An Analytical Study of Family Investment in Education at the Pre-school Level in China - A Comparative Analysis Based on Eastern, Central and Western China

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Abstract. Since the publication of China's National Medium- and Long-Term Education Reform and Development Plan in 2010 and the active development of preschool education, the development of preschool education has gradually received attention from all sectors and the positive effects of the expansion of preschool education in China are evident. However, as the national household share of preschool education still falls short of international standards, the issue of education consumption by households affected by their individual economic development in the expansion of preschool education cannot be ignored. This paper examines the relationship between factors such as household socio-economic income and cultural background and education expenditure of preschool children's families, based on a regression analysis of macro data from the provincial statistical bureaus of the three provinces and micro data from the China Household Tracking Survey in 2018, from the perspective of combining macro and micro data in Guangdong, Henan and Gansu provinces selected in the eastern, central and western regions of China respectively. The study found that for the families themselves, the higher the economic level, the higher the expenditure on preschool education. Also, the higher the level of education of the mother, the higher the expenditure on preschool education. For different regions, the more economically developed the region, the more parents are willing to spend more on their children's pre-school education.

Keywords: Preschool education; household economic income; preschool education expenditure; multiple linear regression.

1. Introduction

Since the outline of China's national medium and long-term education reform and development plan (2010-2020) proposed to actively develop preschool education , the development of preschool education has gradually received attention from all walks of life. As a quasi-public good that is not compulsory but is needed by society at a high intensity, preschool education should be shared between government funds and individual household expenditure [1]. Cost-sharing in education means that the state, local governments, enterprises and institutions, families, and individuals should bear the costs of education respectively, mainly for non-compulsory education. While China has been vigorously promoting the expansion of preschool education, the level of household cost-sharing in preschool education has been gradually decreasing across the country, and the positive effects of education expansion have been evident, demonstrating the value of "equality in children's education" [2-4]. However, existing research by Chinese scholars suggests that, although the national household share of preschool costs declined significantly between 2010 and 2019, the household share was still higher than international standards [3]. In contrast to the level of national cost-sharing of preschool education, the level of household cost-sharing of preschool education refers to the proportion of the cost of preschool institutions (mainly kindergartens) borne by households [3]. This warns that China must confront the individual development of preschool children's families while promoting public education policies [2,4]. In addition, the brutal promotion mechanism coupled with severe child-lite

family patterns in recent years have also plunged education into unhealthy competition [5]. With the current state of affairs at all stages of education, many families have begun to pay more attention to their children's education, focusing not only on the critical stages of further education, such as secondary and high school exams, but many middle- and high-income families have even begun to invest heavily in preschool education in order to prevent their children from "falling behind", from private, private, international, public and other types of kindergartens "Parents' anxiety about their children's education is increasing day by day, from private, international and public kindergartens to early childhood education and interest classes.Therefore, this paper aims to explore the factors that influence investment in pre-school education and to understand the importance that parents currently attach to pre-school education from the perspective of the economic level of different regions, so as to provide reference for the construction and reform of pre-school education.

2. Literature review

Most of the existing studies on educational expansion and educational stratification have focused on the higher education stage and ignored the preschool stage. The current rapid promotion of preschool education in China and the increasing availability of early education resources from out-of-school institutions provide newer empirical material to test educational expansion and educational stratification [2]. Liu Baozhong looked at the influence of family class on family investment in education, comparing the status of family investment in education between the middle class and the non-middle class and analysing the differences in investment in children's education between different families within the two classes [6]. Huo Liting and Cui Zhanfeng's "Preschool Education Expansion and the Evolution of Class Differences in Family Investment in Education" combines modernization theory to argue that the current expansion of preschool education in China has not effectively improved the differences in early education investment opportunities or investment capacity between the disadvantaged and other classes [2]. Liu Wen et al have each examined the effect of a particular variable, such as gender or parental education on family investment in education [7,8].

Although there have been many studies abroad examining the relationship between household socio-economic income and education expenditure at the preschool level, it is clearly not possible to directly generalise foreign research findings to China due to differences in education policies and social environments [9]. Furthermore, family investment in education is an important way to influence children's educational achievement. Educational expectations are both an incentive for parents to invest in education and act as a 'significant others' encouragement' that transmits such values and preferences from generation to generation [10]. At the same time, economic disparities between regions are a constant problem in the country's economic development. Based on factors such as geographical location, natural and historical conditions and national strategies, there are obvious differences in the level of economic development between the east, middle and west of China [11]. The economic differences between regions will inevitably lead to differences in household economic income and expenditure in each region. Therefore, based on the existing studies, this paper aims to incorporate multiple variables such as household income and educational expectations in a macro and micro perspective by comparing the data of specific provinces in the eastern, central and western regions of China, and to make a systematic and comparative analysis of family investment in education at the preschool stage, so as to provide a more complete research result on the state of family investment in education for preschool children in China.

