ORIGINAL PAPER

Effects of the health insurance coverage extension on the use of outpatient services among small children in rural China

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ABSTRACT

A new public health insurance scheme has been gradually introduced in rural provinces in China since 2003. This would likely cause an increment in the use of health services. It is known that the association between health insurance coverage and health service utilization varies among different age groups. This study aims to examine the association between extending health insurance coverage and increment in outpatient service utilization of small children in rural China, and to identify other factors associated with the outpatient service utilization.

A household survey was conducted in 2 counties in north China in August 2010, targeting 107 selected households with a child aged 12–59 months. The questionnaire included modules on demographic information such as ages of children and parents, enrollment status of health insurance, the number of episodes of illness as perceived by parents, month of incidence of episode and outpatient service utilization at each episode. Based on the utilization at each episode of illness, a random effects logistic regression model was employed to analyze the association.

It was found that eligibility for the reimbursement of outpatient medical expenses was not significantly associated with decision to seek care or choice of health facility. This might be in part due to the low level of reimbursement which could discourage the use of insured, and to the close relationship with village clinic workers which would encourage the use of uninsured. Three other factors were significantly associated with increment in the outpatient service utilization; age of children, mother's education, and number of children in a household.

Key Words: health insurance, health seeking behavior, outpatient benefit package, child health service, China

INTRODUCTION

It has been a challenge to extend affordable health services in the vast rural areas in China. In the 1970s, each of the rural communes organized its own commune-based medical scheme, and provided medical services to its members and their families with minimum charges.[1] About 90 % of rural residents were covered with the schemes in the mid-70s. However, the rural

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communes collapsed in the process of a nationwide agricultural reform, which aimed to abolish the collective farming mechanisms. The commune-based medical schemes disappeared along with the collapse of the communes. As a result, rural residents had to pay all their medical expenses by themselves. A previous study reported that rural population had a high risk of suffering from illness-induced poverty.[2]

In 2003, the government of China initiated a New Cooperative Medical Scheme (NCMS), a government–run voluntary insurance scheme. Participation to the NCMS is a household base. Population coverage by the NCMS was more than 90 % in 2010.[3] In the NCMS, each county acts as an insurer, and the funds were financed about 20 % from premiums of rural households and 80 % from government subsidies.[3] Each county defined its own benefits package based on its financial status, and reimbursed the medical expenses to the participants of the NCMS. The primary objective of the NCMS was to insure rural residents against large medical expenses and to protect them from impoverishment by illness.[4] The NCMS is the only health insurance scheme in rural China, as the rural residents could not afford any other insurance schemes. The NCMS prioritized to cover inpatient medical services throughout the country,[5] while the design of outpatient service coverage was left to each county.

In 2010, two counties in one province in north China started to provide a new type of benefit package which reimbursed a part of outpatient medical expenses to services at village clinics and township health centers (THCs).[5] Outpatient services provided by the county hospitals were excluded from the insurance coverage.

The health care system in rural China is composed of three-tiered health facilities: Village clinics, THCs, and county hospitals. A village clinic is staffed mostly by practitioners called "village doctors",[6, 7] who have only basic health care training.[6] The "village doctor" is qualified by local governments for providing primary health care services to residents only in villages.[8] THCs provide outpatient and inpatient care by general physicians, while county hospitals provide specialized services including surgical operations. The insurance coverage of outpatient services is expected to increase the use of village clinics or THCs, the NCMS-authorized facilities, even if the quality of their services might be lower than those in county hospitals, the NCMS-unauthorized facilities.

