

Feasibility Study of Enforcing Immunization Certificate Check Before Primary School or Kindergarten Enrollment in Guizhou Province, China¹

LI SHENG^{*}, SHU-YAN ZUO[†], JING XIE[°], YA-LI QI[°], YI-BING TONG^Δ, GUANG-PENG TANG^Δ, JUN ZHOU[°], DA-YONG ZHANG^Δ, CHANG-BING LONG[°], WEN DU^Δ, AND ZI-JIAN FENG^{‡, #}

^{*}*Peking Union Medical College, Chinese Academy of Medical Sciences, Beijing 100005, China;* [†]*Chinese Center for Disease Control and Prevention, Beijing 100050, China;* [°]*Department of Public Health and Primary Care, University of Cambridge, Cambridge CB2 2SR, UK;* [‡]*Medical College Preventive Department, Beihua University, Jilin 132013, Jilin, China;* ^Δ*Center for Diseases Control and Prevention of Guizhou Province, Guiyang 550000, Guizhou, China;* [°]*Center for Diseases Control and Prevention of Qianlongnan District, Kaili 510800, Guizhou, China*

Objective To study the feasibility of enforcing immunization certificate check before children enroll in primary schools or kindergartens in Guizhou Province. **Methods** Quantitative and qualitative studies were conducted. The multi-stage and cluster sampling approach was adopted for the quantitative part of the study. A questionnaire was designed and 996 children and their keepers were interviewed. Principals, doctors or teachers of the primary schools, directors and child care nurses of kindergarten, and staff of immunization agencies were invited to take part in 12 focus group discussions; meanwhile, face-to-face individual in-depth interviews with 16 officials of the Health, Education and Governmental Departments at various levels were conducted. **Results** The total number of subjects was 996. 16.7% of the children in the study completed all the procedures of the National Immunization Programme. 34.3% of them had immunization certificates while the remainder 44.7% registered in immunization agencies. Factors, including the migrant children, doubt about vaccine efficiency, mother's occupation and educational background, knowledge of the National Immunization Programme on targeted vaccines, played an important role in obtaining or not immunization certificates. 95% of the keepers interviewed thought the immunization certificates were useful; 94.8% of them considered the check was critical while only 3.6% of them thought it unnecessary. The first reason from those who found it unnecessary was that they feared that repeated immunization might affect their children's health. The second reason was the cost of immunization, which some of them could not afford to pay. However, the Health Department expressed a favorable attitude to the checking scheme. Though the Education Department agreed that the scheme was essential, they worried that it would affect the enrollment rate. **Conclusion** In spite of the difficulty in administering immunization certificate check, the effort would be rewarding for raising the immunization coverage rate among the children in Guizhou Province.

Key words: Immunization certificate check; Impacting factors; Sampling research; Quantitative study; Qualitative study; Enrollment rate

INTRODUCTION

Since China carried out the Expanded Programme on Immunization (EPI) in the 1970s, the National Immunization Programme has gained momentum across the country, which witnessed a sharp drop of the disease incidence, due to the practice. Meanwhile, the immunization coverage rate of the EPI vaccination showed a dramatic rise. However, the immunization coverage rates in some regions are rather low and some groups of people,

including the children in the poverty-stricken areas, children born against the family planning policy, and migrant people and their children in the urban areas, have never received any immunization, in spite of the generally high coverage rate in cities. Some researches indicate that the immunization coverage rate among the high-risk groups is lower than 60%^[1].

Since the promulgation and implementation of the Compulsory Education Law in the People's Republic of China and the establishment of the fundamental policy of "rejuvenating the country

¹The study was sponsored by WHO, the Chinese Ministry of Health and the American CDC.

[#]Correspondence should be addressed to Zi-Jian FENG, Office for Disease Control and Emergency Response, Chinese Center for Disease Control and Prevention, 27 Nanwei Road, Xuanwu District, Beijing 100050, China. E-mail: fengzj@chinacdc.cn

Biographical note of the corresponding author: Zi-Jian FENG, male, associate professor, director of Office for Disease Control and Emergency Response, Chinese Center for Disease Control and Prevention.

Biographical note of the first author: Li SHENG, female, born in 1971, Ph. D. candidate, majoring in epidemiology and health statistics. E-mail: shengli909@163.com

through science and technology and education”, the enrollment rate of the school-age children has witnessed a considerable growth. It is reported that the enrollment rate of the school-age children reached 99% in 2000 in China. The policy of checking the immunization certificate before the children enrollment in a kindergarten or primary school will make it possible to offer the relevant vaccinations to those people who have failed to have all the vaccinations required by the normal immunization procedure. In this way, we can not only enhance the children’s general immunization coverage effectively, but also build up the immune system in children against the diseases targeting schools, nurseries and kindergartens.

