, gender and age imbalances, and internal migration.

**Keywords:** PRC, census, demographic trends, transformation of human capital, demographic policy, economic development, new technologies.

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In addition to Covid-19, the most important demographic event in 2020 was the census of the People's Republic of China. Its significance is determined by the fact that China is the largest country in the world in terms of population and that the PRC government is pursuing an active demographic policy to regulate the birthrate, as well as by the growing trend of population aging in China, which is a serious social challenge and also a threat to the existing economic development model, based on a large labor force.

The rapid development of China over the past 40 years owes, in addition to effective economic reforms, to the rapid growth of the population in 1980–2000 (Fig. 1), the so-called *demographic dividend*, which contributed to a significant increase in GDP. In other words, the share of the working-age population in the country increased, while the share of young dependents (chil-

dren) decreased, and the share of older dependents (pensioners) was still low.

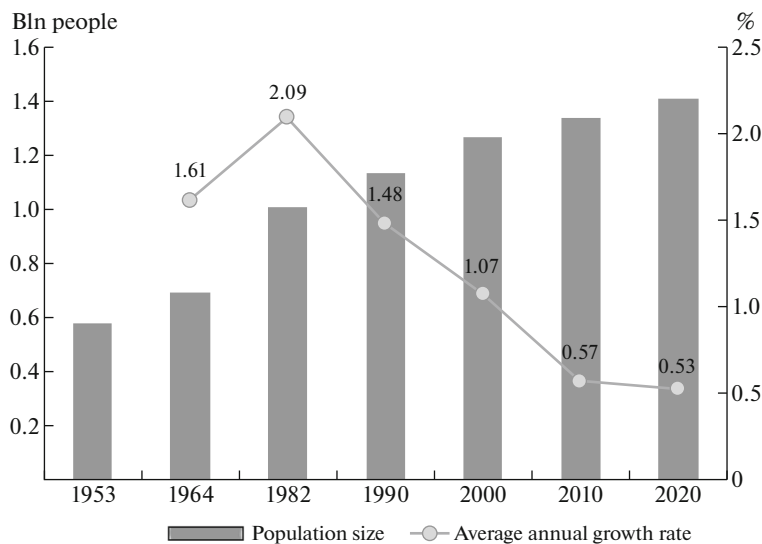
### DEMOGRAPHIC POLICY IN THE PRC

In the second half of the 20th century, socioeconomic problems in China, caused by the previous turbulent historical events and rapid population growth, were quite acute, and since the founding of the People's Republic of China in 1949, the party and state leadership has paid close attention to demographic problems. However, the birth control policy was based on political ideas and economic theories without accounting for sociodemographic factors. Population decision-making “was based on two groups of deeply intertwined ideas: ‘revolution and development’ and ‘movement, plan, market.’ These two sets of ideas are closely related to the structure of interests and the ideology of state leadership in different periods, which cannot always be explained by the theory of rational choice” [1].

The main point of family planning policy in China is as follows. In the period 1949–1970, state encouragement of the population to bear children was chaot-

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**Fig. 1.** Data from seven censuses of the PRC population: population size and average annual population growth rate, 10000 people.  
*Source:* PRC National Bureau of Statistics. <http://www.stats.gov.cn>. Cited May 20, 2021.

ically alternated with periods of birth control. By 1970, China's population began to approach 1 bln people, and in the years 1970–1976, the policy of “later, longer, fewer” was pursued, that is, the promotion of late marriages, late delivery, and fewer births. In the years 1977–1984, birth control tightened, and the “one family–one child” strategy was implemented on a consistent basis. However, the 2000 census revealed an aging trend in the population against the background of low fertility. To overcome this trend, in 2015, the policy of “two children for parents who are only children” and “two children for all” began to be implemented, which gave a short-term effect of a higher birthrate in 2016–2017.

### THE MAIN DEMOGRAPHIC RESULTS OF THE CENSUS

Since the founding of the PRC, seven population censuses have been carried out in the country. Since 1990, according to the Law On Statistics of the People's Republic of China [2] and the Regulations on the National Census [3], a national census has been carried out every ten years. The Seventh National Census of China<sup>1</sup> took place from November 1 through December 10, 2020 [4].

A feature of the latest census was the use of electronic data collection. Each of the approximately 7 million census specialists was responsible for electronic registration of an average of 250 people [5]. Although

<sup>1</sup> The census includes population data for 31 provincial level units: 23 provinces, five autonomous regions, four cities directly under the central government, and active military personnel in mainland China. The census does not include information on residents of Hong Kong, Macau, and Taiwan, or on foreign personnel residing in those territories.

according to the tradition and the announced date, the data were to be published in the last days of April 2021 [6], the census results were announced only on May 11, 2021 [7]. Considering the typical Chinese respect for protocol and symbolism, the departure from the target date obviously had certain grounds. After all, this delay attracted the attention of the international community, especially those opposed to the PRC, and served as a pretext for the emergence of conspiracy theories. According to the official version, the delay in the publication of the results was associated with “an increased volume of data in the census bulletin and, accordingly, an increase in the amount of preparatory work” [8].