Outpatient service utilization is known to vary among different age groups.[9] Therefore, extending health insurance coverage may cause different effects on the use of outpatient services among different age groups. Several studies in the United States showed that extending health insurance coverage increased health service utilization among children,[10, 11] whereas another study in the US showed that children were slightly less affected by the coverage.[12] There were several studies which show that extending coverage generally increased the health service utilization in rural China.[13-15] However, to our knowledge, it is not yet known whether the outpatient service coverage increases the utilization among children.[16, 17]

This study aimed to examine the association between extending health insurance coverage and increment in outpatient service utilization among children aged 12–59 months in rural China, and to identify other factors associated with the outpatient service utilization. We focused on the age group because children under 5 years old are known to have higher risks of morbidity and mortality compared to elder children.[18] On the other hand, we excluded children under 12 months as they often visit health facilities for routine preventive services such as vaccination, and not necessarily for treatment of illnesses.[19]

METHODS

Sampling

A household questionnaire survey was conducted in 2 counties in a province in north China in August 2010. The 2 counties were purposively selected based on the time when a new type of outpatient benefit package was started: it started in May 2010 in County A, and in January 2010 in County B. Counties A and B had 11 and 12 townships, respectively. We selected 2 townships with average income level from each county. Two villages located within 20 minutes distance by automobiles to THCs were then purposively selected from each of the 4 selected townships. Then from each of the 8 villages, average 16 households with a child aged 12–59 months were selected with convenience sampling. In total, 129 households were selected. If a household had 2 or more children aged 12–59 months, only the younger child was selected. Due to lack of reliable recent records of child registration in the villages, we could not adopt random sampling procedures.

Data collection

Trained interviewers visited each household and conducted face-to-face interviews in local language using a structured questionnaire. The respondents were adult residents of the household who mainly took care of children (childcarer), including parents, grandparents, and other relatives. The proportions of parents, grandparents, and other relatives among the respondents were 78%, 18%, and 4%, respectively. The questionnaire included outpatient service utilization at each "episode" of illness of children. "Episode" was defined as a condition which childcarer perceived as illness, such as fever, diarrhea, etc. The questionnaire also included demographic information such as number, age and education of the household members, enrollment in health insurance, the number of episodes of illness of child for about 6 months from New Year's Day to the day of interview in August 2010, month of incidence of episode, and annual household income. In addition, the average medical expense over all age outpatients at village clinics and THCs in a town of county B in June 2010 were collected in the NCMS county office.

Exclusion criteria

We selected one child from each of selected 129 households. Out of the 129 children selected, we excluded 22 children from our analysis: 5 children were not precisely aged 12–59 months, 7 children had no episodes of illness during the 6 months, 10 children were hospitalized and were excluded from our analysis, which targeted outpatient care. Then, data of 107 children and their total 229 episodes during the 6 months period were analyzed.

Statistical analysis

We have conducted two independent analyses: an analysis of the decision to seek care and an analysis of choice of health facility (Fig. 1). Self-medication or a care at health facilities was the outcome for the former analysis (model 1), while choice between village clinics or THCs and county hospitals was the outcome of the latter (model 2.1 and model 2.2).

A child could have multiple episodes. Therefore, the outcomes were repeatedly measured, and those outcomes were correlated to each other. Hence, a standard logistic regression without taking into account of their correlation would produce improper estimates.[20] To control the correlation, we regarded outcomes as panel monthly data from February to August 2010, and we employed a random effects logistic regression model based on unbalanced panel data.[21, 22] This model has advantages that it controls correlation of outcomes, and included unobserved effects into the model, such as character of guardian, constitution of child, which were time-constant.
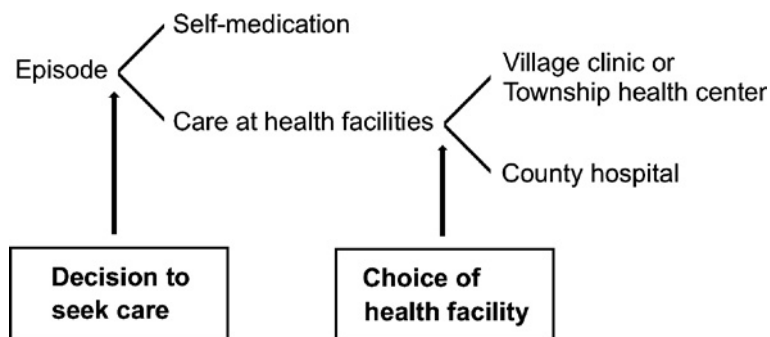
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Fig. 1 Analysis of the decision to seek care and analysis of choice of health facility.