Qiandongnan District is located in northeast Guizhou Province, which is a mountainous area with many different minorities and the measles incidence is very high. Uplands and mountains make topography extremely complex, while the highest altitude reaches 2179 meters, the lowest only 137 meters. All this accounts for the low immunization coverage rate among children in this area. In 2003, the local enrollment rate of the school-age children was 98.03%. Such a high enrollment will provide a good chance to find out the children who miss out the immunization and give them re-vaccinations. In view of such circumstances, we carried out a feasibility

study on enforcing immunization certificate check before school and kindergarten enrollment in Qiandongnan District of Guizhou Province.

MATERIALS AND METHODS

Investigation Time

From June 10, 2003 to June 21, 2003.

Methods

Quantitative and qualitative studies were combined in the study.

Objectives

The multi-stage and cluster sampling approach was adopted for the quantitative part in the study^[2] (Table 1). Nine hundred and ninety six children of grade one primary school, preschool class and kindergarten were chosen randomly for interviews by using a self-designed questionnaire. In the qualitative part, 108 people including principals of the primary schools, school doctors or teachers, kindergarten directors, child care nurses and immunization agencies staff were invited to participate in 12 focus group discussions. Face-to-face individual in-depth interviews with 16 officials of the Health, Education and Governmental Departments at various levels were conducted^[3].

TABLE 1

The Distribution of the Research Sample

Area	Unit	No. of Pairs of Children and Their Mothers	Proportion (%)
City	Resident Primary School	81	8.13
	Primary School for Migrant Kids	159	15.96
	Preschool Class	70	7.03
	Kindergarten	50	5.02
	Primary School	88	8.84
County City	Preschool Class	84	8.43
	Kindergarten	46	4.62
Town	Primary School	109	10.94
	Preschool Class	80	8.04
Village	Primary School	229	22.99
Total		996	100.0

Contents

The questionnaire for the quantitative part is composed of the demographic characteristics of the children and their keepers, the history of immunization for the children, issuance of the immunization certificate and the keepers’ access to the EPI knowledge. The content of interview for the qualitative part is: access to EPI knowledge, importance of EPI for preventing diseases, successful

experiences and lessons from the previous practice of immunization certificate checking, attitude towards the immunization certificate checking policy, and opinions about the immunization charges.

Definition of Migrant Children

Those children who have lived in the present place rather than in their registered residence for more than three months are classified as migrant

children.

The procedures of the National Immunization Programme

Table 2 shows the current procedures of the Chinese National Immunization Programme.

TABLE 2

The National Immunization Programme Procedures

Age	Vaccine
Birth	The First Dose of BCG and HEPB
The First Month	The Second Dose of HEPB
The Second Month	The First Dose of OPV
The Third Month	The Second Dose of OPV and the First Dose of DPT
The Fourth Month	The Third Dose of OPV and the Second Dose of DPT
The Fifth Month	The Third Dose of DPT
The Six Month	The Third Dose of HEPB
The Eighth Month	The First Dose of MV
One and a Half Years to Two Years	The Fourth Dose of DPT
Seven Years Old	The Fourth Dose of OPV, the Second Dose of MV and the First PT

Note. OPV: Oral Polio Vaccine. MV: Measles Vaccine. DPT: Diphtheria, Pertussis, and Tetanus mixture vaccine. BCG: Bacillus Calmette-Guerin vaccine. HEPB: Hepatitis B vaccine. PT: Pertussis and Tetanus mixture vaccine.

Data Analysis

The quantitative part of the study involves setting up a database with Epi-Data 2.0, and summing up and analyzing the data with Epi-Info 2002 and SAS 9.13 software package.

Univariate Analysis

The sample population was stratified into primary school pupils, preschool class pupils and kindergarten children to measure the relation between each factor and immunization certificate holding by the OR_{MH} (Mantel-Haenszel method)^[4] and Epi-Info 2002 software package in different population groups.

Multivariate Analysis

To control the interactive effect of the covariates, an unconditional logistic regression model was used to screen the major factors influencing the immunization certificate holding. "0" was no certificate and "1" was holding the certificate. This analysis was realized through the stepwise logistic process in the SAS 9.13 software

package.

