Original Article

An Evaluation of the Investment for Child Development in China*

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Abstract

Objective This study estimated the investment in child development from three aspects-public health, public education, and family investment to establish the level of investment, to provide reference information for government decision making and to provide international comparisons.

Methods Public investment in health was measured with macro data related to public health spending and child development in government expenditure. Public education investment was based on basic education data. Family investment evaluation was based on per capita family consumer spending data in different age groups to estimate the input for child development.

Results Both public health investment level and the proportion of GDP rose for all age groups over time, but the overall investment level was still insufficient. Public investment in children's education has increased year by year, but the trends in all age groups are unbalanced with much lower investment in early childhood education. Private investment in children has increased over the period, but has declined as a percentage of GDP. International comparisons show that China's investment in child development is much lower than OECD countries.

Conclusion The private investment in child development was the main way in China, with public finance contributing only a small proportion. Given the poor international comparisons, the government needs to review the balance of public investment to redirect more towards the development of children under the age of six to their health and education.

Key words: Child development; Public investment in health; Public investment in education; Private investment

Biomed Environ Sci, 2012; 25(4):413-420 doi: 10.3967/0895-3988.2012.04.006 ISSN:0895-3988

www.besjournal.com(full text) CN: 11-2816/Q

INTRODUCTION

The Importance of Early Childhood Development

Early childhood development is critical. This is because a child's early experience has a unique and powerful influence on cognitive ability, social ability, health, and the organizational structure of the brain. The child's ability or the development of the brain is an ongoing process. More advanced development builds on the earlier development. In early childhood the brain has good plasticity, and this is the best period for some

*This study was funded by National Key Project (973) of Study on Interaction Mechanism of Environment and Genetic of Birth Defect in China (No. 2007CB5119001), State Key Funds of Social Science Project (Research on Disability Prevention Measurement in China, No. 09&ZD072), National Health Baby Promotion Program (No.FP2000NO13), Education Ministry Key Program (No. 02185), National Yang Zi Scholar Program, 211 and 985 projects of Peking University (No. 20020903).

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Received: July 18, 2011; Accepted: February 17, 2012

functional developments[1]. Therefore, the investment in health and education for early childhood is very important, especially for children in disadvantaged conditions. As early childhood development will subsequently affect the quality and efficiency of the national labor force, the quality of life, and social justice, stability and development in the future, the investment in children is essential.

The investment in children also forms the basis for human capital formation, and human capital investment plays a more and more important role in social and economic development. Schultz, the human capital economist, identifies the importance of human capital investment and expressed that human capital, as the accumulation of the nonmaterial wealth of the present or future labors in their health, intelligence, ability, knowledge, skills, experience and qualifications, could bring income for its owner in the present or future[2]. The investment in human capital refers to the investment of human resources in education, training and health.

Children's Survival Situation and Challenge in China

In 2005, there were 260 million children between 0-14 years old in China, the largest child demographic group in any country in the world. In the past 20 years, China has had great success in reducing maternal and child mortality rates, and the living conditions of women and children have improved. But since the 1990s the reduction in maternal and child mortality rates has slowed, and women and children face new threats and challenges to their health in China. There are four main problems. First, the rate of decline in child mortality was already leveling off. Second, there is a contradiction between the macro objectives and the service provision. The government is unclear about its function in the provision of maternal and child health care, which was also impacted by marketization. This has caused the service provided to be unable to meet demand, and the quality of maternity and child health service cannot be guaranteed. Third, the maternal and child care system has failed to cover the socially vulnerable groups. Finally, the coordination mechanisms between maternal and child health care policies and other social policies are weak[3].

The government funds available for maternal and child health care investment were less, and growth rate was slower than the growth rate for other health funding. From 2000-2003, the per capita maternal and child health care input increased from 0.94 Yuan to 1.31 Yuan. Compared to the international per capita basic package of US$10-14, a huge gap existed. In 2004, the maternal mortality rate in China's rural area was 3.2 times that of the city, in the western area and remote area it was 4.1 times and 7.7 times that of the eastern coastal area respectively. Although the Chinese government has actively taken measures to reduce the maternal mortality rate through increasing the maternal in-patient delivery and related policies, the overall government investment in women and children was insufficient, and the difference between urban and rural areas was still dramatic.

