

An Empirical Analysis on the Adequacy and Balance of the Number of Teachers in Ordinary Primary School in China

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Abstract—The balanced development of education is a hot issue in today's society. Teacher resources are the most important factors affecting education equity. As the starting point of compulsory education, primary education plays a vital role in the growth and development of students. In recent years, China has carried out many positive explorations in narrowing the urban-rural gap in the allocation of teacher resources in primary schools, and has achieved many results. However, the uneven distribution of teacher resources for urban and rural compulsory education is still relatively obvious. In order to ensure the number of primary school teachers and promote the rational allocation of teacher resources for primary school, it is recommended to scientifically predict the needs of teachers according to the population, implement rural policy inclination, enhance teacher training, improve rural primary school infrastructure construction, improve the urban and rural primary school teacher exchange system, and stabilize rural primary school teachers.

Keywords—primary school teachers; urban-rural differences; educational balance; number of teachers

I. INTRODUCTION

As the first stage to achieve compulsory education, primary schools have played a huge role in improving the quality of Chinese citizens. However, compared with the primary school stage, many teachers and parents pay more attention to secondary and higher education, and the wages and treatments of teachers in middle and higher education are relatively high. Therefore, many primary school teachers will flow into China's secondary and higher education.

Therefore, it is an important issue to study whether the number of primary school teachers is sufficient.

In recent years, China has issued a series of policies to support the development of rural education, but there is still a certain gap between rural teacher resources and that of cities. In terms of quantity and quality, the city is obviously superior to the rural areas. Under such circumstances, the rural teacher resources are still flowing to the urban area, which leads to the shortage of rural teachers. How to promote the fairness of teachers in urban and rural areas has also become a hot topic. This paper attempts to analyze the urban-rural differences in the number of teachers in ordinary primary schools in China in the past 10 years, including the total number of teaching and administrative staff, teacher-student ratio, the number of full-time teachers and other types of teachers, and the changes in the types of teachers in primary schools in China over the past 10 years. At the same time, it also makes overall analysis of the difference in the number of primary school teachers in urban and rural areas and the adequacy of primary school teachers, and puts forward corresponding Suggestions.

II. THE TREND OF THE NUMBER OF TEACHERS AND STUDENTS IN URBAN AND RURAL ORDINARY PRIMARY SCHOOLS IN CHINA IN THE PAST TEN YEARS

A. Changes in the Total Number of Teaching and Administrative Staff in Primary School

1) The total number of teaching and administrative staff in primary school in China is fluctuating:

TABLE I. CHANGES IN THE NUMBER OF TEACHING AND ADMINISTRATIVE STAFF IN PRIMARY SCHOOLS IN CHINA FROM 2007 TO 2016

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| The number of teaching and administrative staff | 6133815 | 6132903 | 6135536 | 6109847 | 5584868 | 5538481 | 5494877 | 5488941 | 5489441 | 5537298 |
| Growth rate over that in the last year (%) | | -0.01 | 0.04 | -0.4 | -8.6 | -0.8 | -0.8 | -0.1 | 0.009 | 0.9 |

As shown in "Table I", the total number of teaching and administrative staff in primary school in China showed a downward trend in 2007-2016. In the past 10 years, the total

number of teaching and administrative staff in China's primary schools has decreased by about 600,000. Among them, the descend rate was the fastest in 2011, which was

about 52 fewer than the total number of teaching and administrative staff in 2010.

2) *The total number of teaching and administrative staff in rural primary schools in China is decreasing year by year:*

TABLE II. CHANGES IN THE NUMBER OF TEACHING AND ADMINISTRATIVE STAFF IN RURAL PRIMARY SCHOOLS IN CHINA FROM 2007 TO 2016

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| The number of teaching and administrative staff | 3641176 | 3568519 | 3521819 | 3407066 | 2442642 | 2297533 | 2188960 | 2097070 | 2011542 | 1941070 |
| Growth rate over that in the last year (%) | / | -2 | -1.3 | -3.3 | -28.3 | -5.9 | -4.7 | -4.2 | -4.1 | -3.5 |

As shown in "Table II", the number of teaching and administrative staff in rural primary schools in China dropped rapidly, with a decrease of about 1.7 million in 10 years. From 2008 to 2011, the rate of descend gradually increased, and the rate of descend gradually slowed from 2011 to 2016. The descend rate was the fastest in 2011.