Alternative versions boiled down to the following.

First, “the speed and scale of the demographic crisis in China have exceeded people's expectations, and its impact on the country will be more catastrophic” [9] than anticipated. The decrease in the growth rate of the PRC population, which was revealed by the census, may mean that in the near future the population of India, which is estimated at 1.39 bln people, will exceed the population of China [10]. This fact “will have a huge impact on how the Chinese see their country” [9]. The competitive spirit inherent in the Chinese plays an important role here.

Second, there is the opinion that the human losses in China caused by the COVID-19 epidemic significantly exceed the official data [11], and the census results could demonstrate this. This conclusion is confirmed by some Chinese sources; in particular, it was stated that “officials gave the public more optimistic data than they had access to internally” [12].

Third, overestimates of the population size “stemmed in part from the fiscal system's use of pop-

ulation figures to determine budgets, including for education and public security” [13]. According to official publications [14],

this national survey [data from the Seventh Census of the PRC—*Authors*] contains important information on the structure and distribution of the population needed to prepare the 14th Five-Year Plan in order to promote quality development and improve the situation of the population: determining future incomes, consumption, education, employment, pensions, health care, and social security; planning the construction of educational and medical institutions and service facilities for children and the elderly; distributing industrial and commercial services of retail outlets; and constructing urban and rural roads.

In addition to the census, a housing inventory was carried out, which provided the necessary information to adjust China’s housing policies; land allocation; urban planning; regional development; and other strategies, including property tax collection [15].

Thus, the recognition of the fact that the population is declining could seriously harm many economic agents in Asia’s largest economy, affecting everything, from consumption to caring for the elderly. The South China Morning Post (Hong Kong, PRC) published an article in 2019 that China’s population was being overestimated “to hide the harmful legacy of the family planning policy” [16].

The urgency of the moment is directly and indirectly confirmed by the haste of adopting a new state program to further optimize the policy in the field of childbirth. The Politburo of the CPC Central Committee held a meeting on May 31, 2021, to hear a report on the main strategies and measures to respond actively to the aging of the population during the 14th Five-Year Plan period and to consider the “Decision on Optimizing Fertility Policies to Promote Long-Term and Balanced Development of the Population,” where measures of state support were announced for families with children and the “three children” policy was introduced [17]. However, experts doubt that these political changes will increase the birthrate in China, as “only a relatively small number of people actually want to have a third child. The reasons include the high cost of childcare and limited career opportunities for women” [18].

Since the publication of the data of the Seventh National Census, numerous statistical reviews have been published both in the PRC and abroad. Let us dwell on the analysis of key indicators. Although some experts believe that “most Chinese statistics are ... man-made” [19], in our opinion, from the standpoint of structural changes, the published data make it possible to identify the main trends.

Since 2010, the total population of the PRC has increased by 72.06 mln people (+ 5.38%) [7] (Table 1). Government statistics confirm a steady downward trend in population growth since at least 1982:

- The average annual population growth in 2010–2020 amounted to 0.53 ‰ (1.61 ‰ in 1964); the maximum increase was observed in the period 1964–1982 at 2.02 ‰; the decline in population growth in the PRC for the period from 1982 to 2020 amounted to about 74%.

- The total fertility rate (the ratio of the number of live births and the number of deaths during a calendar year to the average annual population) in 1953–2020 shows multidirectional dynamics. At the end of 2020, it amounted to 8.5 ‰, and compared with the maximum value—39.14 ‰ (1964)—it decreased by almost 4.6 times.

- The number of newborns decreased 2.23 times—from 27.21 mln in 1964 to 12 mln in 2020. A stable downward trend in this indicator has been observed since 1990.

- The total fertility rate (the number of live births in relation to the number of women of reproductive age) in 2020 is the lowest in the entire history of the PRC, 1.3 ‰ (6.05 ‰ in 1953, 6.18 ‰ in 1964). It does not ensure simple reproduction of the population, that is, the replacement of the parental generation by children.

- In the population of the PRC, there is still a predominance of men—51.24% at the end of 2020 (51.82% in 1953), women making up 48.76%. Given the scale of the population of the Celestial Empire, the difference of 2.48% in absolute terms reaches 34.9 mln people, meaning men who cannot start a family. The manifestations of the tertiary gender imbalance persist: the coefficient for 2020 is 1.05 ‰ (1.07 ‰ in 2000); the coefficient of secondary gender imbalance is slightly higher, 1.11 ‰ (1.16 ‰ in 2020).<sup>2</sup>

- The average household size is 2.62 people (4.44 in 1964, 4.41 in 1982); during the systematic state control of the population (from 1978 to the present day), the average family size in China has decreased by about 59%.

