Who Teaches in Rural Schools in Underdeveloped Areas? An Investigation Based on a Survey of 5,554 Teachers from 117 Towns in H Province in Wuling Mountains Zone, China

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Abstract*. Teacher shortage is a major hindrance to China's rural education growth in underdeveloped areas, as well as one of the main causes of educational injustice. We conducted a survey of 5,554 teachers from 117 towns in H province in the Wuling Mountains Zone to investigate the issue of rural school teacher supply. From geographical, emotional, and institutional perspectives, we used a polynomial logit model to examine the validity of the "hometown effects" hypothesis. The findings showed that hometown effects exist in China in all three dimensions. The institutional hometown effects are the most pronounced; when compared to open recruitment, teachers sourced through teacher supply augmentation programs (such as the Secondary Normal Graduates Program, Special Position Program, and Targeted Position Program) are more likely to teach in rural schools, particularly more disadvantaged village primary schools or teaching sites. China's policy of increasing teacher supply has had a considerable positive influence on rural school staffing. Students from rural areas make better teacher candidates; feelings for hometowns should be encouraged among normal school or university students in pre-service education; and the implementation of teacher support policies should be emphasized to retain rural teachers and improve their teaching quality.*

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Introduction

As per the teacher-to-class ratios in compulsory education schools released in the Report on China's Rural Education Development 2019, China's rural schools are experiencing a serious teacher shortage (Wu & Qin, 2019). *South Reviews* (2021) published a report entitled "*China Needs More Rural Teachers*" in 2021, which emphasized the critical issue of rural teacher shortage. It was widely shared on social media sites like Phoenix and Tencent, and it drew a lot of attention and discussion. Rural teachers face a variety of issues, including low pay, insufficient social support, limited professional development, a lack of incentive mechanisms, a higher number of problem students, difficult class management, low social status, poor living conditions, potential cultural conflicts, and so on (Neeshatlen, 1985; Yarrow, 1999). These disadvantages in rural school working and living situations make teacher recruitment and retention challenging in the growth of rural education in impoverished areas around the world. As a result, the question of "who teaches in rural schools" has become a hot topic in academia.

Since its foundation, the People's Republic of China has implemented a number of teacher supply augmentation measures to alleviate the rural teacher shortage. The central government began implementing the Secondary Normal Graduates Program in several provinces in the early 1980s, in which graduates from junior colleges and secondary normal schools were selected and assigned to teach in local rural schools. For the next two decades, and until the early 21st century, this initiative was a major source of rural teachers.

The influence of urbanization on the countryside as well as the structural changes in rural schools has made it more difficult to recruit and retain rural teachers, as well as to improve the quality of rural education at the turn of the 21st century. The Ministries of Education and the Finance collaborated in 2006 to develop the *Special Position Program*, which used central government financing to hire college graduates to work in rural compulsory education institutions (Ministry of Education, 2006). The initiative began in western China and was eventually expanded to the central and eastern parts of the country. In the meantime, the State Council issued the Measures for the Implementation of *Free Education for Students of Normal Universities Affiliated to the Ministry of Education* (Ministry of Education, 2007), requiring the six normal universities affiliated to the Ministry of Education to provide free education to their students. In 2013 and 2015, Jiangxi Normal University and Fujian Normal University, both joint establishments of provincial governments and the Ministry of Education, joined the Free Education Program. The *Measures to Implement Public-funded Education for Students of Normal Universities Affiliated to the Ministry of Education* were published by the State Council in 2018, and the "*Free Education Program*" was renamed the "*Public-funded Teacher Education Program*" (also known as the *Targeted Position Program*).

The *Special Position Program* and the *Public-funded Teacher Education Program* have gained widespread acclaim in society for significantly reducing staffing shortages in rural parts of western China, and also for helping to attract and retain rural teachers and improve compulsory education quality (Pu et al., 2019). Preferential policies such as the *Particular Position Program and the Public-funded Teacher Education*

Program were first adopted in the western regions due to regional special demands and the state's limited financial capability. However, there are impoverished and underdeveloped areas in the central provinces that confront similar issues, such as local budget deficits, poverty-stricken rural areas, stymied rural school growth, and a rural teacher shortage. Despite little funding from the central government, several provinces strive to address staffing issues in rural schools by increasing teacher labor supply, improving teacher quality, and reducing structural human resource imbalances. Hunan Province in central China, for example, drafted the *Opinions on Strengthening Primary and Secondary Teacher Education* in 2005 and pioneered the *Targeted Position Program* for village primary teacher education in China. The provincial government and lower levels of government contribute to the funding of this initiative. The provincial department of education uses the joint money to commission local normal institutions and universities to train suitable teachers for specific rural schools.

As a result, open recruitment, the *Secondary Normal Graduates Program*, the *Targeted Position Program, the Special Position Program*, temporary teachers, and other sources of rural teacher supply exist in present China. This study applied a polynomial logit model to assess the validity of the "hometown impacts" hypothesis in the geographical, emotional, and institutional dimensions, based on the findings of a survey of 5,554 teachers from 117 towns in H Province in the Wuling Mountain Zone.