Compared with the total number of rural primary school teachers in 2010, the descend rate reached 28.3%, and the total number decreased by about 960,000.

3) *The number of teaching and administrative staff in China's counties and towns is increasing year by year:*

TABLE III. CHANGES IN THE NUMBER OF TEACHING AND ADMINISTRATIVE STAFF IN PRIMARY SCHOOLS IN COUNTIES AND TOWNS IN CHINA FROM 2007 TO 2016

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| The number of teaching and administrative staff | 1461550 | 1508949 | 1564486 | 1637381 | 1795275 | 1858932 | 1892651 | 1911229 | 1957270 | 1987372 |
| Growth rate over that in the last year (%) | / | 3.2 | 3.7 | 4.7 | 9.6 | 3.5 | 1.8 | 0.98 | 2.4 | 1.5 |

As shown in "Table III", the total number of teaching and administrative staff in China's counties and towns increased year by year in 2007-2016, with a total increase of about 530,000. Among them, the growth rate reached the maximum in 2011, and the growth rate reached the minimum

in 2014. In 2011, the growth rate was 9.6% compared with that of the previous year, an increase of 157,894 people.

4) *The number of teaching and administrative staff in China's urban primary schools is growing rapidly:*

TABLE IV. CHANGES IN THE NUMBER OF TEACHING AND ADMINISTRATIVE STAFF IN URBAN PRIMARY SCHOOLS IN CHINA FROM 2007 TO 2016

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| The number of teaching and administrative staff | 1031089 | 1055435 | 1049231 | 1065400 | 1346951 | 1382016 | 1413266 | 1480642 | 1520629 | 1608856 |
| Growth rate over that in the last year (%) | / | 2.4 | -0.59 | 1.5 | 26.4 | 2.6 | 2.3 | 4.8 | 2.7 | 5.8 |

As shown in "Table IV", the number of teaching and administrative staff in urban primary schools in China showed a rapid growth trend from 2007 to 2016. In 2009, the total number of teaching and administrative staff showed a negative growth, a decrease of 6,204 people. In 2011, the growth rate was the fastest, with a growth rate of 26.4% compared with that of the previous year, a total increase of about 580,000 people.

B. Comparison of the Changes in the Number of Different Types of Teachers in Primary Schools

The number of different teachers in primary schools declined generally from 2007 to 2016, with the largest number of full-time teachers.