Analysis of the Qualitative Survey Data

The interview data were both audio-taped and recorded by shorthand. The transcription, which was based on the recording and the shorthand notes was completed and stored into computer for analysis. The opinions of the interviewees were classified and codified while the sources and frequency of the opinions were marked down and analyzed. Conclusions were drawn based on the analyses of the data.

RESULTS

Quantitative Results

Demographic characteristics information Nine hundred and ninety six pairs of children and their keepers were investigated, out of which 666 children were first grade pupils from 10 primary schools; 54.4% of the subjects were male and 45.6% female. Ninety six of them were bottom classes kids in 2 kindergartens; the proportion of males was 44.8% and females 55.2%. Another 234 were from preschool classes in 4 primary schools; the proportion of males was 50.4% and females 49.6%. Resident children numbered 839 (82.4%) while migrant children 157(15.8%). The ratio of resident children to migrant children was 5.3:1. Most first grade primary school pupils were between 6 and 8 years old (87.9%), preschool class children were mostly 5-6 years old (82.9%), and kindergarten children were mostly 3 years old (74.7%). Proportions of nationality were 14.3% for Han nationality, 78.7% for Miao nationality, 4.0% for Dong nationality, 1.4% for Buyi nationality, and 1.5% for other nationalities.

Children immunization drop-out rate Based on the principle of "immunization certificate precedes the registered card and no certificate or registered card means failure to have had any vaccination", only 166 children (16.7%) have had vaccination of all the vaccines as the National Immunization Programme prescribed. We took "completion of all the vaccination at relevant ages required by the National Immunization Programme" as a criterion for judging whether the immunization is completed or missed out. Table 3 shows the drop-out rate of vaccination. Among all the vaccines, drop-out rate for one vaccine was 80%-90%, the rate for four vaccines ranged from 60% to 80%. The drop-out rate among migrant children was over 94%, significantly higher than that in resident children.

Immunization certificate holding rate and the registered rate Among 996 children in this study, 342 (34.3%) held the immunization certificates, 445

TABLE 3

Comparison of Drop-out rates of BCG, OPV, and MV Between Resident Children and Migrant Children

	BCG		OPV		MV	
	No.	Rate (%)	No.	Rate (%)	No.	Rate (%)
Resident Children	297	35.4	644	76.8	590	70.3
Migrant Children	148	94.0	151	96.2	151	96.7
Total	443	44.5	795	79.8	741	74.4
χ^2	177.5		30.9		46.4	
<i>P</i>	0.0001		0.0001		0.0001	

TABLE 4

Comparison of DPT, TD, and HEPB Drop-out rates Between Resident Children and Migrant Children

	DPT		TD		HEPB	
	No.	Rate (%)	No.	Rate (%)	No.	Rate (%)
Resident Children	527	62.8	553	73.8	727	86.7
Migrant Children	150	95.5	147	97.6	156	98.7
Total	677	68.0	700	77.8	882	88.7
χ^2	65.0		40.2		18.8	
<i>P</i>	0.0001		0.0001		0.0001	

(44.7%) registered in immunization agencies, 591 (59.3%) at least held an immunization certificate or registered in immunization agencies (hereinafter referred to as the record rate). To get a further understanding of the information about the immunization certificate or register, we conducted the stratified analysis of the surveyed units and people.

The children were grouped into resident ones and migrant ones. Three hundred and thirty three (39.7%) of the resident children held the immunization certificates and 9 (5.7%) migrant children held the certificates. 439 (52.3%) resident children registered at immunization agencies while only 6 (3.8%) migrant children did so. 578 (68.9%) resident children had the immunization records and only 13 (8.3%) migrant children did.

The children were categorized into primary

school pupils, kindergarten children, and preschool class pupils (Table 5). The three indices decreased gradually from the kindergarten children, preschool class pupils to the primary school pupils.

Classification by the area: There were significant differences between children of different areas in the immunization certificate holding rate. The urban children's immunization certificate holding rate, register rate and record rate were higher than those of the rural children.

Analysis of the factors influencing the immunization certificate holding Univariate analysis was done by classifying the children into such groups as primary school, preschool class, and kindergarten. The relation between those factors and the certificate holding was measured by OR.