The Estimates of the Investment in Child Development

Chinese scientists began to estimate the cost of child development in the 1970s. In 1979, China's National Bureau of Statistics and the Institute of Population Research of the People's University together began to estimate the expenditure on children. They divided the spending on children into two parts, public and private. The public part of the spending estimation used a proportion of general expenditure, and private expenses were estimated through a cost of living survey or other typical household survey[4]. In 1986, the Institute of Population Research of the People's University conducted such a survey in the Beijing area, and got the private and state expenditure on courses for training the labor force[5]. Other related domestic research was ongoing[6-9], and the related international research also provides reference points for our research[10-12].

Investment in children has gained some scientists' attention, but most of the research in China is cross-sectional studies. This paper tries to estimate the investment in children from three aspects: public health, public education, and private investment and provide a time series analysis from 1980-2006, to show the comparative investment level, to be useful to the government in making decisions and to draw comparisons with other countries.

MATERIALS AND METHODS

Data

"Early childhood" has no strict definition. Often children from 0-6 years are classified as early childhood. UNICEF uses the 0-8 age group as early childhood, and the OECD defined early childhood as

0-10 years. In this study we defined children as 0-19 years and the 0-4 age group as early childhood. We defined four age groups, 0-4, 5-9, 10-14, and 15-19. We divided the investment in children into two broad categories: public expenditure and private expenditure.

In measuring public spending on health, the age specific population data came from the "China Statistical Yearbook", "China Population Statistical Yearbook" and the United Nations' population data. The 1985, 2000, 2006 age specific population data came from the "China Statistical Yearbook" and the United Nations' population data. The rest of the age specific population data came from the "China Population Statistics Yearbook". Maternal and child care budget data came from the China's Total Health Expenditure Report 2007". Family planning operating expenses came from the "China's Health Statistical Yearbook 2008". The total cost of national insurance and welfare came from the "China's Labor Statistical Yearbook 1994". The total birth insurance fund spending came from the "China's Statistical Yearbook 2007". Social welfare spending came from the "China's Finance Yearbook 2007". In the public education input estimation, the data came from the "China's Education Finance Statistical Yearbook" and the "China Statistical Yearbook".

In the private investment evaluation, the number of age specific children and the urban and rural consumer spending per capita came from the "China's Statistical Yearbook". We got the population for the five year age groups from the United Nations population data.

Statistical Methods

Public Health Investment Estimate For this, we selected child development related items from the public finance data, combining the spending of these items with the demographic data to estimate the public health investment in child development. The three categories we selected were health care, general public service and social welfare. The health care spending included the maternal and child care budget and we selected family planning budget for general public service spending. We used the total amount of insurance welfare, birth insurance fund spending and public health spending for children to represent social welfare which reflected the public spending overall. In the health care field, maternal and child care is highly correlated with child development, and the input can be regarded as child development. In the general public service domain, based on the characteristics of child development, the study focused mainly on the population and family planning items. Although the family planning service is not exclusively for children, children are the final beneficiaries, so the study used "family planning" as the general public service index.

In our research we assumed that the target subjects received the same proportion of public health investment, which meant an even distribution among the population; and the public spending represented an equal allocation of spending on large items[4]. In order to ensure that public health investment for children was comparable, we converted all public health spending to 1978 values. In fact, owing to the simple indirect estimation, only the actual amounts of investment showed trends over the period of study.

Public Education Investment Estimate As we studied mainly the rising expenditure on children, we focused on the investments in pre-school education (nursery school), elementary school, junior high school education and special education. China's “special education” is divided into three categories. The first kind is special schools for blind children, for deaf children, and for children with mental health issues and physiological disabilities. The second kind is technical schools with different specializations. The third kind is any other special education school. The majority of special schools are of the first kind. Owing to the special education subjects for children in the 5-19 age group, we have allocated special education funding equally across all age groups.