3. Method

3.1. Data sources

The main data used in this paper come from the China Family Panel Studies (CFPS) executed by the China Social Science Survey Centre of Peking University and the 2019 consolidated statistical

yearbooks of various cities in Guangdong Province, the 2019 Statistical Yearbook of Henan Province and the 2019 Statistical Yearbook of Gansu Province. Among them, CFPS has long been concerned with the education, growth and development of children, and has established a special database for the group of children under the age of 16, collecting information on various aspects of children's growth process, while having informative information on family background for comprehensive analysis [12]. In this study, a sample of children at the preschool level (3-6 years old) from the CFPS 2018 Child Parent Surrogate Database was selected for analysis. As there were missing values for the variables, after removing the missing values for each variable, the sample size for the analysis of annual household education expenditure was 1310, the sample size for the analysis of parents' educational attainment was 564, the sample size for the analysis of desired children's educational attainment was 781, and the sample size for the analysis of household marital status was 802.

3.2. Variable setting

This study focuses on the correlation between household expenditure on education and some of the influencing factors within the household. The dependent variable selected for this study is annual household expenditure on education investment, measured by the questionnaire "In the past 12 months, how much did your household pay in total for this child's education?" In the CFPS2018 questionnaire, 10 items of household expenditure on education were collected for preschool children: extra-curricular tutoring, tutor fees, school fees, food, accommodation, school bus fees, payment for books and equipment, school visits, exchanges, activities, clothing and musical instruments, sports equipment purchase or rental, other expenses, and a total of these 10 items. In this paper, four independent variables were selected, namely "parents' education", "total annual household income", "expected education level of children" and "marital status", representing the total expenditure on these 10 items. The four independent variables are "parental education", "total annual household income", "expected level of children's education" and "marital status", which represent several dimensions that affect the annual expenditure on education investment of households. The control variables in this paper mainly include the gender of the children, the age of the children and the number of siblings of the children.

3.3. Research Methodology

This paper used literature analysis and multiple linear regression analysis methods as well as OLS models to conduct regression analysis on the relationship between annual household income and annual household education expenditure for each of the representative provinces (Guangdong Province, Henan Province and Gansu Province) selected from the east, middle and west of China, combined with macro China Statistical Yearbook data and micro CFPS data.

3.4. Research hypothesis

This paper presents the following six main hypotheses.

H1: Total annual household income from work is significantly related to annual household expenditure on education at the preschool level.

H2: Both parents' education levels were significantly associated with annual household education expenditure at the preschool level.

H3: Preferred level of education for children is significantly correlated with annual household expenditure on education at the preschool level.

H4: There are significant differences in the education expenditure of preschool families in different regions of eastern, central and western China.

H5: Family marital status is significantly associated with annual family education expenditure at preschool level.

H6: The correlation between household income and education expenditure by municipality is consistent with the correlation between education income and education expenditure by individual households in the micro-data survey.

4. Results

4.1. Descriptive analysis

Table 1 shows the various values used in this study.