The model[22] is

$$\log\left(\frac{p_{it}}{1 - p_{it}}\right) = \beta_{0t} + \beta_1 eligibility_{it} + \beta_2 age_{it} + \gamma_1 m.education_i + \gamma_2 f.education_i + \gamma_3 income_i$$

$$+ \gamma_4 children_i + \gamma_5 distance_i + \gamma_6 county_i + \alpha_i.$$

P_{it} is a probability that the outcome variable was equal to 1. The main explanatory variable was the eligibility for outpatient reimbursement ($eligibility_{it}$): eligible or ineligible for the reimbursement. A household member was eligible for the reimbursement if and only if the following two conditions were both satisfied; (1) the household was enrolled in the NCMS; (2) the county where the household was located had already started to provide the new type of outpatient benefit package at village clinics and THCs (NCMS-authorized facilities). As County A started to provide the benefit package in the middle of May, we had no information about whether the child was eligible or not for the reimbursement at each episode in May. Therefore, we excluded the episodes in May of County A from our analysis. The other explanatory variables in the model were age in months (age_{it}), the levels of mother's education ($m.education_i$) and father's education ($f.education_i$), annual household income ($income_i$), number of children in a household ($children_i$), distance from a house to a county hospital ($distance_i$), county where a household was located ($county_i$) and a random effects variable α_i which represented the combined effect on an outcome of all unobserved variables that were constant over time.[22] In the model, $eligibility_{it}$ and age_{it} are time-varying variables, and $m.education_i$, $f.education_i$, $income_i$, $children_i$, $distance_i$, $county_i$, and α_i are time-invariant variables. Sub-index i represents each of the children, and t represents a month between February and August. The eight explanatory variables in the model belong to one of three categories: structural, financial, or personal. $Distance_i$ and $county_i$ belong to structural, $eligibility_{it}$ to financial, and the remaining 5 variables to personal category.[23] All data analyses were done using STATA (version SE 12.0) with programs written in a theoretical study.[22]

Ethical clearance

Ethical approval for the study was obtained from the Bioethics Review Committee of Nagoya University School of Medicine (Approval number 1007, approved on July 27, 2010). Approvals of the survey were obtained from the health bureaus of County A and B. Written informed consents were obtained from all participants of the interviews after adequate explanations of the objectives and procedures of the study in local language.

RESULTS

Table 1 shows household profiles and outpatient reimbursement rates at health facilities. The number of households in County A and B were 52 and 55, respectively. Ten of the 52 households in County A and three of the 55 households in County B were not enrolled in the NCMS. Average age of the children was 28.6 months. More than 80 % of parents of the children had formal education of 7 years or more. The education levels of mothers of NCMS enrolled households were higher than that of those not enrolled households in both counties. Average annual household income was US$ 4,221. The income level of NCMS enrolled households was higher than that of not enrolled households in both counties. The average number of children in a household was 1.42: the minimum was 1 and the maximum was 3. Reimbursement rates for medical expenses of outpatients in County A and County B were 20 % or 25 %.

Average medical expense at each visit to health facilities over all age outpatients was US$ 3.73 at village clinics and US$ 4.41 at THCs in a town of County B in June. Because average annual household income was US$ 4,221 (Table 1), the estimated ratios of the expense to the income at each visit to village clinics or THCs were less than 0.1 % in County A and 0.11 % in County B. Because the reimbursement rate at both facilities was less than or equal to 25 %, the estimated ratio of refund to the income was less than 0.03 % at each visit to village clinics or THCs.

Table 2 shows descriptive statistics of eligibility for the reimbursement and outpatient services utilization, which comprised the decision to seek care and choice of health facility at each episode. The total number of episodes was 229. Regarding the decision to seek care, 227 episodes (99.1 %) were cared at health facilities, while only 2 episodes were self-medicated. Even if the children were ineligible for the reimbursement, 97.2 % of episodes were cared at health facilities, and 62 episodes (89.9 %) were cared at village clinics or THCs. The association between eligibility for the reimbursement and decision to seek care was not statistically significant ($p = 1.000$

Table 1 Household profile and reimbursement rates at health facilities.