A Literature Review and Research Hypotheses

Some studies claimed that "hometown effects" (also known as "draw of home") exist in the teacher labor market, which are not common in other professions (Reininger, 2012; Cannata, 2010; Goff & Bruecker, 2017; Engel et al. 2014). According to the "hometown effects" hypothesis, teachers prefer to teach in the place where they grew up or in an area that is similar to their home environment. In their research of teacher distribution at New York State, Boyd et al. (2005; 2013) find that 61% of teachers start their careers in schools within 15 miles of their homes, and more than 80% in schools within 40 miles. In a survey conducted in Gansu Province, China, Wei (2016) discovered that 93% of teachers begin their careers in native countries, 51% in native towns, and 23% in native villages. Furthermore, Wei et al. (2020) find that rural teachers who start their careers in the same region as their birthplace have much lower employment mobility than those who start their careers in a different region. A survey of 40 rural schools in Guangdong and other provinces found that localization is an important geographical aspect of rural teacher employment, with many teachers working in their hometowns (Liu, 2019). According to Monk (2007), people who are interested in rural education and have strong feelings about rural living will opt to teach in rural areas, despite the fact that interests and feelings are vulnerable to spatial linkages.

As a result, hometown effects, which are a distinctive feature of the teacher labor market in China and other countries, are universal. Governments all over the world are forming rural teacher education and selection programs based on the localization tendency of the teacher labor market, such as the Grow-your-Own Program in the United States, the Indigenous Teacher Education Program in Australia, and the Public-funded Teacher Education Program in China, to name a few.

Localized selection of teachers in rural or distant locations is the most successful strategy to attract and retain rural teachers, according to academia and governments. Teachers with local "registered residences" (also referred to as "huji" or "huko" in China) are more likely to work in local town schools or in more remote rural schools and teaching sites in China, according to a well-known occurrence. There are discrepancies in how Chinese researchers and their international colleagues define the variable "returning to hometown". When assessing the variable "returning to hometown," foreign scholars typically mention the distance between the school and the home or calculate the distance using the school's and home's zip codes (Boyd et al, 2013). In China, "returning to hometown" refers to returning to work in the area of one's registered residence or birthplace; Scholars commonly utilize the county-level division of administrative regions (in China, a county is a lower-level administrative unit than a city) as a criterion to separate natives and foreigners, i.e., people from outside a certain county (Liu, 2019). As a result, we suggest the first hypothesis (H1): Teachers with a local registered residency are more likely to teach in rural schools, implying that rural teachers have geographical hometown effects.

Researchers also pointed out that many front-line teachers in rural areas spent part of their childhood or schooling in the area (Monk, 2007). According to surveys, 72.3% of teachers who have worked in rural schools for a long time were raised in rural areas, and 60% acquired their education in rural schools. In contrast, Chinese research focuses on geographic hometown preferences associated with registered residence, but there is little talk about emotional hometown impacts deriving from teachers' early life or education experiences in local places. Our second hypothesis (H2) is that: Based on geographical hometown effects related to the registered household, there is an emotional hometown preference based on teachers' rural life experience, i.e., teachers who grew up in rural areas or attended rural schools are more likely to teach in rural schools.

China's education administration system differs from that of various Western countries. In China, the county-level government is primarily responsible for funding primary and secondary schools in towns and villages. As a result, the county-level government is also responsible for teacher recruitment and appointment based on the staffing needs reported by the towns and villages under its jurisdiction. Government policies have a greater impact on teachers recruited through teacher supply augmentation initiatives. The Targeted Position Program in H Province requires program participants to agree to teach in the areas of their registered residency for 5-7 years after graduation, and the county bureau of education sets their compensation and other perks, such as Bianzhi membership (a system of officially budgeted posts in China). The county government may take into account teachers' preferred working locations as well as their registered residences when making teacher appointments. Teachers, on the other hand, are typically assigned to areas where teaching staff is in limited supply throughout the year (Wei, 2016). As a result, while examining teachers' hometown preferences within a county region, we must consider this institutional aspect. The third hypothesis (H3) we propose is that: after accounting for geographical and emotional hometown effects, institutional hometown effects exist, as evidenced by the fact that students educated through teacher supply augmentation programs are more likely to teach in rural schools.

Research Design

Sample Summary

The Wuling Mountains Zone is a theoretical economic notion employed in the state's efforts to alleviate poverty, and it spans most of the Wuling Mountains. The Wuling Mountains Zone is economically poor and has a large underprivileged population due to its physical location. It is one of the most important beneficiaries in the country's poverty alleviation program. The participants in this study are rural teachers from 117 towns in seven counties in H province in central China's Wuling Mountains Zone. The following factors influenced the sample selection: (i) According to national criteria, the seven counties studied are destitute. The Wuling Mountains Zone is one of China's 14 most impoverished areas, with insufficient basic public services, severely outdated infrastructure in education, culture, health, and sports, and per capita education and health spending of only 51% of the national average. Recruiting and keeping talented rural teachers in this area is a common problem in socioeconomically underdeveloped areas. (ii) H Province was one of China's first provinces to adopt the Targeted Position Program. In 2006, H Province launched a special program to recruit junior secondary school graduates for 6-year pre-service education in order to provide targeted training of multi-disciplinary primary school teachers for towns and villages, one year ahead of the Ministry of Education's and its six affiliated normal universities' *Free Teacher Education Program* (Hunan First Normal University, 2017). H Province has acquired a large number of teachers as a result of various sorts of teacher supply augmentation schemes during the last 10 or more years, ensuring the sample's representativeness.