Table 1. Descriptive statistics

Variable name	Average value	Standard deviation	Maximum value	Minimum value	Sample size
Guangdong - Annual household income from work	88033.88	86931.34	680000	0	317
Guangdong - Total expenditure on education	4031.833	5352.849	53000	0	317
Guangdong - Mother's degree at undergraduate level and above	0.1391304	0.3475972	1	0	115
Guangdong - Father's degree at undergraduate level and above	0.244898	0.434483	1	0	49
Guangdong - Prefer children to be educated to primary level and above	0.9955556	0.0666667	1	0	225
Guangdong - Prefer children to be educated to junior secondary level and above	0.9866667	0.1149534	1	0	225
Guangdong - Preferred education level for children is high school and above	0.9377778	0.2420973	1	0	225
Guangdong - Prefer children to be educated to tertiary level and above	0.8444444	0.3632416	1	0	225
Guangdong - Prefer children to be educated to undergraduate level and above	0.8311111	0.3754891	1	0	225
Guangdong - Prefer children with a Master's degree or above in education	0.0622222	0.2420973	1	0	225
Guangdong - Prefer children to be educated to PhD level and above	0.0355556	0.1855921	1	0	225
Guangdong - Marital status as two-parent family	0.8584071	0.349406	1	0	226
Henan - Annual household income from work	66052.02	60978.42	500000	0	538
Henan - Total Education Expenditure	3488.587	4600.751	65000	0	538
Henan - Mother's degree at undergraduate level and above	0.1929825	0.3957984	1	0	171
Henan - Father's degree at undergraduate level and above	0.2280702	0.4233178	1	0	57
Henan - Prefer children to be educated to primary level and above	1	0	1	1	1
Henan - Prefer children's education level to be junior high school and above	0.996988	0.548821	1	0	332
Henan - Preferred education level for children is high school and above	0.9849398	0.1219764	1	0	332
Henan - Prefer children to be educated to tertiary level and above	0.8524096	0.3552288	1	0	332

Henan - Prefer children to be educated to undergraduate level and above	0.8072289	0.3950703	1	0	332
Henan - Prefer children with a Master's degree or above in education	0.1054217	0.3075595	1	0	332
Henan - Prefer children with PhD and above education	0.0662651	0.2491203	1	0	332
Henan - Marital status as two-parent family	0.9277108	0.259357	1	0	332
Gansu - Annual household income from work	48424.84	43642.03	400000	0	455
Gansu - Total Education Expenditure	2112.097	3101.867	16600	0	455
Gansu - Mother's degree at undergraduate level and above	0.0982143	0.2989417	1	0	112
Gansu - Father's degree at undergraduate level and above	0.166667	0.375823	1	0	60
Gansu - Prefer children to be educated to primary level and above	1	0	1	1	244
Gansu - Prefer children to be educated to junior secondary level and above	1	0	1	1	244
Gansu - Prefer children's education level to be high school and above	0.9754098	0.1551908	1	0	244
Gansu - Prefer children to be educated to tertiary level and above	0.8729508	0.3337126	1	0	244
Gansu - Prefer children to be educated to undergraduate level and above	0.8319672	0.3746639	1	0	244
Gansu - Prefer children with a Master's degree or above	0.1352459	0.342689	1	0	244
Gansu - Prefer children with a PhD or above in education	0.1065574	0.3091839	1	0	244
Gansu - Marital status as two-parent family	0.9467213	0.2250503	1	0	244

4.2. Results of multiple regression analysis

This study applies multiple linear regression analysis to explore the extent to which four possible factors from within the family influence the total family education expenditure. Firstly, parental education was categorised as father's and mother's education at the undergraduate level and above, desired children's education level was categorised as desired children's education at primary level and above, junior secondary level and above, senior secondary level and above, college level and above, undergraduate level and above, master's level and above and doctorate level and marital status was set as a two-parent family and all of them were set as dummy variables, and then regression analysis was conducted. Tables 2, 3 ,4 and Table 5 compare the relationship between total household expenditure on education and total annual household income from work, parental education, desired level of education of children and marital status respectively.

According to the results of the multiple linear regression analysis, the p-values of gross annual household income and parental education on annual education expenditure of preschool children were less than 0.01, which were highly significant and positive, while the p-values of desired children's education level and marital status on annual education expenditure of preschool children were greater

than 0.05, No significant correlation was shown between the variables (The following annual education expenditure of preschool children is referred to as the annual family education expenditure)

Table 2. Annual gross income from work and Total education expenditure for the year

	Guangdong Province	Gansu Province	Henan Province
Annual gross income from work	0.0260546**	0.011681**	0.0186712**
	(0.0031435)	(0.003294)	(0.0031575)
cons	1738.144**	1546.445**	2255.32**
	(388.6163)	(214.6263)	(283.7269)
Adjusted R^2	0.1764	0.0249	0.0595
Obs	317	455	538

Note: *p<0.05; **p<0.01.

In Table 2, the regression analysis based on reg shows that the p-value is less than 0.01 in Guangdong Province, Henan Province and Gansu Province, indicating that in these three provincial areas in the east, middle and west of China, the total annual income from household education work has a highly significant effect on the total annual household education expenditure. Based on the interpretation of the cons data, it can be seen that when the total income is zero, the average annual total education expenditure is 1738.144 RMB in Guangdong Province, 1546.445 RMB in Gansu Province and 2255.32 RMB in Henan Province. When the annual gross working income increased by RMB 1, the total annual education expenditure increased by RMB 0.0260546 in Guangdong Province, RMB 0.011681 in Gansu Province and RMB 0.0186712 in Henan Province.