TABLE 5

Comparison of Immunization Certificate Holding Rate, Registered Rate and recorded Rate Between Primary School Children, Kindergarten Children, and Preschool Class Children

	Immunization					
	Certificate Holding Rate		Register Rate		Record Rate	
	No.	Rate (%)	No.	Rate (%)	No.	Rate (%)
Kindergarten	68	70.8	51	53.1	83	86.5
Preschool Class	102	43.6	117	50.0	161	68.8
Primary School	172	25.8	277	41.6	374	52.1
Total	342	34.3	445	44.7	591	59.3
χ^2	4015.3		4071.0		3992.0	
<i>P</i>	0.0001		0.0001		0.0001	

TABLE 6

Comparison of Immunization Certificate Holding Rate, Registered Rate and Recorded Rate Among Different Areas

	Immunization Certificate Holding Rate		Register Rate		Record Rate	
	No.	Rate (%)	No.	Rate (%)	No.	Rate (%)
City	137	38.1	27	7.5	139	38.6
County City and Town	77	35.3	163	74.8	169	77.5
Village	128	30.6	255	61.0	283	67.7
Total	342	34.3	445	44.7	591	59.3
χ^2	3988.9		4310.3		4090.1	
<i>P</i>	0.0001		0.0001		0.0001	

TABLE 7

Analysis of Single Factor Influencing the Immunization Certificate Holding ($\alpha=0.05$)

Factors	OR _{M-H} and 95% CI	<i>P</i>
1. Information Related to Children:		
Sex (0= male,1 =female)	1.13 (0.86-1.49)	0.3707
Nationality (0=the Han Nationality, 1 =Other Nationalities)	0.93 (0.64-1.36)	0.7222
Birth Place (0=Hospital, 1 =Family)	2.09 (1.55-2.82)	0.0001
Resident or Migrant Children (0=Resident, 1 =Floating)	9.53 (4.65-19.52)	0.0001
Birth Order of Children (0=First- or Second-born, 1 = Third-born or up)	2.31 (1.36-3.92)	0.0016
2. Information Concerning Keepers:		
Paternal Occupation (0= Officials, Teachers, Doctors; 1 =Farmers, Business Men)	2.15 (1.53-3.03)	0.0001
Paternal Educational Background (0=High School and Above, 1 =Below High School)	2.42 (1.78-3.29)	0.0001
Maternal Occupation (0= Officials, Teachers, Doctors; 1 =Farmers, Business Men)	3.00 (2.10-4.28)	0.0001
Maternal Education Level (0=High School and Above, 1 =Below High School)	3.23 (2.37-4.39)	0.0001
3. Family Financial Status		
Average Income Per Year (0=2000 Yuan and Above, 1 =Below 2000 Yuan)	2.36 (1.75-3.20)	0.0001
4. Access to the Planned Immunization Knowledge		
Number of Vaccines Related to EPI the Keepers Know (0=4 and Above, 1 =Below 4)	3.15(2.33~4.27)	0.0001
Number of Vaccine Related to EPI the Keepers Know When the Vaccines Should Be Inoculated (0=2 and Above, 1 =Below 2)	2.45 (1.70-3.51)	0.0001
Number of Diseases Targeted by EPI (0=2 and Above, 1 =Below 2)	2.40 (1.75-3.27)	0.0001
5. Keepers' Attitudes to Vaccination		
Believing the Disease Related to EPI Is Serious (0=Yes, 1 =No)	1.47 (0.98-2.20)	0.0001
Believing the Vaccine Related to EPI Can Prevent Certain Diseases (0=Yes, 1 =No)	4.33 (2.73-6.86)	0.0001
6. Opinions on Service Related to EPI		
Vaccination Way (0=Doctor Going to the Children's Family, 1 =the Keepers Bringing Their Children to Immunization Site)	1.97 (1.45-2.67)	0.0001
BCG Scar Left (0=Yes, 1 =No)	2.84 (2.01-4.01)	0.0001
Immunization Card in File (0=Yes, 1 =No)	2.08 (1.58-2.75)	0.0001
7. Joining EPI Insurance		
(0=Yes, 1 =No)	2.20 (1.51-3.22)	0.0001

Note. EPI insurance: Before children receive vaccination in immunization agencies, their keepers must pay some money for it. Once the children suffer from the disease targeted by the vaccination after receiving the immunization, their keepers will get more money from the immunization agencies for compensation. The policy had been carried out since 1980s in China, now it all ended.

Analysis of the multivariate factors To control the mixed and interactive effects, a stepwise unconditional logistic regression model was used to analyze the effect of multivariate factors (Table 8).