The Wuling Mountains Zone encompasses the counties and cities of H Province's western, northwestern, and central regions, with the western half of the province having the most counties. We chose four counties at random from the province's west, two from the northwest, and one from the central region based on geographical distribution, and conducted a two-month field study in each of the seven counties in 2020. The seven counties have a total of 117 towns and nearly 15,000 primary and secondary school teachers, as shown in **Table 1**. A total of 5,554 questionnaires were obtained for this study, all of which were legitimate.

Variables and Measurement

The Dependent Variable

The school type, which is a categorical variable, is the study's dependent variable. County-level schools (referring to primary and secondary schools in the county's metropolitan areas), town-level nine- and 12-year schools, town junior secondary schools, town primary schools, village primary schools, and teaching sites are all covered. This paper groups town-level nine- and 12-year schools, town junior secondary schools, and town primary schools into one category in the regression model for statistical convenience, making school type a categorical variable with three categories: county-level schools, town primary and secondary schools, and village primary schools and teaching sites, which are coded as 0, 1, and 2, respectively.

Independent Variables

Table 1. Sampled Counties.

Sampled Counties	Numbers of Towns Under Jurisdiction	Numbers of Teachers	Retrieved Questionnaires	Valid Questionnaires	Validity Rate
A	12	1,641	718	718	100%
B	19	2,244	1,005	1,005	100%
C	17	3,417	1,358	1,358	100%
D	26	3,405	1,832	1,832	100%
E	20	5,730	596	596	100%
F	23	n/a	0	0	n/a
Total	117		5554	5554	100%

Notes: 1. Respondents are grades 1-9 teachers (no secondary vocational and high school teachers surveyed); 2. Due to some emergencies, the investigation team failed to distribute the questionnaires in F County, and only conducted interviews in this county.

The teacher's registered residence, rural living and education experience, and teacher supply sources are the three independent factors in this study. For the teacher's registered residence, the inquiry provides five options: the town or village where the school is located; other towns or villages within the local county; the local county's urban region; other counties within the province; and other provinces. There is just one option for this question. We combine "other counties within the province" and "other provinces" into one category: registered residence outside the local county, and come up with a variable with four categories of registered residence, with 1, 2, 3, and 4 representing registered residence in the town or village where the school is located, other towns or villages within the local county, the local county's urban area, and outside the local county, respectively. Furthermore, we collect information about teachers' birthplaces, determine whether the teacher is a local based on their response to the question "Whether your birthplace is the same as the location of the current school" in the questionnaire, and create a dummy variable for teachers' birthplaces, with 0 indicating "no" and 1 indicating "yes".

In addition, with the variable of five or more years of early rural life or education experience, the questionnaire evaluates emotional hometown impacts. Teachers' rural experience or schooling experience is treated as a dummy variable, with 0 indicating "no" and 1 indicating "yes." The source of teacher supply is a categorical variable, with 0, 1, 2, 3, 4, 5 representing open recruitment, temporary teachers, the Targeted Position Program, the Special Position Program, the Secondary Normal Graduates Program, and other supply sources (such as inter-school teacher rotation), respectively.

Control Variables

Individual characteristics of teachers, such as gender, age, ethnicity, and proximity to the school, serve as control variables in this study. Gender is a dummy variable (0 = female, 1 = male); age is a continuous variable; proximity to the school is a dummy variable (0 = no, 1 = yes); and ethnicity is a categorical variable (0 = Han nationality, 1 = Miao nationality, 2 = Tujia nationality, 3 = other ethnic minorities).

The Model and Analytical Approach

This study employs polynomial logit regression to analyze the dependent variable "school type," which is a multi-category variable. The model is as follows:

$$\ln\left(\frac{\pi_{ij}}{\pi_{ib}}\right) = \ln\left(\frac{P(y_i = j|x)}{P(y_i = b|x)}\right) = x_i'\beta_j$$

where b signifies the baseline group and j specifies the number of school types in the categorical variable, i.e., j =1, 2, 3... The anticipated probability of each category can be computed by solving the equation below (Yang & Zhang, 2020):

$$\pi_{ij} = P(y_i = j|x) = \frac{\exp\left(x_i'\beta_j\right)}{\sum_{m=1}^{J}\exp\left(x_i'\beta_m\right)}$$

Thus, we obtain the frequency ratio of each category relative to the baseline group. In the examination of regression findings, the odds ratio is utilized to calculate and evaluate the model's regression coefficients. To further address the research issue, the study employs stepwise regression to examine the hometown effects of rural China's teachers.