Table 3. Parents' education level and Total education for the year

	Guangdong Province	Gansu Province	Henan Province
Mother's education at undergraduate level and above	10185.36**	3423.116**	6799.495**
	(1685.872)	(1220.921)	(1041.377)
cons	5620.889**	3013.248**	3393.051**
	(628.8337)	(382.6263)	(457.4746)
Adjusted R^2	0.2375	0.0582	0.1967
Obs	115	112	171
Father's education at undergraduate level and above	3283.784	606.86	4430.105**
	(1954.082)	(1308.725)	(1128.261)
cons	5516.216**	2769.14**	4096.818**
	(967.0199)	(534.2848)	(538.8201)
Adjusted R^2	0.0366	-0.0135	0.2047

Note: *p<0.05; **p<0.01.

In Table 3, reg-based regression analysis shows that the p-values for Guangdong Province, Gansu Province and Henan Province with mothers' education at or above the bachelor's degree are less than 0.01, and the p-values for households with mothers' education below the bachelor's degree (mothers' education at or above the bachelor's degree = 0) are less than 0.01, indicating that in the eastern, central and western regions of China, both mothers' education at or above the bachelor's degree and bachelor's degree or below the bachelor's degree have a highly significant positive effect. In the eastern, central and western regions of China, both the mother's education at or above the bachelor's degree level and the mother's education at or below the bachelor's degree level have a significant positive effect on the total annual education expenditure of the household. The average education expenditure of households with mothers' education at or below the bachelor's degree level (mothers'

education at or above the bachelor's degree level = 0) was RMB 5,620 in Guangdong Province, RMB 3,393 in Henan Province and RMB 3,013 in Gansu Province. In Guangdong Province, the education expenditure of households with mothers' education at undergraduate level and above is RMB 10,185.36 higher than that of households with mothers' education at undergraduate level. In Gansu Province, the annual education expenditure of households with mothers' education at undergraduate level and above is RMB 3,423.116 higher than that of households with mothers' education at undergraduate level and below, and in Henan Province, the annual education expenditure of households with mothers' education at undergraduate level and above is 6,799.495 Yuan.

The p-values for those whose fathers have a bachelor's degree or above are greater than 0.05 in Guangdong Province and Gansu Province, indicating that in the eastern and western regions, there is no significant effect of father's education level on total annual household education expenditure, while the p-value for those whose fathers have a bachelor's degree or above is less than 0.01 in Henan Province, proving that in the central region, there is a highly significant positive effect of father's education level on total annual household education expenditure. The average annual total education expenditure of fathers with an education level of bachelor's degree or below was RMB 4096.818, and the annual total education expenditure of fathers with an education level of bachelor's degree or above was RMB 4430.105 higher than that of fathers with education level of bachelor's degree or below.

Table 4. Preferred level of education for children and Total education expenditure for the year

	Guangdong Province	Gansu Province	Henan Province
Preferred level of education for children is primary and above	-1675	0.011681	0
	(7513.833)	(0)	(0)
Preferred level of education for children is junior secondary and above	-435.9091	0	-6642.5
	(4716.026)	(0)	(5463.821)
Preferred level of education for children is high school and above	-356.71	1013.1	2189.091
	(2883.415)	(1685.48)	(2552.147)
Preferred level of education for children is tertiary and above	4827.619	1216.4	-13.92424
	(3786.616)	(1387.242)	(1461.152)
Preferred level of education for children is undergraduate and above	-1264	-648.3588	1392.355
	(3572.634)	(1206.424)	(1301.798)
Preferred education level for children is Master's degree and above	-1274.333	-435.4983	814.9785
	(2547.673)	(1429.886)	(1392.706)
Preferred education level for children is PhD and above	-412.9167	709.2802	-3013.636
	(3313.289)	(1578.736)	(1709.592)
cons	5700	1465.5	7800
	(6135.019)	(1513.605)	(4886.99)
Adjusted R^2	0.0106	-0.0118	0.0117
Obs	225	244	332

Note: *p<0.05; **p<0.01.