The data in Table 1 reflect not only significant quantitative changes in the population of the PRC. The main trends in the qualitative change in human resources in the future will determine the further direction of the state’s development. The age structure and level of education of the population are changing significantly:

- The share of the country’s residents 0–14 years of age decreased by more than 2.5 times, from 40.69%

<sup>2</sup> The sex ratio at the moment of conception is called the primary ratio; at the moment of birth, secondary; and upon reaching maturity, tertiary. Secondary and tertiary gender imbalances mean a violation of the sex and age structure of society, respectively, at the moment of birth and upon reaching maturity.

**Table 1.** PRC censuses data

Sequential number of census Indicators	No. 1 1953	No. 2 1964	No. 3 1982	No. 4 1990	No. 5 2000	No. 6 2010	No. 7 2020
Population of the country, mln people, including mainland China	602	720	1032	1160	1295	1371	1443
	595	695	1008	1134	1266	1340	1412
Average annual growth period, %	—	1.61	2.09	1.48	1.07	0.57	0.53
Fertility rate, %	37	39.14	20.05	15.62	7.72	11.9	8.5
Number of newborns, mln people	21.26	27.21	22.29	23.73	17.64	15.88	12
General fertility rate, %	6.05	6.18	2.86	2.31	1.22	1.44	1.3
Share of male population, %	51.82	51.45	51.50	51.52	51.63	51.27	51.24
Gender balance, tertiary, %	1.08	1.06	1.05	1.06	1.07	1.05	1.05
Gender balance, secondary, %	*	1.07	1.06	1.10	1.16	1.18	1.11
Average household size, people	4.33	4.43	4.41	3.96	3.44	3.10	2.62
Share of population aged 0–14, %	36.27	40.69	33.60	27.70	22.89	16.60	17.95
Share of population aged 15–59, %	56.41	53.51	59	63.50	70.15	70.14	63.35
Proportion of population aged 60 years, %, incl. >65 years, %	7.32	6.08	7.4	8.81	10.33	13.26	18.7
Average life expectancy, years	55.8	*	67.84	68.55	71.40	74.83	77
men	*	*	*	66.84	69.63	72.38	73.64
women	*	*	*	70.47	73.33	77.37	79.43
Mortality rate, %	14	11.5	6.6	6.67	6.45	7.11	7.07
Population with higher education, mln people	*	2.88	4.41	16.16	45.71	119.60	218.36
Share in total, %	*	0.4	0.44	1.6	3.6	8.93	15.5
Share of the illiterate population, %	80	38.10	23.5	15.88	6.72	4.08	2.67
Average duration of study, years	*	*	*	*	*	9.08	9.91
Share of titular Han nation, %	98.94	98.22	97.30	91.96	91.59	91.51	91.11
Share of urban population, %	13.31	18.37	21.13	26.41	36.22	50.00	63.89
Share of migrant population, %	*	*	0.66	1.89	10	19.40	26.60
Territorial distribution of population, %							
Northeast	7	*	*	*	*	8.18	6.98
Western China	30	*	*	*	*	26.90	27.12
East China	35	28*	*	*	*	37.78	39.93
Central China		*	*	*	*	26.62	25.83

Sources: Compiled by the authors based on <http://www.stats.gov.cn>, <https://www.docin.com>, <http://www.chinabgao.com>.

in 1964 (maximum value) to 16.60% in 2010 [20]. In 2020, this indicator was 17.95% (+1.35%). The share of the working-age population 15–59 years of age has been steadily declining since 2000, and in 2020 it was 63.35% (–6.79% compared to 2010). The share of the population 60 years of age or older increased to 18.70% (+5.44% compared to 2010).

• There is an increase in average life expectancy—from 55.8 years in 1953 to 77 years in 2020 (73.64 years for men, 79.43 years for women), which indicates an improvement in the quality of life and medical care. However, note that life expectancy in China is highly differentiated by region due to differences in living conditions in urban and rural areas and in coastal and

inland provinces. The relative isolation of rural areas, persistent poverty, and low levels of public infrastructure and spending have led to obvious disparities: the difference in life expectancy between the developed and the poorest provinces reaches 13 years [21]. Shanghai, Beijing, and Zhejiang have low mortality rates even by high-income country standards, while Tibet, Guizhou, and Xinjiang have mortality rates similar to those in low-income Southeast Asian countries [22].