Variables	Total	County A			County B		
		Total	Enrolled	Not enrolled	Total	Enrolled	Not enrolled
Number of households, n	107	52	42	10	55	52	3
Age in months[a], month	28.6	31.3	29.7	38.1	26.0	26.3	21.0
Mother's education, n (%)							
< 7 years	20 (18.7)	14 (26.9)	10 (23.8)	4 (40.0)	6 (10.9)	5 (9.6)	1 (33.3)
≥ 7 years	87 (81.3)	38 (73.1)	32 (76.2)	6 (60.0)	49 (89.1)	47 (90.4)	2 (66.7)
Father's education, n (%)							
<7 years	18 (16.8)	9 (17.3)	6 (14.3)	3 (30.0)	9 (16.4)	9 (17.3)	0 (0.0)
≥ 7 years	89 (83.2)	43 (82.7)	36 (85.7)	7 (70.0)	46 (83.6)	43 (82.7)	3 (100.0)
Household income, US$	4221	4208	4266	3967	4233	4286	3318
Number of children in a household, n	1.42	1.33	1.29	1.50	1.51	1.48	2.00
Distance to a county hospital, km	28.6	19.8	17.1	31.0	36.8	37.6	24.3
Outpatient reimbursement rate, %							
Village clinics			25			25	
THCs			20			25	

[a] Age in months in February 2010.

Table 2 Descriptive statistics of eligibility and the utilization at each episode.

Eligibility for reimbursement	Decision to seek care, n (%)			Choice of health facility, n (%)		
	Total	Self-medication	Care at health facilities	Total	Village clinics and THCs [a]	County hospitals [b]
Total	229	2 (0.9)	227 (99.1)	227	210 (92.5)	17 (7.5)
Eligible	158	0 (0.0)	158 (100.0)	158	148 (93.7)	10 (6.3)
Ineligible	71	2 (2.8)	69 (97.2)	69	62 (89.9)	7 (10.1)

[a] NCMS-authorized facilities.
[b] NCMS-unauthorized facilities.

Table 3 Association between eligibility and choice of health facility, and determinants of choice of health facility.

Variables	Model 2.1		Model 2.2	
	OR (95 % CI)	*p*-value	OR (95 % CI)	*p*-value
Eligibility for reimbursement				
Ineligible	1		1	
Eligible	2.07 (0.46–9.28)	0.341	1.09 (0.28–4.28)	0.897
Age in months, month			1.09 (1.02–1.16)	0.014
Mother's education				
< 7 years			1	
≥ 7 years			7.38 (1.29–42.33)	0.025
Father's education				
< 7 years			1	
≥ 7 years			0.17 (0.01–2.62)	0.204
Household income, US$100			0.98 (0.96–1.00)	0.102
Number of children in a household, n			7.64 (1.32–44.28)	0.023
Distance to a county hospital, km			1.02 (0.98–1.06)	0.310
County				
County A			1	
County B			2.18 (0.44–10.72)	0.337

An outcome is the choice of health facility; village clinics or THCs = 1, county hospitals = 0, n = 227. OR and CI mean odds ratio and confidence interval, respectively.

in model 1). In model 1, explanatory variables were eligibility, age, and unobserved variable.

As shown in Table 3, the association between eligibility for the reimbursement and choice of health facility was not statistically significant ($p = 0.341$ in model 2.1, $p = 0.897$ in model 2.2). However, age in months (Odds Ratio (OR) = 1.09, $p = 0.014$), the level of mother's education (OR = 7.38, $p = 0.025$), and the number of children in a household (OR = 7.64, $p = 0.023$) were significantly associated with the study participants' choice of health facility (model 2.2). Age in months, the level of mother's education, and the number of children of a household were also associated with an increase in the probability that village clinics or THCs would be the eventual choice.

DISCUSSION

To our knowledge, this is the first study to examine the association between health insurance coverage and outpatient service utilization of small children in rural China. We assessed decisions of parents at each episode of the illness of every child, whether they sought outpatient services or not and the type of health facility of their choice. We found that extending health insurance coverage was not positively associated with the increased utilization of outpatient services of small children in rural China. Even though the children were ineligible for the reimbursement, the ratio of seeking care at health facilities was high (97.2 %). Similarly, the ratio of care at village clinics or THCs (NCMS-authorized facilities) was high (89.9 %).