Research Results

Sample Descriptions

Table 2 provides a summary of the subjects. (i) Female teachers account for 16.46% more than their male counterparts, which is in line with China's current gender structure in elementary and secondary schools. (ii) The proportions of young and older teachers are greater than those of middle-aged teachers, according to the age distribution pattern. (iii) Currently, 72.04% live within walking distance of a school. (iv) The ethnicity of the subjects in the sample is quite diverse. More than half of the subjects are Miao and Tujia ethnic groups, which corresponds to the existing population situation in the Wuling Mountains Zone). (v) In terms of professional titles, the teaching staff is primarily made up of first- and second-rank teachers, with senior teachers accounting for approximately 11.76%. (vi) Pre-service education was provided to over 60% of teachers through teacher supply augmentation initiatives. (vii) The vast majority of study participants were students from rural elementary and secondary schools. Therefore, sample distribution is consistent with general features of participants, indicating that the sample is ideal and representative.

Localization of Rural School Staffing

Table 2. A Sample Summary.

Variable	Sample Classification	Frequency	Percentage (%)
Gender	Female	3,234	58.23
	Male	2,320	41.77
Age	18-27	1,485	26.74
	28-38	1,295	23.32
	39-55	2,311	41.61
	56-77	435	7.83
	others	28	0.50
Living around School Locations or Not	Yes	1,553	27.96
	No	4,001	72.04
Nationality	Han	2,066	37.39
	Miao	1,763	31.91
	Tujia	1,567	28.36
	Other ethnic minorities	129	8.19
Professional Title	The third-rank teacher and others	1,240	22.32
	The second-rank teacher	1,503	27.06
	The first-rank teacher	2,158	38.85
	Senior teacher	653	11.76
Sources of Teacher Supply	Open recruitment	1,158	20.85
	Targeted Position Program	1,078	19.41
	Special Position Program	1,076	19.37
	Secondary Normal Graduates Program	956	17.21
	Temporary teachers	470	8.46
	Others	816	14.69
School Type	Village primary schools and teaching sites	949	17.09
	Town-level 9- and 12- year schools	667	12.01
	Town primary and secondary schools	2,644	47.61
	County-level schools	1,294	23.30

Notes: 1. Percentiles 1/4, 1/2, and 3/4 are employed to divide age groups 2. The Targeted Position Program includes the Ministry of Education's public-funded teacher education Program and local level targeted position programs. 3. The Special Position Program includes nation level and local level programs.

The data in **Table 3** show that rural teachers in the county's territory have a high rate of localized employment. More than half of the teachers working in rural primary schools or teaching sites (475/949 = 50.5%) have a registered residence in the local towns or villages. Teachers, who live in other towns or villages in the county, or beyond the county, are less likely to work at rural primary schools or teaching sites; instead, they prefer to teach in town primary and secondary schools, or at the county level. Furthermore, teachers who live in the county's urban areas are the least likely to work in village primary schools or teaching sites. A close link exists between rural teachers' registered residence and their school category ($p < 0.001$), indicating that teachers with local registered residency are more likely to accept work in rural schools. As a result, H1 has been certified.

Table 3. School Types of Teachers with Different Registered Residence.

Variable Names	# of Teachers from the Local Town and Village	# of Teachers From Other Towns or Villages of the Local County.	# of Teaches From Urban Areas of the County	# of Teachers from Outside the County	Total
Village Primary Schools and Teaching Sites	475	193	112	169	949
Town Primary and Secondary Schools	1460	856	447	548	3,311
County-Level Schools	225	394	548	127	1,294
Total	2,160	1,443	1,107	844	5,554
chi^2	688.2650				
P-value	0.000 (***)				

*Note: Levels of significance: ***p < 0.001, **p < 0.01, *p < 0.05, +p < 0.1*

Table 4. School Types of Teachers from Different Teacher Supply Sources.

Variable	Open Recruitment	Temporary Teachers	Targeted Position Program	Special Position Program	Normal College or University Student Program	Other Sources	Total
Village Primary Schools and Teaching Sites	178	158	155	221	133	104	949
Town Primary and Secondary Schools	595	287	704	719	593	413	3,311
County-Level Schools	385	25	219	136	230	299	1,294
Total	1,158	470	1,078	1,076	956	816	5,554
chi^2	378.1099						
P-value	0.000						

*Note: levels of significance: ***p < 0.001, **p < 0.01, *p < 0.05, +p < 0.1*

The Influence of Teacher Supply Augmentation Programs on Rural School Staffing

As mentioned before in this study, due to China's unique educational administration system, rural teachers may experience local effects as a result of institutional arrange-

ments. So, how do different teacher supply programs affect teachers' hometown preferences? There are substantial disparities in school categories among teachers produced by different programs (p < 0.001), according to data from **Table 4**. Teachers in village primary schools or teaching sites are mostly from the Special Position Program (221 teachers), which is part of the policy to increase teacher supply. The majority of Targeted Position Program and Special Position Program teachers (704 and 719, respectively) chose to work in town primary and secondary schools, which offer superior working conditions, accounting for about half of the entire staff.