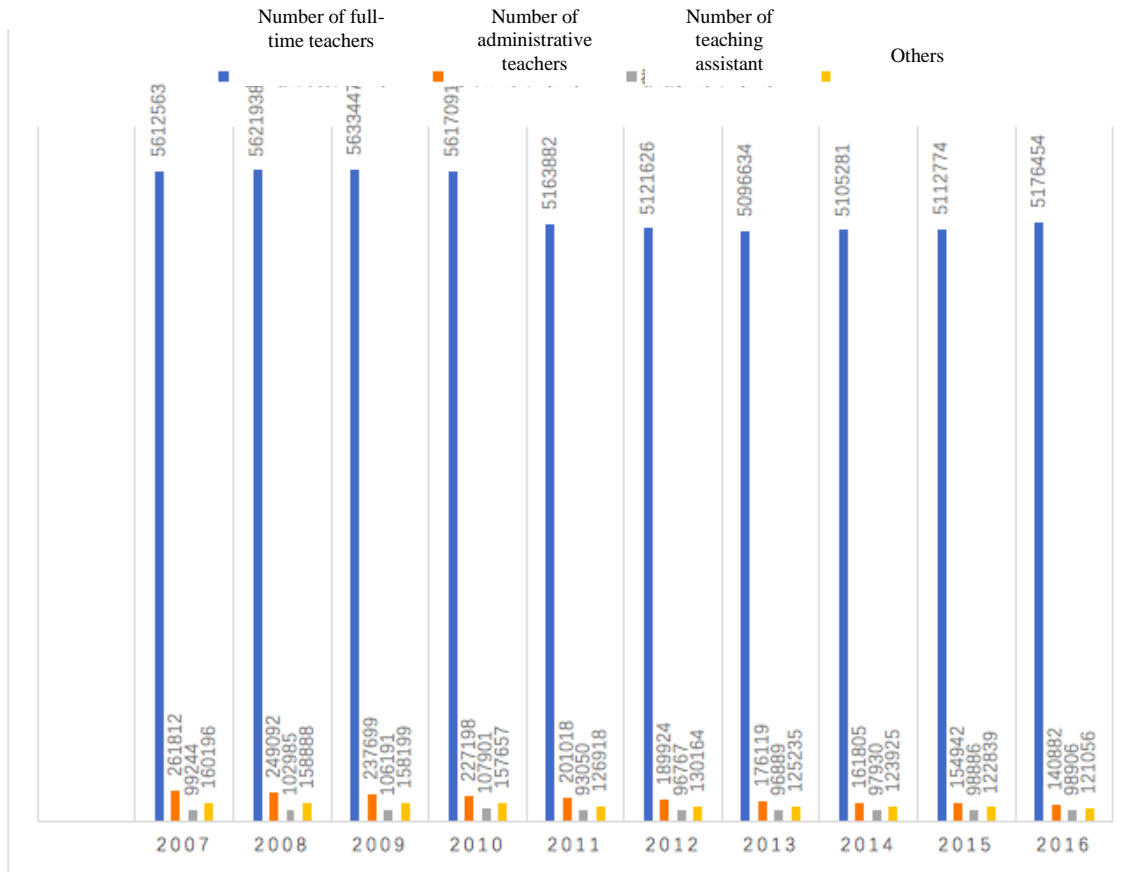


Fig. 1. Changes in the number of different teachers of primary schools from 2007-2016.

As shown in "Fig. 1", the number of full-time teachers, administrators, teaching assistants, and other personnel in China's primary schools generally declined in 2007-2016, with 436,109, 120,930, 338, and 39,140 people reduced. Among them, the number of full-time teachers is the largest, and the total number of teaching assistants is the least.

In 2007-2016, the number of full-time teachers in rural primary schools in China has declined rapidly; the number of full-time teachers in cities and counties has grown steadily; and the gap between the ratio of full-time teachers to the total number of teaching and administrative staff in urban and rural areas has gradually decreased.

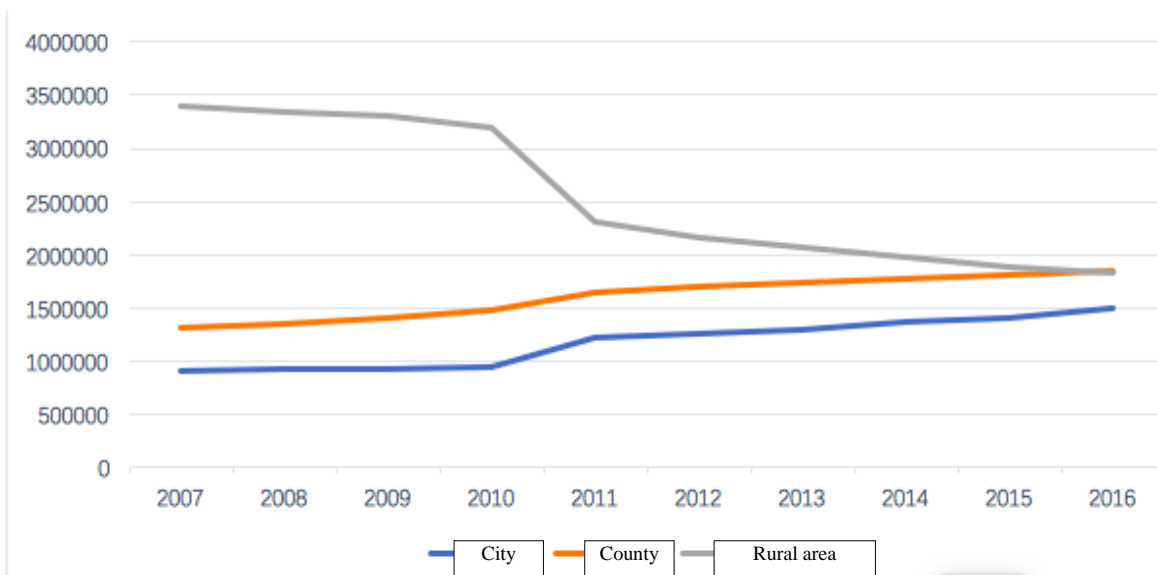


Fig. 2. Comparison of the full-time teachers of primary schools in rural and urban areas in China from 2007-2016.