- The level of education of the PRC population has noticeably increased: the proportion of the illiterate decreased from 80% (1953) to 2.67% (2020), and the proportion of the population with higher education increased from 0.4% (1964) to 15.5% (2020). This was facilitated by an increase in investment in education after the 18th CPC Congress (2012). On average, the Chinese devote about 9.91 years to education.

Demographic studies show that in the years 2021–2030 the absolute and relative indicators of the size of the working-age population will continue to decline at a rapid pace, the demographic load ratio will grow, and the demographic dividend will gradually disappear [23]. Supposedly, against the background of an increase in the level of education of the population, “the demographic dividend will gradually turn into a dividend of talents ... which will further transform the model of economic development” [24].

The ethnic composition and distribution of the population across the country are also undergoing changes. The shares of the titular Han Chinese nation and ethnic minorities in 2020 amounted to 91.11% (– 0.4% to 2010) and 8.89%, respectively. The upward trend in the number of ethnic minorities has remained stable since 1953, when the Han Chinese were 98.94%. The increase in the share of ethnic minorities in the population is explained not only by the preservation of the traditional family structure among them and the low level of urbanization in their places of residence but, above all, by the fact that during the years of the implementation of the birth control policy, the corresponding measures in relation to ethnic minorities were softer: they were allowed to have more children in the family than Han people. That is why the highest average annual population growth is observed in regions with a traditionally low share of the titular nation—in the Xinjiang Uygur Autonomous Region (XUAR) and Tibet—18.5% and 21.5%, respectively.

China is traditionally characterized by an uneven distribution of the population by region. According to the 2020 census, the eastern region accounts for 39.93% of the population; the central region, 25.83%; the western region, 27.12%; and the northeastern region, 6.98%. Compared to 2010 [20], the share of the population in the eastern region increased by 2.15%; in the central region, by 0.79%; in the western region, by 0.22%; and in the northeastern region, by 1.20%. Over the past ten years, the largest population

decline has occurred in three northeastern provinces: in Liaoning, by 1.15 mln people; in Jilin, by 3.37 mln; and in Heilongjiang, by 6.46 mln [7]. This trend is explained by three reasons: climatic features, economic recession in the respective territories, and the associated migration of the population (especially young people). At present, the population is concentrated in economically developed regions and urban agglomerations. The largest average annual growth due to internal migration was recorded in Guangdong and Zhejiang—19.6 and 20.8%, respectively.

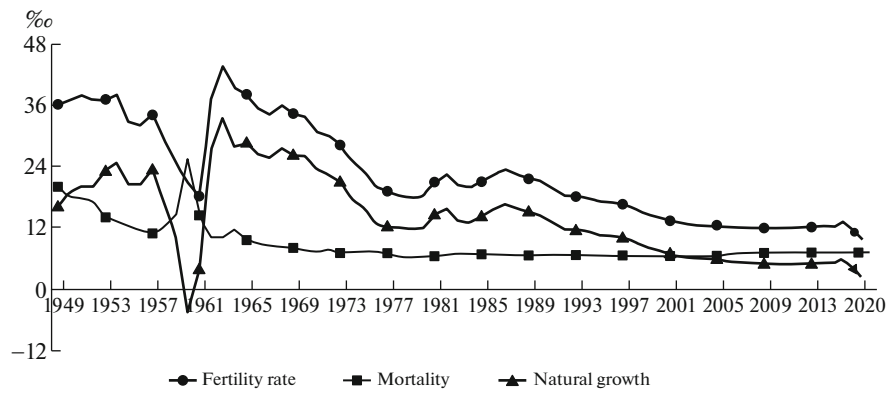
Urbanization plays a significant role in the demographic development of China. The share of the urban population has grown over the last decade to 63.89% (+ 14.21%); respectively, the share of the rural population has decreased to 36.11% (see Table 1). In the period 1953–1990, urban population growth was 2.76–5.11% between censuses. Since 1990, the rate of urbanization has accelerated, every ten years the share of the urban population increasing by 9.81–13.89%.

Internal labor migration has become a noticeable phenomenon and feature of the demographic situation in the PRC. According to the results of the 1982 and 1990 censuses, indicators of internal migration did not exceed 0.66–1.89% of the population, while in 1990–2020 the number of people who left their place of permanent residence increased by 14 times. Since 2010, the indicator has grown by 69.73%. In other words, more than a quarter of the country’s population (375.82 mln people) do not live where their household is registered and do not have the status of a local household in the hukou system [25] (a system of social control in China, which ties each resident to his/her birthplace, as well as access to health care, pensions, local educational resources for children, social security programs, etc.). The significant proportion of the moving population is a significant social and economic challenge for the PRC.