The study results from 117 towns in H Province suggest that educational policies may have a significant impact on the hometown effects of rural China teachers. Due to the fact that the Special Position Program recruits teachers based on the staffing needs of local schools as opposed to the distribution plan of county-level educational authorities, the influence of teachers' independent decisions on hometown effects cannot be neglected. Therefore, additional research is required to explore institutional hometown impacts.

The Effects of Geographical Influence, Emotional Preference, and Policy Guidance on Rural Teachers' Employment

The results of a regression study of the impacts of geographical influence, emotional preference, and policy advice on teachers' choice of school types are presented in **Table 5**. The registered residence of teachers is used to assess geographical hometown impacts, whereas their early rural life or schooling experiences are utilized to measure emotional hometown effects. The scope of Model 1 is limited to evaluating the effect of teachers' registered residence on their employment and school kinds. In Model 2, the early rural life or education experience of teachers is included in Model 1. The source of teacher supply is added as a variable in Model 3. Due to the inability to conduct direct comparisons between the Mlogit model's regression coefficients, we must convert them into odds ratios in order to evaluate and present the results of the analysis (Hong, 2015).

The Relationship between Geographical Hometown Effects and Teachers' Choice of School Types

Using teachers employed by county-level schools as the baseline group, Model 1 demonstrated that after controlling for variables such as gender, age, ethnicity, and whether or not they live around the school location or not, teachers from the local town or village are more likely to work in village primary schools or teaching sites than teachers with registered residence outside the county, with a 2.147 times higher odds ratio ($e^{1.147}$-1), which is statistically significant (p < 0.001) than teachers with registered residence within the county. In a related manner, teachers who were native to the town in which the school is located were 1.254% more likely to teach in the town's primary and secondary schools than teachers whose registered residences were outside of the county ($e^{1.006}$-1, p < 0.001). In a fundamental sense, this is in line with the statistical descriptions made in the past.

Table 5. Results of the Regression Analysis of Hometown Effects on Rural Teachers' Employment.

	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1		Model 2		Model 3	
	School types (County-level schools as the baseline group)					
Variable	I	II	I	II	I	II
Gender	0.747***	0.813***	0.747***	0.811***	0.808***	0.843***
	(0.108)	(0.085)	(0.109)	(0.085)	(0.111)	(0.086)
Age	-0.035***	-0.039***	-0.036***	-0.041***	-0.046***	-0.042***
	(0.005)	(0.004)	(0.005)	(0.004)	(0.006)	(0.005)
Living around the School location or not	-0.838***	-0.654***	-0.843***	-0.700***	-0.836***	-0.711***
	(0.115)	(0.092)	(0.119)	(0.095)	(0.121)	(0.096)
Nationality (Han nationality as the baseline group)						
Miao	-0.723***	-0.508***	-0.727***	-0.510***	-0.748***	-0.539***
	(0.112)	(0.088)	(0.112)	(0.088)	(0.115)	(0.090)
Tujia	-0.506***	-0.254**	-0.512***	-0.261**	-0.552***	-0.301**
	(0.115)	(0.092)	(0.115)	(0.092)	(0.119)	(0.094)
Other ethnic minorities	-1.582***	-0.516*	-1.589***	-0.521*	-1.631***	-0.564*
	(0.383)	(0.235)	(0.383)	(0.235)	(0.389)	(0.240)
Registered Residence (Registered residence outside the local county as the baseline group)						
Local town Or village	1.147***	1.006***	1.149***	0.999***	1.137***	0.886***
	(0.163)	(0.137)	(0.164)	(0.137)	(0.172)	(0.142)
Other towns or Villages in the Local county	-0.610***	-0.349**	-0.610***	-0.363**	-0.482**	-0.332**
	(0.156)	(0.124)	(0.156)	(0.124)	(0.162)	(0.129)
Urban areas of the Local county	-1.318***	-1.166***	-1.318***	-1.156***	-1.137***	-1.108***
	(0.168)	(0.127)	(0.168)	(0.127)	(0.173)	(0.132)
Early rural life or Education experience			0.035	0.230*	0.168	0.311**
			(0.135)	(0.108)	(0.138)	(0.111)
Teacher Supply Sources (Open recruitment as the baseline group)						
Temporary teachers					2.656***	2.039***
					(0.264)	(0.240)
Targeted Position Program					0.308*	0.646***
					(0.154)	(0.114)
Special Position Program					1.032***	0.988***
					(0.155)	(0.126)
Secondary Normal Graduates Program					0.363*	0.604***
					(0.168)	(0.123)
Other sources					-0.105	-0.015
					(0.162)	(0.116)
Constant terms	1.918***	2.971***	1.915***	2.917***	1.649***	2.434***
	(0.195)	(0.162)	(0.197)	(0.164)	-0.242	-0.194
Pseudo R^2	0.092		0.093		0.118	
Log likelihood	-4746.895		-4743.728		-4610.350	
AIC	1.739		1.740		1.697	
BIC	-37564.929		-3754543		-37657.16	
Sample size	5,500	5,500	5,500	5,500	5,500	5,500