This study considered that the 0-4 age group included one year in pre-school education; the 5-9 age group included two years in preschool education and three years in elementary school education; the 10-14 age group covered three years in elementary school education and two years in junior high school education; the 15-19 age group covered one year in junior high school education, and 3 years in senior high school education. We found the basic education investment for the 15-19 age group increased significantly after 2001. This was caused by the change in scope of the statistics for high school education. Before 2001, the statistical scope of high school education funding only included the senior high school, but since 2001 it has included both junior and senior high school. The data in this part include state financial education funds (including the budget and non-budgetary funds); the investments by social organizations and individuals into schools;

social donations; tuition, miscellaneous fees and other education funds. As tuition and miscellaneous fees belong to private spending, which has been calculated under the private investment part, this part of expenditure for child development maybe inflated because of potential double counting?

Private Investment Estimate We used the family's per capita consumer spending data, and used the weighted results to represent the annual private spending on child development. We calculated the weighted investment in children for each of the age groups based on the cost of raising a single child in 1998. The calculation of the weighting is shown in Table 1[9,13], the 0-4, 5-9, 10-14, and 15-16 age groups' weight are: 0.96, 1.00, 0.98, and 1.15, respectively. As the family's per capita consumer spending only have 0 to 16 data, we use the weight of 15-16 age group to represent the 15-19 age group, which is calculated in this paper.

This measure assumes that the children and adults spend the same in the family. The advantage of this measure is that the urban and rural per capita consumer spending data came from the family survey by the national bureau of statistics. The data covered all family consumers spending: food, clothing, family equipment supplies and service, medical care, transportation, telecommunication, education, culture entertainment services, living and miscellaneous goods and services. In 1979, the Institute of Population Research of People's University adopted this method of measurement[4].

RESULTS

Public Investment in Children's Health

The estimates of public investment in children's health changed greatly around 1993 because of the adjustment of the statistical criteria. Some items of child welfare were dropped and other items like maternal insurance were added. To ensure comparability, we restricted our estimates to 1994-2006 (Table 2). The public investment in children's health kept rising and reached its highest in 2006 (9.298 billion Yuan). We also calculated the public investment in children's health as a percentage of GDP with all figures converted to our baseline date for comparability. The spending as a percentage of GDP was highest in 2006 (0.21%).

Public Investment in Children's Education

The public investment in children's education rose from 1996 to 2006, and the distribution of exp-

Table 1. Comparative Weighting of Family Support for Children in 1998

Age	Child Support (1)	Age Group (2)	Average Child Support for Different Age Group(3)	Weighting of Different Age Groups (4)=(3)/(∑(1)/17)
0	3 701.0*	0-4	3 201.5	0.96
1	2 743.3			
2	3 125.6			
3	3 146.8			
4	3 290.6			
5	3 471.2	5-9	3 327.7	1.00
6	3 308.3			
7	3 425.9			
8	3 235.2			
9	3 197.8			
10	3 043.1	10-14	3 246.4	0.98
11	3 031.8			
12	3 289.7			
13	3 430.8			
14	3 436.7			
15	3 809.2	15-16	3 813.9	1.15
16	3 818.6			
Total	56 505.6			

Note. * Includes the delivery fee.

Table 2. Public Investment in Children's Health by Age Group, 1994-2006 (Billion Yuan)

Year	Age Group				
	0-4	5-9	10-14	15-19	0-19
1994	0.28	0.34	0.29	0.27	1.18
1995	0.26	0.38	0.31	0.26	1.22
1997	0.31	0.46	0.44	0.36	1.57
1998	0.34	0.50	0.52	0.41	1.77
1999	0.40	0.55	0.67	0.49	2.11
2000	0.55	0.59	0.68	0.58	2.40
2001	0.55	0.71	1.00	0.76	3.02
2002	0.75	0.96	1.37	1.17	4.25
2003	0.93	1.20	1.66	1.55	5.35
2004	1.14	1.40	1.91	2.01	6.45
2005	1.49	1.74	2.22	2.36	7.80
2006	1.73	2.02	2.55	3.00	9.30

Source: Data from "China's Health Statistics Yearbook 2008", "China's Labor Statistics Yearbook 1994", "China's Statistical Yearbook 2007", and "China's Finance Yearbook 2007".

enditure among age groups varied. The financing level indicated the available public education resources for children at different stages, which mirrors the education philosophy of the country. Table 3 shows an obvious preference of public investment towards older children and the group aged 10–14 took the largest share, which was in accordance with the compulsory education policy in China. On the other hand, as the key stage for child development, early childhood aged 0-4 received only limited resources. In 2006, for example, the public investment in pre-school education including kindergarten was just 4.06 billion Yuan and the corresponding amount for children aged 10-14 was 210.54 billion Yuan. In other words, the public education investment in children aged 10-14 was 52 times more than in children aged 0-4.