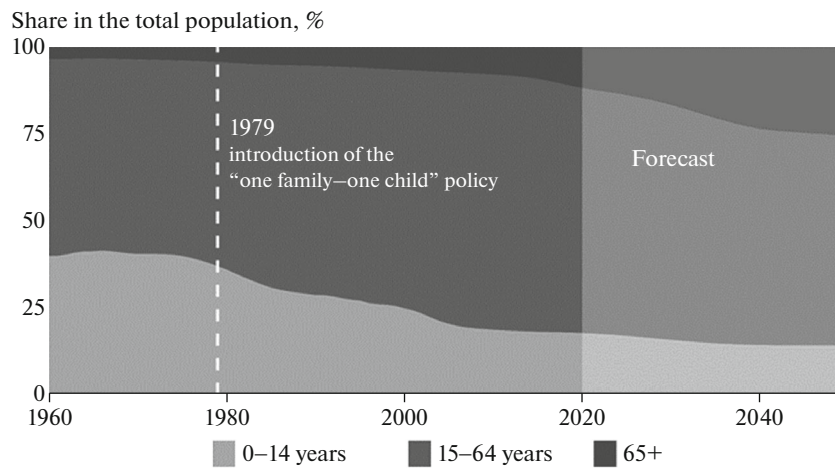
## THE AGING OF THE POPULATION OF CHINA: DEVELOPMENT OF THE THEME

Over the period of the active population control policy (since 1978) in the PRC, a demographic transition has occurred from the traditional to the modern type of population reproduction, which is characterized by low mortality, fertility, and natural growth rates. On the one hand, favorable conditions were created for the subsequent socioeconomic development; on the other, new demographic problems arose, one of which was the aging of the population [26].

Fertility rates in China have been declining for several years in a row (Fig. 2). In 2016, the authorities, worried about the aging of the population, canceled the one-family–one-child policy, which had been in force since 1978, and allowed Chinese people to have two children. This measure provided a jump in fertility (+7.9% in 2016, fertility rate 12.95 ‰), but then the



**Fig. 2.** Fertility, mortality, and natural population growth rates of the PRC in 1949–2020, ‰. *Source:* PRC National Bureau of Statistics. <http://www.stats.gov.cn>. Cited June 10, 2021.



**Fig. 3.** Dynamics of the population shares by age groups of the PRC in 1960–2020 and forecast up to 2050, %. *Source:* World Bank. <https://www.worldbank.org/>. Cited June 11, 2021.

curve turned down again (−0.7% in 2017). In 2019, the number of births was 14.65 mln (−580 000 compared to 2018) [27]; the birthrate was 10.48‰ (−0.46‰ compared to 2018).

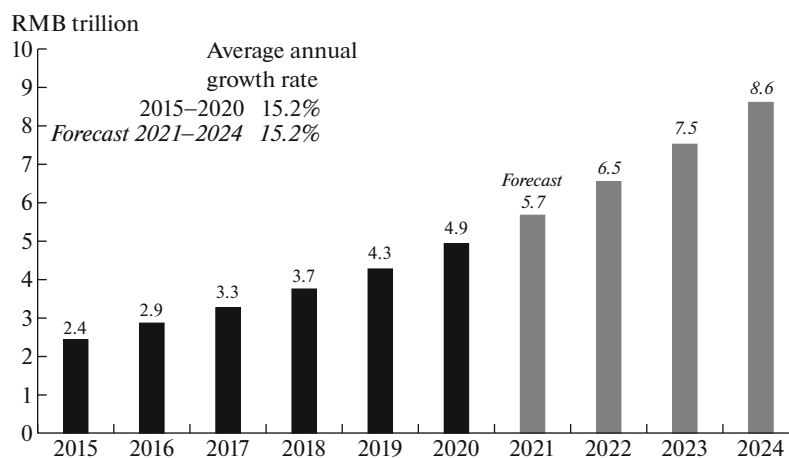
The situation has deteriorated sharply since the Covid-19 epidemic. In 2020, the number of births fell to 12 mln (−18% compared to 2019), and the total fertility rate fell to an extremely low level of 1.3. Fertility monitoring data from the National Health Commission [28] showed that the epidemic is more severely affecting young people. In 2020, the number of births to women under the age of 30 decreased by 23.6% compared to the previous year. The number of first and second births in this age group decreased by 22% and 26%, respectively [29].

As was noted above, the Seventh Census confirmed the trend of population aging: the age of 60–65 was reached by 73.64 mln people (+0.3% compared to 2010), and 65 years and older, by 190.64 mln, which is 13.50% of the country’s population (+4.63% to 2010)

[20]. A decrease in the birth rate and an increase in the number of elderly people may result in imbalances in the labor market and a shortage of labor supply (Fig. 3). According to forecasts, by 2030 the ratio of children, working-age population, and the elderly in urban agglomerations will be 14 : 67 : 18, and by 2035, 20 : 60 : 20.