Notes: I: Village Primary Schools & Teaching Sites; II: Town Primary & Secondary Schools. 1. Values in parentheses are standard errors. 2. Levels of significance: ***p<0.001, **p<0.01, *p<0.05, +p<0.1

In the meantime, we observed that teachers with registered residences in other towns or villages within the county do not demonstrate a positive hometown preference for the local rural schools compared to teachers with registered residences outside the county, and the likelihood is even significantly reduced (the coefficients in Model 1 are -0.610, and -0.349, respectively, and the p-values are both less than 0.001). As a result, we can conclude that the geographical characteristic of hometown effects is not positively correlated with teachers' registered residence in the local county (as was assumed in prior research), but rather with teachers' registered residence in the local town, a smaller administrative area. This cautions us that, in the context of China, a more comprehensive examination of the consequences of geographical hometown is required. The survey results from Hubei, Jiangsu, and Henan confirmed that teachers from local towns had the lowest turnover rates (Liu, 2019).

The Relation between Emotional Hometown Effects and Teachers' Choice of School Types

The coefficient of determination of Model 2 is improved, and the model's significance is maintained, when the variable of early rural life or teacher education experience is introduced. Teachers with five or more years of early rural life or education experience are more likely to work in village primary schools or teaching sites (with a positive coefficient) than in county-level schools after controlling for variables such as gender, age, ethnicity, registered residence, and whether or not they live near the school location, though the difference is not statistically significant. Nonetheless, compared to those with no such experience, teachers with five or more years of early rural life or education experience had a 26% greater odd ratio of working in town primary and secondary schools ($e^{0.230}$-1), which is statistically significant ($p < 0.01$). The findings of Stiut (2010) and Boylan (2010), who both believed that teachers' prior rural living or job experience had a beneficial effect on their extended stay at rural schools. As a result, H2 is only partially accepted.

The Relationship between Policy-guided Hometown Effects and Teachers' Choice of School Types

In order to investigate the impact that the teacher supply augmentation programs have on hometown effects, Model 3 contains the variable of teacher supply sources as an independent variable. As a consequence of this, the model's coefficient of determination rose from 0.093 to 0.118, which indicates that the model's explanatory power has improved and that this improvement is statistically significant. Taking teachers employed at county-level schools as the baseline group, Model 3 demonstrates that after controlling for the variables of gender, age, ethnicity, registered address, and whether or not the teacher lives near the school location, teachers produced through the Targeted Position Program by the Ministry of Education and local governments have a 36.10% higher odds ratio ($e^{0.308}$-1) of working in village primary schools and teaching sites, and a 90.81% higher odds ratio ($e^{0.646}$-1) of working in town primary and secondary schools, compared to those recruited through open recruitment, and these differences are statistically significant ($p < 0.1$ and $p < 0.001$, respectively).

There is no question that the hometown effects associated with the Targeted Position Program are partially attributable to the rigorous and forceful implementation of pertinent policies, which state that graduates who benefit from the program must return to work in their original region of residence. Moreover, the majority of students trained under local targeted position programs come from towns or villages. This substantially increases the likelihood of teachers returning to the town or village. Then, what about graduates of the Specific Position Program, which does not restrict the supply of students but instead creates special posts based on the needs of local schools?

Under the same control conditions, in comparison to the baseline group (consisting teachers from county-level schools), teachers recruited through the Special Position Program are much more likely to work in village primary schools and town schools than those recruited through open recruitment. The odds ratios are 1.801 times ($e^{1.032}$-1) and 1.689 times ($e^{0.988}$-1) higher, respectively, which is statistically significant at the 0.001 level.

Similarly, teachers recruited through the Secondary Normal Graduates Program in the early stages are far more likely to work in rural primary schools and urban schools than those recruited through open recruitment (with positive coefficients, significant at levels of 0.05 and 0.001, respectively).

Since the 1980s, the implementation of teacher supply augmentation programs in China has significantly reduced the teacher shortage in rural schools, particularly in remote and disadvantaged village primary schools and teaching sites, as indicated by the data presented above. Effective educational policy direction generates considerable institutional impacts in the local community. As such, H3 is confirmed.

In addition to this, the impact of the control factors should not be disregarded. When compared to the baseline group of county-level school teachers, the likelihood that male teachers will work in town primary and secondary schools, as well as village primary schools and teaching sites, is significantly higher than the likelihood that female teachers will do the same ($p < 0.001$) in Models 1, 2, and 3. The likelihood of a teacher working in a rural school decreases significantly with the teacher's age (with negative coefficients, $p < 0.001$). Teachers who live in close proximity to schools are less likely to work in town schools and village primary schools (with negative coefficients, $p < 0.001$). It is statistically significant that teachers of Han nationality are more likely to work in town schools and village primary schools than teachers of ethnic minority backgrounds (such as Miao, Tujia, and other ethnic minorities). This suggests that Han educators have a greater propensity to work in rural schools.