TABLE 8

Multivariate Analysis of Factors Affecting Immunization Certificate Holding

Factors	OR _{M-H} and 95% CI	Parameter	P
Migrant Children	5.27 (2.54-10.92)	1.66	0.0001
Number of Vaccines Related to EPI the Keepers Know	3.00 (2.16-4.16)	1.10	0.0001
Maternal Educational Background	2.96 (1.84-4.77)	1.09	0.0001
Believing the Vaccines Provided by the Planned Immunization Can Prevent Certain Diseases	1.96 (1.38-2.78)	0.67	0.0002
Supporting Immunization Card Filing System	1.79 (1.32-2.43)	0.58	0.0002

Qualitative Results

The keepers' attitudes and opinions towards the immunization certificate check scheme More than 95.0% of the keepers thought immunization certificate was useful. 94.8% of the keepers considered it important to check the immunization certificate at the time of enrollment while 3.6% of them viewed it unnecessary because, on the one hand, if they lost the record, the blind re-vaccination of some vaccines might harm the children's health; on the other hand, re-vaccination would be costly. 46.9% of the keepers agreed that re-vaccination should be charged reasonably; 23.5% suggested the current price should be lowered while 29.6% thought they should get it free of charge. 86.4% thought the checking of immunization certificate would not exert a negative impact on their children's enrollment in a school or kindergarten while 10.8% feared that such a scheme would affect their children's enrollment and 2.8% gave no comment.

Immunization certificate checking policy in the past and factors leading to its termination No schools or kindergartens surveyed reported previous checking practice. At the focus group discussion, only the head of a kindergarten affiliated to an enterprise said a checking policy was implemented in the 1990s, but it no longer exists today. Only a few immunization agencies found some children came for vaccination for school or kindergarten enrollment. In the in-depth interviews, officials from Education Departments at all levels said they had never read such a document or known such a policy. In contrast, the Health Department officials definitely confirmed the existence of the laws and policies concerning immunization certificate checking. They thought such a policy was not well carried out mainly due to a disregard and no cooperation of the Educational Departments. However, some people thought that this

policy was well carried out in the urban areas, but not so in rural areas where the peasants did not recognize the importance of immunization, thus leading to the low certificate holding rate and rare certificate checking at the time of enrollment.

Knowledge of the people working in the Educational Departments and the keepers about EPI The people of Educational Departments gave various answers to the diseases and the vaccines targeted by EPI. Some knew many diseases such as smallpox, encephalitis, hepatitis A, hepatitis B, and pertussis, but only 1 or 2 of them were the target of EPI. Others only knew one or two of the vaccines or diseases, such as candy vaccine and measles. Still a small number of people only knew the vaccines and did not know what diseases they could prevent. There were different versions about the National Immunization Procedures. Most people knew some vaccines must be vaccinated several times, but they were not very clear about the specific immunization procedure. The majority of interviewees knew these diseases were infectious and, would cause great losses when spreading. To quote from a principal, "The disease itself is not frightening at all. What terrifies people is the impact it exerts. An outbreak or prevalence of some diseases is more terrifying than the decline in the teaching quality."

Attitudes and opinions about implementation of the immunization certificate checking regulation Although the Educational Departments thought it necessary to check the children's immunization certificate at the time of enrollment, they thought it rather difficult to carry out this policy mainly because the immunization charge will affect the enrollment rate and it may have a negative impact on the school. However, they affirmed that they would earnestly carry out this policy as long as the authorities demanded. The health departments showed positive attitude towards the regulation, emphasizing that this

would not only solve the problem of low immunization coverage among the migrant people, but also could boost the revenue. What the Health Departments concerned about mostly was whether the Educational Departments would support and cooperate with them or not. As for the immunization certificate checking issue, both of the vice head of Taijiang County Government in charge of health and education affairs and the vice chief of Laotun Township in charge of education and health thought it necessary to implement such a regulation, on the basis that the enrollment rate of schools is not affected. Meanwhile they worried that the insufficient funds and health services in the rural areas might retard implementation of such regulation. Basically, how to ensure the enrollment rate intact and how to charge rationally have become the primary issues while working out the immunization certificate checking regulation. Therefore, we conducted further interview concerning these two issues.

Measures for keeping enrollment rate unharmed with the introduction of immunization certificate checking regulation People in the Education, Health and Governmental Departments suggested that two measures should be taken to prevent a drop in the enrollment caused by the immunization certificate checking regulation. First, educational campaigns should be promoted so that more keepers recognize its importance and necessity for the regulation and comply with it. Second, the immunization service charges should be rational so that no single child will be missed out.