The problem of population aging has become especially acute and is getting worse in northeastern, central, and eastern China. The provinces of Heilongjiang, Jilin, and Liaoning in the northeast are among the top three in terms of aging and population decline. The decline in the population in the northeast is influenced by many factors, such as an unfavorable natural environment, low birthrates, and economic and social underdevelopment. The current situation inevitably gives rise to a number of acute socioeconomic problems.

First, the decline in the share of the working-age population has a strong impact on the competitive advantages of China’s labor-intensive industries and



**Fig. 4.** The volume of the “silver hair” consumer market in China, 2015–2019 (forecast until 2024). *Source:* Review of economic analysis of Chinese Silver Hair Market in 2020.

[http://pg.jrj.com.cn/acc/Res/CN\\_RES/INDUS/2020/10/23/5ab57abc-ffce-4065-bdf1-3210158e33dd.pdf](http://pg.jrj.com.cn/acc/Res/CN_RES/INDUS/2020/10/23/5ab57abc-ffce-4065-bdf1-3210158e33dd.pdf). Cited May 20, 2021.

agriculture. The decline and aging of the rural population lead to massive abandonment of agricultural activities, which can seriously affect the food security of the country [30]. There has already been a decrease in consumption, which entails a reduction in industrial production at enterprises and, hence, in employment. At the same time, we observe an ineffective use of public infrastructure; an excess of production capacity; a large number of bankruptcies and layoffs of workers; and a falling demand for labor, the size of which is declining. Chinese experts state: “We are facing an unusually simple truth. The next generation is smaller than the previous generation → the total population will inevitably decrease → consumption will inevitably decrease → the economy will inevitably shrink → the national power will inevitably decrease. China falls directly into the trap of ultralow fertility” [31].

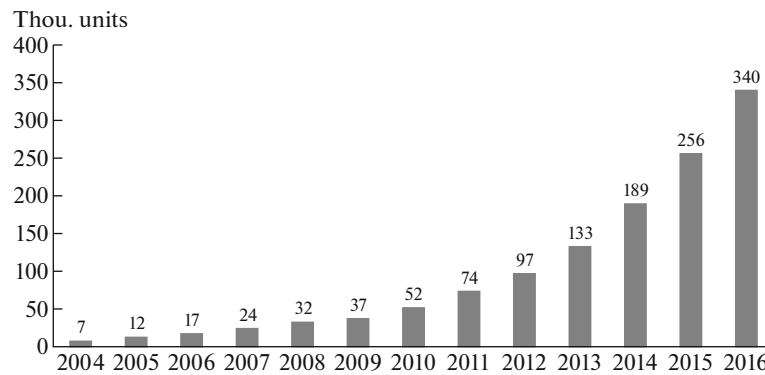
Second, the retirement burden is growing: providing for the increasing number of elderly people is becoming a heavy burden for the employed population. Over the past 30 years, the dependency ratio of the elderly population in China has increased from less than 9% to 17.8%, that is, for every 100 people of working age, there are now about 17.8 pensioners [32]. According to the National Development Research Institute of Peking University, if China does not raise the retirement age by 2050, the younger generation will have to spend 41% of their income on supporting the elderly [33].

Third, gender imbalance remains a serious problem. Traditionally, sons take care of the older generation, while girls, getting married, become members of another family. In the context of the strict policy of restricting the birthrate, families gave preference to boys. It became a common practice to carry out abortions when a woman was found to be pregnant with a girl. The result was the aforementioned gender imbalance, not to mention the moral aspect of this problem.

To prevent such an inhuman practice in the PRC, they began to impose bans on ultrasound examinations on determining the sex of the unborn child.

The upward trend in the average age of the population is a problem typical of not only Chinese society. Economically developed countries have faced it for a long time. In the PRC, however, the deformation of the age composition of the population had occurred long before the country approached the economic indicators of the developed countries owing to the success of the birth control policy. With their inherent pragmatism, the Chinese tend to view the demographic imbalance not only as a challenge but also as a kind of opportunity. Business models have begun to emerge that offer products and services for the elderly, stimulating and reshaping the consumer market. This phenomenon is called the *silver economy*, *silver hair economy*, and *elderly economy*. Population aging in China has become a long-term investment program [34]. Entrepreneurs are encouraged to focus on investment opportunities generated by an aging society, including health preservation, medical equipment, pension funding, innovative products [35], and services aimed at the elderly. The market size of the “silver hair economy” is estimated by Chinese experts at trillions of yuan (Fig. 4).