Table 3. Public Investment in Basic Education by Age Group (Billion Yuan)

Year	Age Group				
	0-4	5-9	10-14	15-19	0-19
1996	0.97	40.44	72.60	35.52	149.53
1997	1.14	44.28	78.84	40.18	164.44
1998	1.33	48.89	80.21	31.35	161.78
1999	1.52	53.05	86.79	35.06	176.42
2000	1.72	57.88	95.34	41.83	196.77
2001	2.01	68.16	113.29	89.93	273.39
2002	2.25	77.41	130.22	110.02	319.90
2003	2.48	84.22	143.54	127.49	357.73
2004	2.92	96.71	178.51	135.30	413.44
2005	3.49	109.33	202.50	159.61	474.93
2006	4.06	118.16	210.54	161.78	494.54

Source: Data from the "China Education Finance Statistics Yearbook" and "China Statistical Yearbook".

Private Expenditure on Child Development

Private expenditure was greater on older children than younger and private investment increased over time (see Table 4), but the percentage of GDP spent on private investment in raising children declined gradually (see Table 5). The private investment in raising children aged 0-4, 5-9, 10-14, and 15-19 accounted for 4.4%, 4.4%, 5.4%, and 6.6% of GDP in 1985, respectively. However, the corresponding percentages fell to 1.6%, 2.0%, 2.5%, and 3.4% in 2006. This trend may reflect that the incremental growth of per capita consumer spending was much slower than that for GDP.

Table 4. Family Expenditure on Children by Age Group, 1985-2006 (Billion Yuan)

Year	Population Number	Aged 0-4	Aged 5-9	Aged 10-14	Aged 15-19	Aged 0-19
1985	4286.6	39.77	39.49	48.77	59.87	616.56
1990	8824.7	87.63	78.24	73.64	108.88	1 230.86
1995	23754.4	195.42	230.55	194.64	219.18	3 215.23
2000	36517.6	265.21	296.99	330.88	334.25	4 879.09
2003	48707.3	233.62	313.49	425.04	465.33	6 308.21
2004	55411.8	262.67	337.06	449.71	555.63	7 146.25
2005	63959.2	398.84	465.24	491.61	655.48	8 407.09
2006	71071.7	346.42	420.64	520.54	719.71	9 114.48

Table 5. Family Expenditure on Children by Age Group as a Percentage of GDP, 1985-2006

Year	GDP (Billion Yuan)	Aged 0-4	Aged 5-9	Aged 10-14	Aged 15-19	Aged 0-19
1985	901.60	4.4	4.4	5.4	6.6	20.8
1990	1 866.78	4.7	4.2	3.9	5.8	18.7
1995	6 079.37	3.2	3.8	3.2	3.6	13.8
2000	9 921.46	2.7	3.0	3.3	3.4	12.4
2003	13 582.28	1.7	2.3	3.1	3.4	10.6
2004	15 987.83	1.6	2.1	2.8	3.5	10.0
2005	18 386.79	2.2	2.5	2.7	3.6	10.9
2006	21 087.10	1.6	2.0	2.5	3.4	9.5

Comparison among Public Health, Public Education, and Family Investment in Children

Table 6 shows a range of public health and education investment in children aged 0-19. The total expenditure was 669.296 billion Yuan, of which public investment in education was highest at over 70%, followed by investment in social security and subsidy, urban construction and maintenance and running costs for health care.

Table 7 shows the results divided by age group. Public education was the highest expenditure item among all the age groups except children aged 0-4 who were hardly involved in public education. A large difference existed in public expenditure between education and other categories.