TABLE V. COMPARISON OF THE RATIO THE NUMBER OF FULL-TIME TEACHERS TO THE TOTAL NUMBER OF TEACHERS IN PRIMARY SCHOOLS IN URBAN AND RURAL AREAS OF CHINA FROM 2007 TO 2016

| Year | City | County | Rural area |
|------|------|--------|------------|
| 2007 | 88% | 90% | 93% |
| 2008 | 88% | 90% | 94% |
| 2009 | 89% | 90% | 94% |
| 2010 | 89% | 90% | 94% |
| 2011 | 90% | 92% | 94% |
| 2012 | 91% | 92% | 94% |
| 2013 | 92% | 92% | 94% |
| 2014 | 92% | 92% | 94% |
| 2015 | 93% | 93% | 94% |
| 2016 | 93% | 93% | 94% |

As shown in "Fig. 2", the number of full-time teachers in rural primary schools in China dropped sharply from 2007 to 2016, with the fastest decline in 2010-2011, a decrease of 269,407 people. The number of full-time teachers in counties

and urban primary schools has steadily increased, with an increase of 541,561 and 593,428 people in 10 years. Before 2015, the number of full-time teachers in primary schools in China has always showed that rural areas > counties > cities. In 2016, the number of full-time teachers of primary schools in counties has surpassed the number of full-time teachers in rural areas, showing the phenomenon of counties > rural areas > cities. As shown in "Table V", the proportion of full-time teachers in cities, counties, and rural areas had been on the rise and the gap had gradually narrowed in the past 10 years. In the past six years, the number of full-time teachers in cities, counties, and rural areas has accounted for more than 90% of the total number of teachers.

The number of administrative staff in rural areas and counties in China showed descend trend from 2007 to 2016, the number of administrative staff in urban primary school showed a trend of decreasing first, then rising and then decreasing.

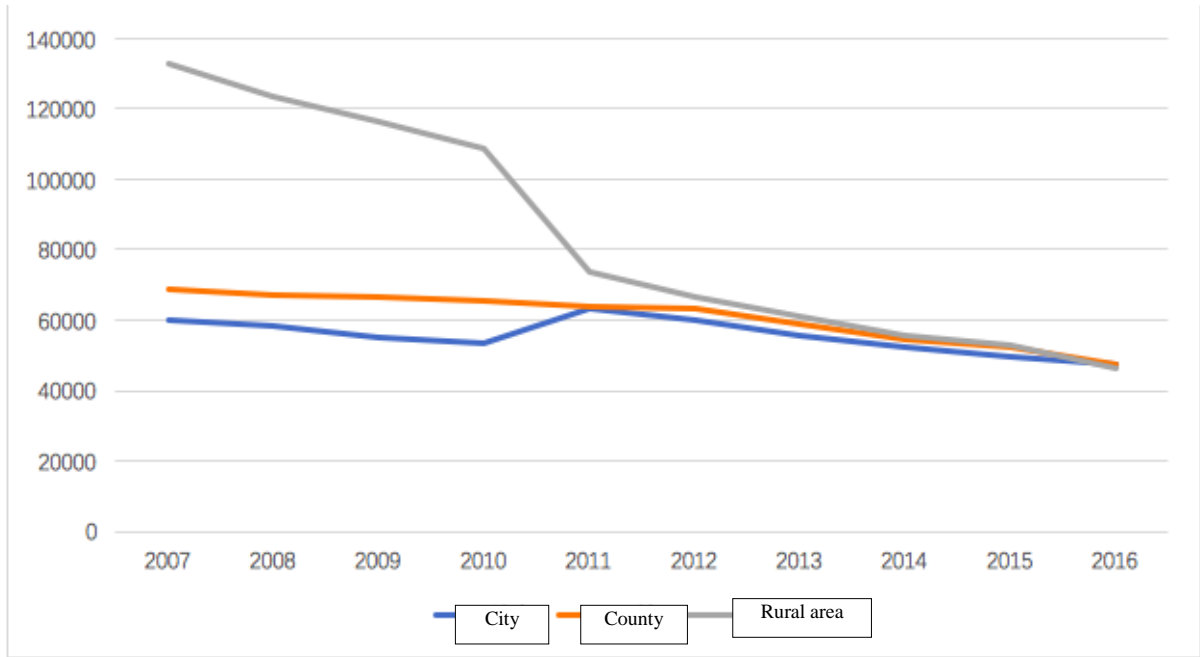


Fig. 3. The number of rural primary school administrators in China from 2007 to 2016.