China’s leadership provides all-round support to the industry aimed at older people: a number of decrees in this area have been issued; appropriate policies are being developed and implemented [36]; and the pension system, which supports the development of the silver economy, is becoming more comprehensive. According to experts, “from the point of view of the global response to population aging, technological progress will be a decisive factor” [37]. A new round of technological revolution and industrial transformation is gaining momentum, diversifying and improving services for the care of the elderly and developing tech-



**Fig. 5.** Park of industrial robots in China, thou. units. *Source:* China has rapidly become a global leader in automation. <https://ifr.org/news/robots-china-breaks-historic-records-in-automation/>. Cited May 21, 2021.

nological innovations in the field of aging: mobile internet, large databases, artificial intelligence, medical sensors, etc., combined with the concepts of *healthy aging* and *active aging*.

#### EMPLOYMENT TECHNOLOGIES IN CHINA

The Made in China–2025 strategic plan declares smart manufacturing as a top priority “to overcome the challenges of growing international competition and slow down the growth rate of the domestic economy” [38]. Anticipating the difficulties associated with the aging of the population, China is developing modern technologies [39] that will provide it with economic growth under the shrinking working-age population, following the example of the most economically developed countries, where a new system of productive forces is already taking shape, in which demand for labor is much lower than under the industrial type of production [40]. New technologies not only save labor; they are indispensable in a number of cases, such as in modern electronics. Similar trends are observed in other areas of the economy. These include the further mechanization of agriculture, the use of large complexes for the transshipment of large volumes of rock in the mining industry, cars without drivers, automated warehouses, automated ports, the use of robots in the service sector, etc. This is a global trend, and in order to compete successfully in the world market with firms from developed countries, China is already using modern technologies and the newest materials.

The displacement of human labor from the sphere of material production affects all sectors of the economy [41], but robotics, especially industrial robots, occupies a special place in this complex of technologies (Fig. 5). Since 2013, the PRC has been the world’s largest market for industrial robots, accounting for 38% of the global volume of robotization in 2017–2018. According to the International Federation of

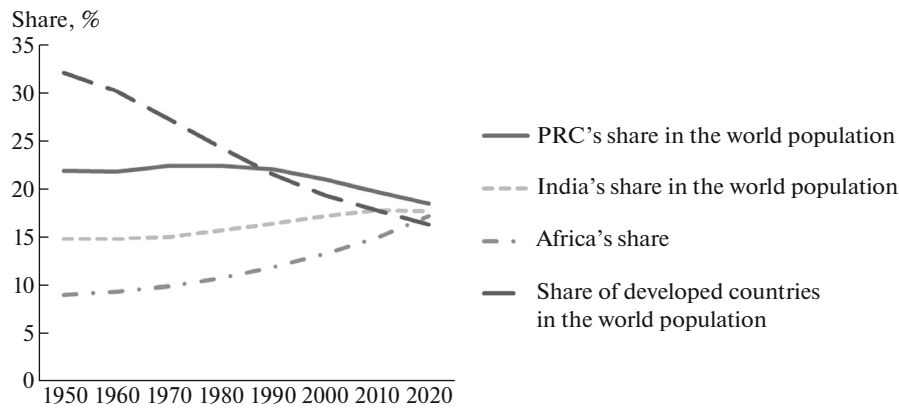
Robotics (IFR), 140 500 robotic devices were installed in factories across the country in 2019, which is 9% less than in 2018 [42] but exceeds the total number of robots installed in Europe and America.

China is rapidly becoming one of the world leaders in industrial automation [43]. The electrical, electronic, and automotive industries are the main consumers of robots, about a third of which are made in China itself [44], and the rest are imported from Japan, the Republic of Korea, European countries, and the United States. Local producers are increasing their supplies twice as fast as foreign ones. China accounts for a quarter of world sales of industrial robots for the automotive industry [45]. In addition to these industries, other industries are also stepping up the installation of robots and other labor-saving equipment to increase production in the growing Chinese market. The transformations taking place against the background of COVID-19 further stimulate this process [46].

China is investing heavily in the development of modern labor-saving technologies in the service sector, public transport, catering, hospitality, cleaning, medical equipment, the use of service robots for serving the elderly, home robots, express delivery, etc. Medical services, including distance medicine, which is being developed through the WeDoctor firm, occupy a special place in the context of the aging population. The above-mentioned company provides health-care support services to more than 2700 hospitals, 240 000 doctors, and 160 mln users of the company’s electronic platform in China [47]. Another direction of introducing new technologies in health care in the PRC is the personification of medical services through electronic services with the provision of high-quality medical care by remote access [48].