When comparing all age groups, the expenditure on health care provision, general public service, social welfare and urban construction and maintenance tended to increase. This related closely to the number of children in the different groups. For public education expenditure, the two groups with highest investment were children aged 10-14 and 15-19. The expenditure on the other groups was

Table 6. Public Investment in Children in 2006

Types	Expenditure (Billionuan)	Percent Age (%)
Operating expenditure for health care	36.01	5.4
General public service expenditure	26.03	3.9
Expenditure on social security and subsidy	57.93	8.7
Expenditure on maternal insurance	3.75	0.6
Operating expenditure on civil affairs- welfare center for children	0.47	0.1
Expenditure on New Rural Cooperative Medicare Scheme	4.25	0.6
Expenditure on urban construction and maintenance	46.33	6.9
Child care center	12.19	1.8
Elementary school	218.32	32.6
Junior high school	150.76	22.5
Senior high school	110.65	16.5
Special education	2.62	0.4
Total	669.30	100.0

Source: Data from the "China Health Statistics Yearbook 2008", the "China Labor Statistics Yearbook 1994", the "China Statistical Yearbook 2007", the "China Education Finance Statistics Yearbook 2007" and the "China Finance Yearbook 2007".

much smaller. This partly reflected the attention paid to the nine-year compulsory education in China. The total public investment in child development as a percentage of GDP was 3.17%, with the highest for the 10-14 group at 1.23%, and the lowest for 0-4 group at 0.17%.

In 2006, the total percentage of GDP spent on child development was 12.67%, with 1.77% for 0-4 age group, 2.74% for 5-9 age group, 3.73% for 10-14 age group, and 4.43% for 15-19 age group. When comparing the public and private expenditure, the family was obviously the main supporter of child development. Using the investment in children aged 0-4 as an example, the private expenditure (1.6% of GDP) was almost 10 times as large as the public expenditure (0.17% of GDP). Although the differences in other age groups were not so great, the private investment in children was generally greater than public investment.

International Comparisons of Investment in Early Childhood

Table 8 shows public investment in children aged 0-5 in selected OECD countries. More than 1% of GDP was spent on early childhood in highly investing countries and the average level was 0.6% among all the 24 OECD countries. Our study showed that the public finance invested only 0.17% of total GDP in 0-4 year old child development, which is lower than these countries. As the calculation methods and items selected for the evaluation are different this cannot be a definite statement but the results indicate that China still has a long way to go to reach the level of expenditure in developed countries.

Table 7. Investment in Child Development by Age Group in 2006 (Billion Yuan)

Types	Age Group				
	0-4	5-9	10-14	15-19	0-19
Operating expenditure for health care	6.70	7.81	9.87	11.63	36.01
General public service expenditure	4.85	5.65	7.13	8.40	26.03
Social welfare	12.36	14.41	18.19	21.44	66.40
Expenditure on urban construction and maintenance	8.63	10.05	12.70	14.96	46.33
Education	4.06	118.16	210.54	161.78	494.53
Public expenditure on child development	36.59	156.08	258.42	218.20	669.3.0
Public expenditure as % of GDP	0.17	0.74	1.23	1.03	3.17
Family expenditure on child development	315.25	381.96	470.55	651.32	1819.07
Family expenditure as % of GDP	1.60	2.00	2.50	3.40	9.50
Total expenditure on child development	351.84	538.03	728.97	869.52	2488.36
Total expenditure as % of GDP	1.77	2.74	3.73	4.43	12.67

Table 8. Public Expenditure on Children in Selected OECD Countries and China, 2005

	Public Spending on Early Childhood as a % of GDP
Denmark	1.20
France	1.00
Finland	0.90
Belgium	0.80
New Zealand	0.70
UK	0.60
Germany	0.40
US	0.40
Japan	0.30
Korea	0.20
OECD 24- average	0.60
China	0.17

Source: Social Expenditure Database 1980-2005; OECD Education Database; Euro stat for Non-OECD countries; US Department of Health and Human Services.