In Table 4, regression analysis based on reg shows that regardless of the level of education parents want their children to have, and regardless of the East, Midwest and West regions, the p-value is

greater than 0.05, so there is no significant effect of the level of education parents want their children to have on annual household education expenditure in the East, Midwest and West regions.

Table 5. Family marital status and Total education expenditure for the year

	Guangdong Province	Gansu Province	Henan Province
Family marital status as two-parent family	1686.327	1680.825	592.0157
	(1173.132)	(1047.27)	(1042.86)
cons	4730.313**	1401.538	3782.708**
	(1086.91)	(1018.99)	(1004.459)
Adjusted R^2	0.0047	0.0064	-0.0021
Obs	226	244	332

Note: *p<0.05; **p<0.01.

In Table 5, regression analysis based on reg shows that there is no significant effect of household marital status being a two-parent household on education expenditure in Guangdong Province, Gansu Province, and Henan Province.

Meanwhile, in order to further verify the correlation between economic development and education expenditure in different regions, this paper has done an analysis on the relationship between urban residents' income and education expenditure in each city of the province, with relevant data from 18 major cities in Guangdong Province, 28 cities in Henan Province and 14 urban areas in Gansu Province respectively. (See Figures 1, 2 and 3)

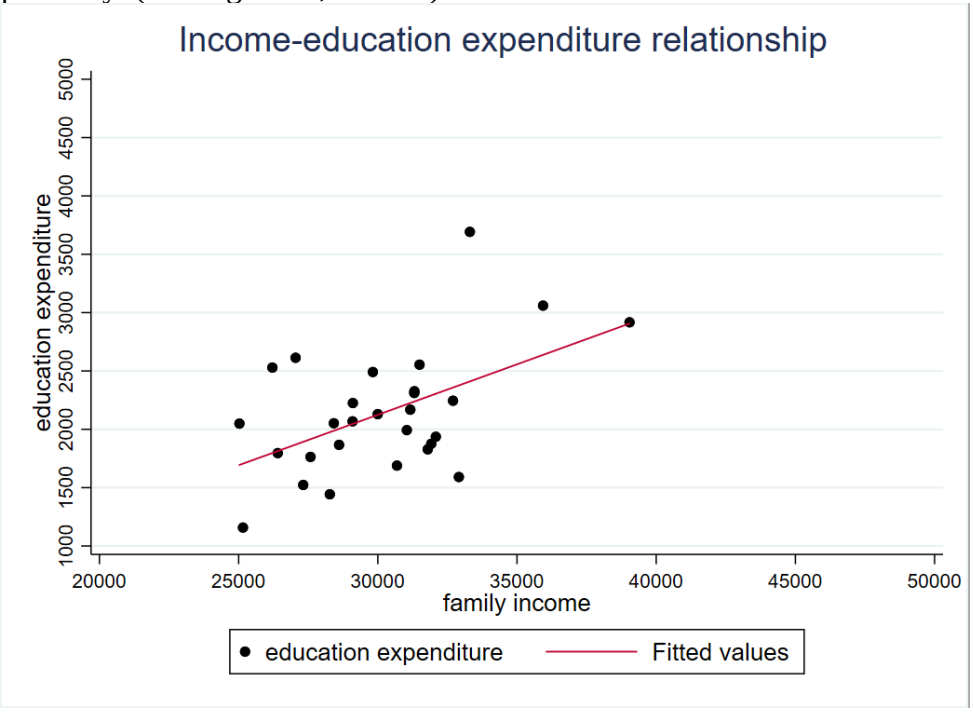

Fig.1 Henan Province Relationship between income and education expenditure

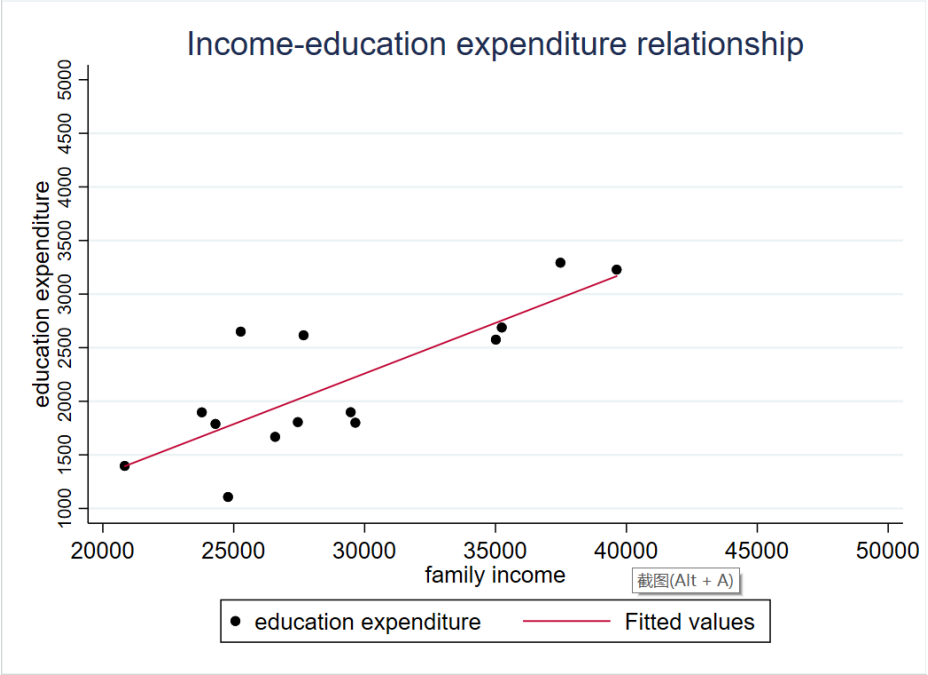

Fig.2 Gansu Province Relationship between income and education expenditure

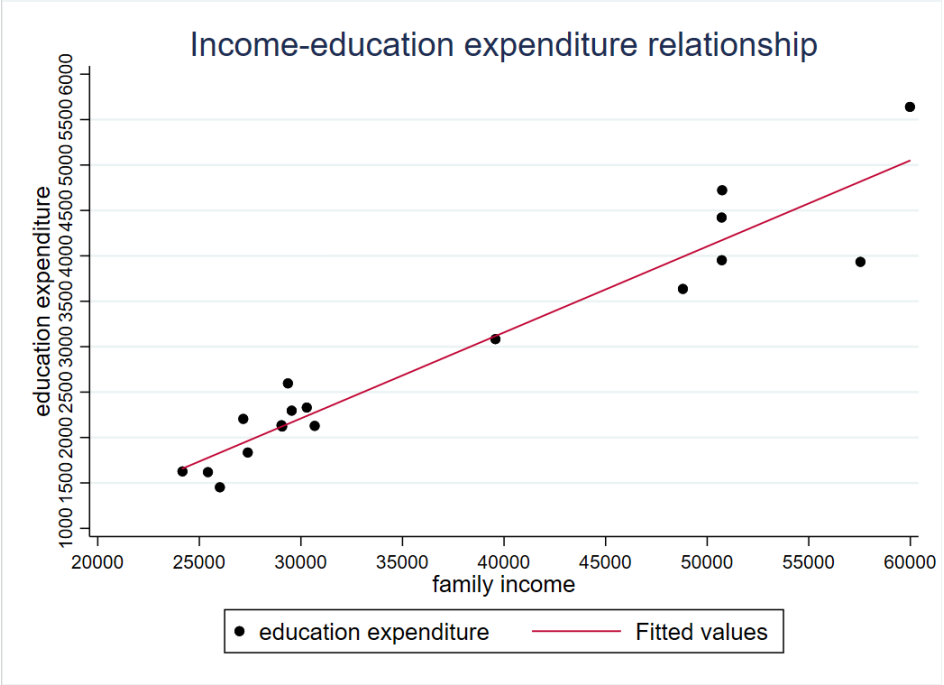

Fig.3 Guangdong Province Relationship between income and education expenditure

A linear regression scatter plot shows that Guangdong province p=0.00, Henan province p=0.005 and Gansu province p=0.01, all with p-values less than 0.01, indicating a significant positive correlation between urban residents' income and education expenditure.

Therefore, both macro and micro data show a significant effect of annual household income on annual household expenditure on education.

5. Discussion

As a result of the author's research, the previous hypothesis is partially valid, as analysed below.

This paper examines the relationship between four intra-household factors and total household expenditure on education at the preschool level. Survey data based on the East Midlands and West

regions make the test appear more specific than previous similar studies. The main findings of this paper are as follows.

(a) Gross annual household income from work and parents' level of education were all significantly associated with annual household expenditure on education at the pre-primary level.