Several factors may have influenced the above findings. First, the low ratio of refund to annual household income may have discouraged residents eligible for the reimbursement to increase the use of health services. The ratio of the refund for outpatient services at village clinics or THCs to annual household income was estimated to be less than 0.03 %.

Second, a village clinic played not only the role of a primary care provider, but also a drug store in the village. The village clinic was possibly the only shop selling over-the-counter drugs in the village. Thus, regardless of eligibility for the reimbursement, village residents were likely to visit village clinics to purchase drugs. Residents who visited village clinics were likely to receive medical consultation as well, since consultation of "village doctors" was likely to be provided free of charge.[24, 25]

Third, regardless of eligibility for the reimbursement, parents of small children were likely to visit village clinics, because they had close relations with the "village doctors." A previous study in rural China reported that the family members of children relied on "village doctors", because they accepted credit for medical expenses, made a house call,[7] and provided regular vaccinations. On the contrary, a qualitative study in Vietnam reported that poor attitudes of doctors in public health facilities made the parents of children reluctant to seek their free of charge care.[26]

Finally, regardless of eligibility for the reimbursement, residents were likely to visit health facilities close to their residences: *i.e.*, village clinics or THCs, of which services were covered partly by the insurance. The Ministry of Health of China subsidizes the fee for medical services and medicines to keep the patients' payment low.[27] Each village has a village clinic located closely to houses of the residents.[28] Several studies in developing countries reported that vicinity of health facilities increased health services utilization when combined with the dearth of transportation, which contributed to increase the costs of visits[29-31] and opportunity costs.[26]

Although health insurance coverage may not be clearly associated with the utilization of outpatient services, we identified three other factors which associated with the utilization: children's age in months, the level of mothers' education, and the number of children in a household. Children of younger age were more likely to be cared at county hospitals, similar to the findings of previous studies.[9, 32] This may be due to the fact that parents are afraid that very sick children, who could not appeal the condition by themselves, might be in serious illness.

Increased level of mothers' education was also associated with increased utilization of village clinics or THCs. This finding is in line with previous studies which reported that educated mothers are more likely to seek care at clinics rather than hospitals.[9] Possible reason could be the fact that educated mothers are more likely to perceive illness of children at an early stage,[33] and are likely to avoid unnecessary medical care for their children, therefore would be more likely to visit village clinics or THCs at first.

An increase in the number of children in a household was associated with increment in the utilization of village clinics or THCs. The number of children in a household reportedly has a positive effect on the probability of receiving care at clinics and primary level health facilities,[9]

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since the guardians of children might want to save the health care costs and time to go to the distant health facilities so that they could take care of other children.

This study had several limitations. First, the sample might not be representative, as we adopted purposive sampling and convenience sampling, but not random sampling. Therefore, our results may not represent country wide status. However, we found that we selected over 50 % of total children of the age group in a village, which had a recent child registration record. Since the selected villages had similar household numbers, we considered that we sampled sufficient number of children to minimize sampling biases. Second, the interval between the commencement of the new type of outpatient benefit package in the study area and our data collecting period might not be long enough to show the effects. Some childcarers may not have been aware of the new benefit package in detail. Third, we analyzed the data of County A excluding the episodes in May, as the insurance coverage was extended gradually in May. Had we included them in the analysis, the level of mothers' education, and the number of children in a household would not be statistically significant. Fourth, the data has possible recall biases of the respondents, as we asked illness episode in the past 6 months. They might remember only episodes when they had taken their children to health facilities. The face-to-face interviews by trained interviewers we conducted were, however, helpful to encourage the guardians to remember minor episodes as precisely as possible.

CONCLUSIONS

This study revealed that extending health insurance coverage for outpatient services may not be directly associated with increment in outpatient service utilization of small children in rural China. It also identified 3 other factors significantly associated with increment in outpatient service utilization: younger age, increased level of mother's education, and increased number of children in a household.

ACKNOWLEDGEMENTS

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interests.

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