Differences also existed in the investment structure between the United States of America and China. The federal budget in the US covered nutrition and housing for children, which were not included in China. The federal budget in the US spent 0.37% of GDP on health in 2007[10], and the national budget in China spent only 0.03% of GDP on health care in 0-4 age group, about 10 times less than in the US. Like other developing countries, China invested more in education than other development items. For example, in Jamaica, among all the public investment in children, 25% was invested in elementary education, 23% in middle, 3% in early childhood, and 27% in other education. The investment in health was 18%, and only 4% was invested in social welfare and other aspects[11].

Statistics also showed the pattern in China was similar to other Asian OECD countries, e.g. Japan and Korea, whose governments spent a relatively smaller percentage of GDP on child development (see Table 8). The cultures in these countries emphasize the role of the family and this maybe the reason why their governments chose to depend more on families in promoting children's well-being. The importance of the family can also be seen by comparing the situations in the US and China. The family investment in children aged 0-5 accounted for 1.4% of GDP in the US[14] and the corresponding percentage was 1.6% for children aged 0-4 in China. Although calculated differently, the results were close to each other, possibly reflecting the fact that family played a key role in child development in China.

DISCUSSION

The public health investment in children and its percentage of GDP tended to increase with time among all the age groups, with the 15-19 years old group increasing the fastest and 0-4 years old group the slowest. The children aged 0-4 always got less investment than others and even that investment sometimes decreased. There is a close relationship between public health investment in children and their development. An increase in investment will improve the development of children. However, from the current child development indicators, the public investment in children's health is still lacking.

Though the public investment in pre-school education kept rising, it was insufficient compared to the private investment. As discussed above, education in early childhood is critical for development through the whole life and also influences the quality of the future workforce, well-being of citizens, and equity, stability and sustainability of society. There are rich and poor families and investment by the family in children also varies. Thus, government should help children, especially the disadvantaged groups, to ensure equity in society.

Currently, the Chinese education investment system emphasizes the key role of county level government, which provides most financial support. However, although providing only 10% of the national education expenditure, the central government has a louder voice in decision making. Under this system, the children living in areas with strong public finance capacity usually access more education resource. If the transfer payment system does not work well, problems related to equality of opportunities will occur. Alongside economic development, the public investment in basic education continues to increase at a fast speed. However, it is still not sufficient. For example, the public investment in education reached 3.32% of GDP in 2007, which was lower than the government's target of 4%. More importantly, most of the increases in education finance go to higher education, and only a small amount is allocated to the most cost-effective basic education. This mainly results from the unreasonable role played by government. On the one hand, the government is "absent" as it is does not provide additional finance,

while on the other hand, the government has a determining role in allocating education resources. In such a situation, higher education schools seek to be the ones preferred by government, leaving basic education with little investment.

There was a wave of studies in 1980s-1990s when the private investment in children aged 0-16 increased very quickly but disparities existed among different survey results. We have assumed that the annual investment in children from 0-16 years old was similar, which was supported by Yang (1998)[9]. We then compared the previous results with the average annual cost of living expenditure per capita multiplied by 16. The latter was lower than the former during all the years except 1978. The difference increased as the data became more recent. The comparison indicated that using the average living expenditure per capita to replace the survey data might cause an underestimation of private investment in children. It is worth noting that all the survey results, except Feng (1987)[6], only reflected the private investment in children who reached 16-years-old, and did not consider the group who died before reaching the age of 16. From this perspective, the bias of our estimation method is not as large as estimated above. As we cannot calculate the degree of underestimation this is an area for further investigation.

There is a huge difference between urban and rural China. But because of the shortcomings of the indirect evaluation methods, we were not able to allocate our estimates to rural or urban China. We calculated the average level for the total population and then distributed the investment based on the population structure. So ultimately, the difference between urban and rural is just reflected by the difference in numbers of the population. We look forward to the evaluation to clarify the gap between urban and rural China.

Generally, the family is the main force investing in child development, and the investment from public finance is still low, especially in early childhood. During early childhood the private investment is nearly 10 times as much as the public investment. In the list of public investment, education takes a higher share than other items, and the investment in nutrition, health and disease prevention is insufficient. The public finance spent on education during early childhood is poor when compared to the investment in adulthood education. This is closely related to the traditional culture and consumption custom in China. However, considering the importance of early childhood for the development throughout the whole life span, the Chinese government should play a more responsible role in investing in child development, instead of depending so much on private investment.

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