Accession to the WTO in 2001 limited and weakened the impact of central planning on the economy, but it is still significant. Obviously, the focus on the introduction of modern labor-saving technologies in





**Fig. 6.** Shares of China, India, Africa, and developed countries in the world population in 1950–2020. *Source:* constructed by the authors according to the UN forecast *World Population Prospects 2019*. File POP/1-1: Total population (both sexes combined) by region, subregion, and country, annually for 1950–2100 (thousands). Estimates, 1950–2020. <https://population.un.org/wpp/Download/Standard/Population/>. Cited May 20, 2021.

the PRC is caused not by the game of market forces but by the decision at the state level [49] to stake on strengthening international competitiveness, even considering the risk of rising unemployment. The automation, intelligence, and digitalization of the manufacturing process have become a leading trend in the modernization of the Chinese manufacturing industry. The government is vigorously promoting R&D in the robotics industry.

Artificial intelligence and related technologies are expected to replace about 26% of existing jobs in China within 20 years. However, at the same time, new technologies can create about 90 mln new jobs, while increasing productivity and real incomes [46].

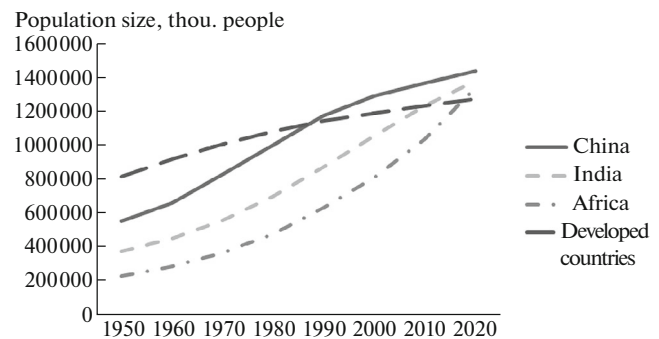
### CHINA IN THE WORLD POPULATION

Currently, there are four large countries and groups of countries with a population of about 1 bln people. Together, they make up about 70% of the world's population. These are China, India, developed countries, and African countries. China was and remains the largest country in terms of population, but this situation is changing (Fig. 6). While from 1950 to 1970 its share in the world population grew and in the period before 1980 stabilized, in recent decades it has been steadily declining. This indicates the effectiveness of the policy of limiting the birthrate, which was pursued for a number of years; the completion of the demographic transition from high birth and mortality rates to low ones; and the success of the policy of industrialization, modernization, and urbanization.

China's success was not predetermined. The example of India shows that slow socioeconomic development combined with a soft demographic policy to reduce the birthrate leads to population growth and to the persistence of economic backwardness. In African countries, against the background of the practical

absence of birth control policies and economic lagging behind, there is an explosive growth in population and an increase in poverty. The number of inhabitants of developed countries is growing slowly, and in some European countries it is even decreasing; as a result, the share of developed countries in the world population is decreasing (Fig. 7). The dynamics of the population size of the PRC by the nature of changes in recent years is approaching that observed in developed countries. It is a quest for stabilization as opposed to growth in India and especially Africa.

It is important to emphasize that China has ceased to be a world demographic problem associated with rapid population growth against the background of the planet's finite natural resources [50, 51]. The Eastern giant has shown a successful example of the rapid, in terms of historical timing, transformation of a large



**Fig. 7.** Population dynamics of the PRC, India, and developed countries, 1950–2020. *Source:* compiled by the authors based on *World Population Prospects 2019*. File POP/1-1: Total population (both sexes combined) by region, subregion, and country, annually for 1950–2100 (thousands). Estimates, 1950–2020. <https://population.un.org/wpp/Download/Standard/Population/>. Cited May 20, 2021.

**Table 2.** The main indicators of the reproduction of the PRC population in comparison with groups of countries by income level, 2015–2020

	Total fertility rate	Average life expectancy
High incomes	1.67	80.9
Average incomes	2.35	71.4
Low incomes	4.52	63.4
PRC	1.69	76.6

*Sources:* Compiled by the authors based on World Population Prospects 2019. File MORT/7-1: Life expectancy at birth (both sexes combined) by region, subregion, and country, 1950–2100 (years). Estimates, 1950–2020. <https://population.un.org/wpp/Download/Standard/Mortality/>. World Population Prospects 2019. File FERT/4: Total fertility by region, subregion, and country, 1950–2100 (live births per woman). Estimates, 1950–2020. <https://population.un.org/wpp/Download/Standard/Fertility/>.

backward country with a huge population into the category of developed countries with a stable population and advanced production potential [52].

The Seventh Census in the PRC made it possible to identify and confirm the main trends in the country's demographic development. The population is getting older, but its qualitative characteristics are improving (Table 2): the average life expectancy is growing, and the proportion of people with higher and secondary specialized education is increasing, supporting economic growth while the number of workers is shrinking. The demographic dividend, in part thanks to which China has become a leader of the global economy, is gradually being offset by the aging population, huge environmental pressures, and resource allocation problems.

#### CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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