As shown in "Fig. 3", the number of rural primary school administrators in China showed a rapid decline in 2007-2016, with a total of 86,707 people reduced in 10 years. Among them, the number of rural primary school administrators dropped sharply from 2010 to 2011, with the decrease in the number of administrative staff by 34,713 in one year. Before 2016, the urban-rural difference in the number of primary school administrators in China was decreasing, it still

showed rural area > county > city. In 2016, cities and counties achieved surpass compared to the countryside, showing the city > county > rural area.

The number of teaching assistants in rural primary schools in China has declined in 2007-2016, and the number of teaching assistants in counties, towns and cities has generally increased.

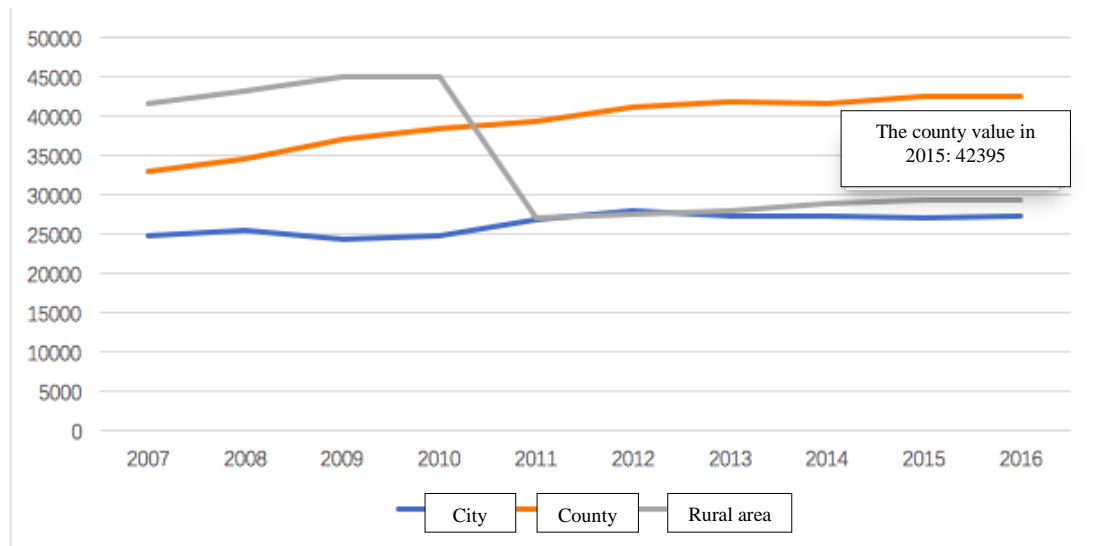


Fig. 4. Comparison of the number of teaching assistants of primary schools in rural and urban area of China from 2007 to 2016.

As shown in "Fig. 4", in 2007-2016, the number of teaching assistants in China's rural areas dropped sharply, with a total of 12,302 people reduced. The number of teaching assistants of urban primary school declined slightly in 2009 and 2015, but overall it showed an upward trend, with a total increase of 2,514 people in 10 years. The number of teaching assistants in counties and towns continued to rise, with a total increase of 9,450 people. The number of teaching assistants of rural primary school declined rapidly in 2011, and in the same year, the number of teaching assistants was lower than that of county towns. In 2012 and 2013, there were two cross-overs in the number of urban and rural teaching assistants. After 2013, the number of rural teaching assistant of primary schools exceeded that of cities.

C. Urban-rural Comparison of Changes in Teacher-Student Ratio in Primary Schools in China

TABLE VI. THE TEACHER-STUDENT RATIO OF PRIMARY SCHOOLS IN CHINA

| Year | Nationwide | Rural areas | County | City |
|------|------------|-------------|--------|--------|
| 2007 | 1:17.2 | 1:17.2 | 1:17.5 | 1:17.1 |
| 2008 | 1:16.8 | 1:16.6 | 1:17.2 | 1:17.1 |
| 2009 | 1:16.4 | 1:16.1 | 1:16.9 | 1:17.0 |
| 2010 | 1:16.3 | 1:15.7 | 1:16.9 | 1:17.1 |
| 2011 | 1:17.8 | 1:16.6 | 1:18.1 | 1:19.4 |
| 2012 | 1:17.5 | 1:15.9 | 1:18.0 | 1:19.5 |
| 2013 | 1:17.0 | 1:14.7 | 1:17.8 | 1:19.6 |
| 2014 | 1:17.2 | 1:14.5 | 1:18.1 | 1:19.9 |
| 2015 | 1:17.7 | 1:14.7 | 1:18.7 | 1:20.2 |
| 2016 | 1:17.9 | 1:14.9 | 1:18.9 | 1:20.3 |

It can be found from "Table VI" that the teacher-student ratio of primary schools in China has fluctuated continuously from 2007 to 2016, and the overall trend is downward.