Robustness Check

In the robustness test, teachers' registered residence is replaced by birthplace, sources of teacher supply are by means of joining Bianzhi, and the Mlogit model is used for regression analysis. As shown in **Table 6**, the model's analytical results remain significant despite slightly reduced values of coefficients of determination, suggesting the model's remarkable robustness. In this study, the impacts of control variables such as gender, age, ethnicity, and proximity to the school are consistent with previous analytical findings.

Table 6. Robustness Check on Hometown Effects on Rural Teachers' Employment.

	(7)	(8)	(9)	(10)	(11)	(12)
	Model 1		Model 2		Model 3	
	School Types (County-level schools as the baseline group)					
Variable	I	II	I	II	I	II
Gender	0.862***	0.933***	0.862***	0.930***	0.972***	0.954***
	(0.105)	(0.081)	(0.105)	(0.081)	(0.116)	(0.087)
Age	-0.029***	-0.035***	-0.032***	-0.039***	-0.043***	-0.044***
	(0.004)	(0.003)	(0.005)	(0.004)	(0.008)	(0.006)
Living around the school location or not	-0.895***	-0.669***	-0.944***	-0.758***	-0.912***	-0.686***
	(0.113)	(0.090)	(0.117)	(0.093)	(0.131)	(0.101)
Nationality (Han nationality as the baseline group)						
Miao	-0.811***	-0.576***	-0.815***	-0.581***	-0.825***	-0.640***
	(0.107)	(0.083)	(0.107)	(0.083)	(0.120)	(0.091)
Tujia	-0.554***	-0.295***	-0.560***	-0.304***	-0.561***	-0.363***
	(0.111)	(0.087)	(0.111)	(0.087)	(0.125)	(0.095)
Other ethnic minorities	-1.432***	-0.403+	-1.437***	-0.407+	-1.395**	-0.212
	(0.373)	(0.222)	(0.373)	(0.222)	(0.445)	(0.253)
Birthplace	0.848***	0.593***	0.852***	0.603***	0.718***	0.535***
	(0.096)	(0.074)	(0.096)	(0.074)	(0.109)	(0.081)
Early rural life or education experience			0.239+	0.414***	0.377*	0.505***
			(0.130)	(0.103)	(0.153)	(0.116)
Ways of Joining Bianzhi (Joining Bianzhi through examinations as the baseline group)						
From temporary positions					2.127***	1.730***
					(0.240)	(0.202)
From Targeted Position Program					0.285	0.539***
					(0.179)	(0.136)
From Special Position Program					-0.198	-0.081
					(0.159)	(0.118)
From Secondary Normal Graduates Program					-0.115	0.202+
					(0.150)	(0.106)
Constant terms	1.259***	2.474***	1.198***	2.364***	1.222***	2.157***
	(0.173)	(0.140)	(0.175)	(0.141)	(0.282)	(0.215)
Pseudo R^2	0.040		0.041		0.052	
Log likelihood	-5020.523		-5012.341		-4066.613	
AIC	1.835		1.834		1.805	
BIC	-37095.184		-37085.711		-29858.928	
Sample size	5,500	5,500	5,500	5,500	5,500	5,500

Notes: *I: Village Primary Schools & Teaching Sites; II: Town Primary & Secondary Schools.* 1. Values in parentheses are standard errors. 2. Levels of significance: ***$p<0.001$, **$p<0.01$, *$p<0.05$, +$p<0.1$

The key explanatory variable, birthplace, is a dummy variable with a value of 0/1 (0 = non-local birth, 1 = local birth). It has a positive regression coefficient of p0.001, indicating that, after controlling for variables such as gender, teachers born locally are more likely to work in village primary schools and teaching sites, or town primary and secondary schools (than county-level schools), and the difference is statistically significant. The findings of the emotional hometown effects tests also show that the impact of teachers' early years of rural living or education is favorable (all coefficients were positive) and statistically significant ($p < 0.05$). As a result, the geographical and emotional influences of home are still present. The impact of the variable "the way of joining Bianzhi" confirms that institutional hometown impacts are also significantly good. Teachers who join Bianzhi as temporary teachers are more likely to work at village primary schools and town schools than at county-level schools, compared to the baseline group (teachers who join Bianzhi through examinations). Joining Bianzhi from the Targeted Position Program and the Secondary Normal Graduates Program had both positive and statistically significant regression coefficients. Nonetheless, there is no statistically significant difference ($p > 0.1$) in rural school employment between teachers who join Bianzhi through the Special Position Program and those who join through examinations.

After substituting teachers' registered location and sources of teacher supply with other key explanatory variables, the impact of geographical, emotional, and institutional hometown effects on rural teachers' employment remains significant, according to the results of the robustness test. The modified model yields essentially identical analytical results to the original model. Consequently, we believe the model estimation results of this study to be reliable.