This study found that families with higher economic levels were willing to spend more of their income on their children's education during the pre-school years. Mothers who also have an education level of Bachelor's degree or above spend more on education, while the father's education level does not have a significant effect on education spending. In China, mother is generally the main bearer of family upbringing, and being more concerned about the environment and level of education their children receive at the pre-school level, while the socio-economic status advantage they have gained in their own academic education makes them aware of the importance of education to their children's growth and development, and therefore willing to invest more.

The data study also found that parents' educational expectations of their children did not have a significant impact on education spending, whether in Guangdong Province, Henan Province or Gansu Province, whether parents expected their children to have a junior or senior high school education or a higher level of education did not affect their financial investment in preschool education, while marital status, whether married or divorced, did not affect their children's educational attainment either The educational attainment of children is not affected by marital status, whether married or divorced.

(b) There are significant differences in household expenditure on education for preschool children in different regions of eastern, central and western China.

This paper finds that although factors such as total household income and parental education have a significant impact on preschool expenditure in all three provinces, the situation varies and varies significantly from province to province. For example, mothers with education levels above specialist in Guangdong province spend more on education at the preschool level than in Henan province, which in turn is higher than in Gansu province. In the more developed regions, in addition to the level of education of mothers, good economic development and the diversity of preschool development have led to more advanced ideas and awareness among parents to support the educational growth of their children, prompting them to be more willing to invest in their children's education.

(c) The correlation between income and education expenditure for urban residents in provincial cities from the macro data survey and the correlation between household education income and education expenditure from the micro data survey are generally consistent. For families, higher economic power can provide more educational support and options for their children. The degree of urban development, as an external objective condition, has a strong positive effect on household spending on preschool education. Household spending on preschool education increases as income increases.

Through the above conclusions, the following recommendations are made.

The development of education, whether in the region or in the family, cannot be achieved without economic investment. In terms of regional investment in education, there is a need for the state and government to increase public investment in education based on the development of the local economy, to provide more quality public affordable preschool resources, and to balance the imbalance in educational opportunities brought about by differences in the economic income status of families.

From the family side, helping parents, who are already in a less privileged socio-economic and cultural position, to raise their awareness of their children's education and to create awareness of other educational resources (caring companionship, time and energy investment, habit formation, etc.) to invest in their children is one way to improve the current situation.

The significant impact of investment in education on the level of education of mothers in different regions in the East, Middle and West shows that the role of mothers not only plays an important role in life, but also plays a key role in the upbringing and nurturing of their children, and that the level of education of mothers has a direct impact on the level and effectiveness of education received by the

next generation of children. It is recommended that the state should encourage more women to pursue higher levels of education, thus contributing to the educational development of the next generation.

6. Conclusion

This paper finds that household education expenditure at the preschool level for 3–6-year-olds in China has a significant correlation effect with total household income and the mother's education level, and that there are significant differences in household education expenditure for preschool children in different regions of eastern, central and western China.

The preschool years are an important period in children's development. A good educational environment includes both home education and institutions such as kindergartens and out-of-school interest development, and children's access to high-quality educational resources and environments is key to growth. Differences in investment by families with different incomes and education levels can lead to differences in education levels and educational outcomes, especially for families of lower socio-economic status who have limited choices. The government and relevant authorities still need to enhance the likelihood of lower-income families having access to quality learning opportunities through measures such as increasing public funding guarantees and improving the quality of teaching in public schools. At the same time, the education level of mothers affects household expenditure on education, so the government recommends increased policy support in supporting the growth of women, especially the mother group, such as conducting workshops on relevant topics in different regions and offering further education degrees in universities to continue to raise the education level of women and thus enhance the positive impact on the developmental stages of children.

Due to the limitation of the selected data sample, there is a lack of specific data on the expenditure of 10 items, so this paper cannot investigate the specific expenditure structure of household investment in preschool education and understand the focus of parents' household education expenditure. The previous survey on the level of preschool education consumption expenditure of families with children aged 3-6 in urban China, which was conducted by a scholar in 2013 using the questionnaire method, has reference value in this regard, but as the data sample is from 2010, and with the changing economic conditions of Chinese household residents and changes in education policies and environment, the direction of education investment of many families has changed, the data aspect and the guiding significance for today's society There are still shortcomings.

It is hoped that the relevant departments and institutions can collect the latest data, especially after the dramatic shift in out-of-school education since the promulgation of the double reduction policy. What kind of direction and strategies parents are investing in the pre-school stage, and whether the structure of family investment in education has changed, all require more accurate data for specific analysis.

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