The teacher-student ratio in rural primary schools showed a volatility trend from 2007 to 2016. The teacher-student ratio in 2007 was 1:17.2, and it rose to 1:14.9 in 2016, a large increase.

In 2007-2016, the teacher-student ratio of primary schools in counties fluctuated continuously, and the overall trend showed a downward trend. In 2009 and 2010, the teacher-student ratio reached a maximum of 1:16.9. In 2016, the teacher-student ratio reached a minimum of 1:18.9.

From 2007 to 2016, the teacher-student ratio of urban primary school students showed a downward trend. Since 2010, the teacher-student ratio has decreased year by year, reaching a minimum of 1:20.3 in 2016. Among them, the fastest decline in 2010-2011 was from 1:17.1 to 19.4.

III. ANALYSIS ON THE CAUSES OF THE RURAL-URBAN DIFFERENCE IN THE NUMBER OF PRIMARY SCHOOL TEACHERS OF CHINA

A. Changes in Population Size Affect Their Changes in Teachers' Needs

The total number of primary school teachers is mainly influenced by the number of students in primary schools, and the total number of students in school is determined by the birth rate. In July 1971, the State Council approved the "Report on Doing a Good Job in Family Planning Work", and incorporated the indicators for controlling population growth into the national economic development plan for the first time. In September 1982, the 12th National Congress of the Communist Party determined the family planning as the basic national policy. The constitution was written in December of the same year, marking the official establishment of China's family planning policy. Since the beginning of the 21st century, the number of China's working-age labor force has decreased, and the population is becoming more and more aging. In order to solve these emerging population problems, the country has gradually introduced a two-child policy that the parents are both from single-child family or one of the parents is from the single-child family since 2011. The implementation of the comprehensive two-child policy began in October, 2015. When China implements the family planning policy, the

number of newborns in China is generally declining every year, which directly leads to a decline in the total number of primary school students. Since the gradual liberalization of China's family planning policy in 2011, the total number of newborns in China has generally increased. The number of full-time teachers in China's primary schools will rise in the present and future.

B. The Urban-rural Economic Difference Is the Premise That the Teachers in Urban and Rural Primary Schools Are Not Balanced

In rural areas, due to the low level of economic development, backward infrastructure, insufficient attention on policy, and low salary of primary school teachers, excellent graduates of primary education are reluctant to go to work in rural primary schools. Because of the attractiveness of the city, the existing excellent primary school teachers in rural areas also flow to counties and towns, which lead to a growing gap between teachers in urban and rural areas. The teachers in rural areas are becoming weaker and weaker, and the supply of full-time teachers is seriously inadequate.

C. National Policies Have a Profound Impact on the Allocation of Teachers and Students in Urban and Rural Primary Schools

Before 2015, China did not have a specific policy on rural education. China's management of rural education has always been in a loose state. The level of rural education is low. There are also some problems in rural education of Chinese primary schools also exists in the number, quality and structure of teachers. Driven by the Supporting Plan for Rural Teachers (2015-2020), the development of rural teachers has accelerated, and rural primary school teachers have gradually achieved a more rational allocation. The phenomenon of teacher-student ratio has also changed.

D. The Teacher-Class Ratio Affects the Resource Allocation of Urban and Rural Teachers

In the primary school stage, there is a huge difference when using the teacher-class ratio and the teacher-student ratio to examine the level of urban-rural teacher allocation. When using the teacher-student ratio to examine the allocation of urban and rural compulsory education teachers, it finds that the teacher-student ratio in rural areas has been significantly improved, but in practice, rural schools always "lack teachers", and more often, "lack teachers with over authorized personnel". The changes in the number of students and the number of classes are often asynchronous.