Conclusions and Suggestions

This study applies the polynomial logit model to assess hometown effects from geographical, emotional, and institutional aspects based on a survey of 5,554 teachers from 117 towns in H province in the Wuling Mountains Zone. The conclusions are as follows.

(i) Teachers with local registered residences are more likely to work in rural schools in China, proving the importance of geographical hometown effects. However, based on the subdivisions of registered residence, we find that the scope of local registered residence pertaining to this topic is limited to the local town, a smaller administrative division, as opposed to the local county (assumed by preview studies). Wei's (2016) research in Gansu Province and Liu's (2019) research in Guangdong, Zhejiang, Shanxi, Sichuan, and Guizhou Provinces supports the conclusion.

(ii) Teachers with at least five years of rural life or education experience are more likely to work in village schools or teaching sites, demonstrating a favorable effect of teachers' hometown attachments on their employment in rural schools. In recruiting and educating rural teachers, consideration should be given to the motivational effect of teachers' attachment to their hometown. Existing studies have also indicated that it is difficult to attract a sufficient number of qualified teachers using only market-based strategies in underdeveloped regions. Incorporating spiritual components such as emotions, wills, and beliefs into teacher

education and recruiting is not only helpful in enhancing the retention rate of competent employees, but also in instilling a feeling of civic responsibility in teachers towards their hometowns (Li, 2020).

(iii) The results of regression analysis show strong institutional hometown effects after controlling for geographical and emotional hometown preferences. Those educated by teacher supply augmentation programs are more likely to work in rural schools, notably village primary schools and teaching sites in more backward conditions, than those employed through open recruiting. It demonstrates how educational programs have aided in the expansion of China's rural workforce. Preliminary studies have not paid enough attention to the policy-induced local consequences.

Because of the severe lack of available human resources in rural schools, both the central and local governments have been making efforts to increase the number of available teachers (Wang & Wu, 2019). The central and local authorities have come to the conclusion that selecting, training, and recruiting students of local origins as rural teacher candidates under the logic of hometown effects is an effective way to ensure a sufficient supply of rural teaching staff. This conclusion has led to the formation of a consensus among the central and local authorities. However, an excessive reliance on institutional hometown effects may lead to some negative consequences, such as a high rate of default on the part of normal school students educated under the *Free Teacher Education Program* (Ren & Chen, 2020), and a high turnover rate of teachers produced by the Special Position Program who only use rural school positions as a transition in their careers (Wang & Feng, 2020).

On the basis of this study's empirical findings and results from prior research, we provide some policy recommendations for attracting and keeping rural teachers.

First, the geographical quality of hometown effects is most prominent within a constrained administrative region, i.e., the local town. Its conclusion for policymakers is that more students from native towns should be recruited into future rural teacher education programs, and that when staffing rural schools, graduates should be encouraged to teach in their native towns' rural schools. It is important to note that this recommendation may be more applicable in developing countries and regions, particularly those with large disparities in educational resources between urban and rural areas or with distinct racial or ethnic cultural characteristics, where teachers have stronger ties to their native lands and are obligated to care for their families and relatives, and where working close to home helps them achieve work-life balance (An & Cao, 2017).

Second, in the pre-service education of rural teachers, their attachment to their hometowns should be fostered (Zheng & Hu, 2018). According to existing research, 72.3% of teachers with extensive experience in rural schools were raised in rural areas, and 60% have schooling experience in rural settings (Boylan & McSwan, 1998). In a longitudinal research study, Hernan (2018) evaluates the effects of two distinct approaches to rural teacher training. The first program engaged pre-service teachers in a variety of classroom-, school-, and/or community-based professional activities; the second program directly recruits and trains students from rural backgrounds. It is determined that the second strategy is superior to the first because those with a background in rural life are better able to comprehend rural culture and integrate into rural life.

Third, to maintain an appropriate supply of skilled rural teachers, it is crucial to invest more in the Targeted Position Program through partnerships with secondary normal schools, normal junior colleges, and normal universities, and to improve the educational quality of the program. However, strengthening the execution of rural teacher support policies is more crucial. According to Merrow (1999), addressing the teacher shortage solely through recruitment is a "wrong diagnosis" and a "phony cure." Increasing rural teachers' compensation, elevating their social status, and providing them with more accolades may be more effective solutions to the rural school staffing issue.

In conclusion, the present study attempts to experimentally answer the question, "Who teaches in rural schools?" based on the hometown effects hypothesis. It has broadened the scope and dimensions of the concept by sparking discussion on the institutional aspect of hometown effects. However, the limitations of this study should be acknowledged. First, there are significant gaps between central and western China, as well as between poor regions in various provinces. This study focused on the origins of rural teachers in the Wuling Mountains Zone in central China, and the sample is somewhat unrepresentative, which hinders the generalizability of the findings. Second, the hometown effects hypothesis is a Western academic theory. To confirm the explanatory power and scope of applicability of the theory in China, it is necessary to conduct additional empirical studies based on evidence. Furthermore, this study identified the institutional impact of hometown effects on rural teachers in China, but the influence mechanism of pertinent policies on rural teachers' employment decisions remains to be investigated.

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