TABLE VII. CHANGES IN THE TEACHER-CLASS RATIO IN RURAL PRIMARY SCHOOLS IN CHINA FROM 2007 TO 2016

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Number of full-time teachers | 3400420 | 3337264 | 3296824 | 3190526 | 2303126 | 2162856 | 2061245 | 1974360 | 1891552 | 1829322 |
| Total number of classes | 1978619 | 1872370 | 1777443 | 1667992 | 1312212 | 1235725 | | | 1069136 | 1047716 |
| Teacher-class ratio | 1:1.72 | 1:1.78 | 1:1.85 | 1:1.91 | 1:1.76 | 1:1.75 | 1:1.81 | 1:1.8 | 1:1.77 | 1:1.75 |

¹From the teacher-class ratio, the number of students in classes of a school is reduced, and the classroom teaching time is not reduced. From the teacher-student ratio, in the case of a decrease in the number of students and the same number of teachers, the teacher-student ratio in this school will increase, and the number of students will decrease as the teacher-student ratio increases. According to the requirements of the "Experimental Program of Compulsory Education Curriculum Setting" promulgated in 2001, all primary schools in China must set up comprehensive courses according to the requirements of the comprehensive development of moral, intellectual, physical, aesthetics and labor education. The teaching points in Chinese rural areas are scattered. Therefore, many primary school teachers in rural China have to teach more than one course, which also adds the burden on primary school teachers in rural areas. This growth in teacher-student ratio is passive, and there still has a huge gap in the number of rural teachers.

IV. SUGGESTIONS FOR ENSURING THE SUFFICIENT NUMBER OF PRIMARY SCHOOL TEACHERS IN CHINA AND PROMOTING THE BALANCED DEVELOPMENT OF PRIMARY SCHOOL TEACHERS

A. Scientifically Predicting the Needs of Teachers and Improving the Quality of Teachers

In order to rationally allocate urban and rural teacher resources, the government should use scientific and technological means to scientifically predict the needs of urban and rural teachers to guide the distribution of teacher resources. Through the prediction of the needs of urban and rural teachers, it can provide a basis for government decision-making. The government can more scientifically allocate the resources of urban and rural teachers, thus narrowing the gap between urban and rural areas. At the same time, the government should also pay attention to improving the quality of teachers, strengthen the training of teachers in rural areas, improve the overall quality of rural teachers, and comprehensively improve the quality of teaching in rural schools. The government should also encourage fresh graduates of primary education to go to the countryside for education and teaching. This is of great significance to make up for the shortage of rural teachers and to rejuvenate the rural teachers.

¹ Qin Yuyou. Balance between Teacher Allocation in Urban and Rural Compulsory Education: Consolidate Achievement and Step over Trap, Education and Economy, No.6, 2016. (in Chinese)

B. Implementing Rural Policy Inclination and Stabilizing Rural Primary School Teachers

In response to the unbalanced teacher resources of primary schools in China, the government issued the Supporting Plan for Rural Teachers (2015-2020) in 2015. The introduction of the plan has played a huge role in stabilizing the rural teachers. For the serious problem of the loss of rural primary school teachers, the plan put forward a series of policies on rural schools. These policies are of great significance for retaining rural primary school teachers, attracting excellent teacher resources to teach in rural areas, and promoting the balance of teacher resources in urban and rural areas. To ensure the effective implementation of these policies, the government must play a leading role. At the same time, the government should increase investment in rural education and strive for more social funds to develop rural education.

C. Strengthening the Unified Teachers' Salary Nationwide

In view of the current imbalance of financial levels in various regions, the teacher's salary and treatment have gradually been transferred from the county governments to the national co-ordination, in order to reduce the urban-rural differences and regional differences in teacher salaries.

D. Improving Rural Primary School Infrastructure

Weak infrastructure in rural primary schools and inconvenient transportation lead to the loss of rural students and teachers. And those who are forced to stay in the countryside can only receive education that is of lower quality than that of the city. In order to solve the situation of teachers and student outflows, the government should increase investment to support the construction of rural schools and improve the rural primary school environment. In view of rural primary school teaching points that are far away, the government and schools should adopt strategies such as setting up school buses to shorten the time spent by students going to school and teachers going to work.

V. CONCLUSION

By comparing the adequacy and balance of the number of primary school teachers, it can find that there is a huge gap in the number of primary school teachers, and the urban-rural differences are huge. Against the background of increasing population and balanced education, educators should actively take more actions and increase the quality of primary school teachers, strive to narrow the gap between urban and rural areas, and provide students with complete and high-quality education.

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