Opinions and suggestions on the cost In terms of cost, three opinions were voiced from officials of different Educational, Health and Governmental Departments: 1. vaccines which should be inoculated before enrollment age should be offered free for the convenience of carrying out the policy effectively; 2. the immunization service should be paid for due to tight government and department budget; 3. the price should be flexible, i.e. children from low-income families should receive the service free of charge, while well-off families should pay for the service. Opinions also varied between people from the Education and Health Departments. People of the educational side favored free service, while people from the Health Department insisted the service be charged for. In spite of the differences, all interviewees agreed that a fair price system should be established to guarantee that no single child be missed out from the service.

DISCUSSION

This study involved 996 pairs of children and

their keepers. Only 166 (16.7%) children received all the vaccinations required by the National Immunization Programme. The migrant children were defined as a special group as they were the ones who missed out on the administration of several kinds of vaccines. Due to the high immunization drop-out rate, it was difficult to build up an effective immunity system against outbreaks and prevalence of the diseases targeted by the EPI in schools and kindergartens. Outbreaks of measles in some schools and kindergartens occurred frequently in recent years, which fully alerted the danger caused by the low immunization coverage rate. So it is critical to check the immunization certificate at the time of enrollment and take strict measures to implement the regulation so that children are inoculated with the necessary vaccines before enrollment and their overall immune systems are enhanced. It is reported that the enrollment rate of the school-age children reached 98.03% in 2004 in Qiandongnan District, which means that the rate offers good chances to find out those who miss out the immunization and give them vaccinations.

The feasibility of enforcing immunization certificate checking depends on two facets: one is the "hardware", which means the competence of the immunization agencies to support the vaccination work. The other is the "software", which means support from all parties concerned including schools, keepers, and immunization agencies. The investigation showed that the National Immunization Programme began in 1960s and spread out in 1970s in Qiandongnan District. The cold chains were equipped and run in 1986. There are in total 204 primary schools and 210 immunization agencies in Kaili City where the District Government is located. In Taijiang, one of the counties in Qiandongnan District, there are 165 primary schools and 188 immunization agencies. The number of immunization agencies exceeds that of primary schools means that the local immunization agencies have sufficient sources to provide service to the local schools. So we paid more attention to the attitudes of different parties towards the checking regulation during investigation. After all, as the saying goes, the attitude is the drive leading to action. According to the survey, we found that three key factors influence the interviewees' positions on certificate checking policy. First, some people believe that repeated immunization may harm children's health. To address this worry, we consulted vaccine experts and they gave a negative answer. There have been no cases reported so far related to side-effects of repeated immunization. Therefore people's worry can be relieved by means of our education campaigns. The other is that some people

suspect that the policy will be in contradiction to the Law of China on Compulsory Education, and that the policy may affect the enrollment rate. Finally, the issue of price becomes the concern of some people.

The second issue is whether the policy is in contradiction to the Law of China on Compulsory Education. According to Article 15 of the Law, "The People's Governments at various levels must create conditions for the school-age children and juveniles to receive compulsory education. Unless approved by the local People's Government due to some disease or special reasons, the school-age children or juveniles must receive the compulsory education. Otherwise, the local government shall criticize and inculcate the keepers and take effective measures to make them send their children to school." That means that those who refuse to send their children to school or deprive their children of schooling without any justifiable reason will be punished by the Law on Compulsory Education. To apply the Law to our situation, we can justify that the immunization certificate checking regulation is intended to identify the children who have not received the immunization, and help them complete the procedure. The policy does not mean to deprive those children without a certificate or immunization record of the right to receive education. Therefore, the regulation is by no means in contradiction to our national Law on Compulsory Education.

The cost of the immunization service is another sensitive issue. Based on the following three points, we thought certain amount of fee should be charged. First, the funds distributed by the State to the immunization agency were insufficient and the service fee can subsidize the cost of the work and maintain continuous implementation of the policy. Next, we have to take the safe injection into consideration. If the immunization is free, the glass syringe might be used to lower the cost and might lead to many negative effects when syringes are not sterilized thoroughly, which may add unnecessary burden to local hospitals and waste a lot of money in medical treatments. If families pay for the immunization, disposable syringes might be used and the safe injection of "one syringe and syringe needle for one person" can be guaranteed. Finally, according to the principle of "paid service", the doctors should be rewarded for their work. As rural doctors have no fixed salaries from the government, they can be motivated by the remuneration for their work. People suggested that the immunization should be charged for based on the service cost rather than on the profits. The price system should be flexible to meet the needs of different groups of people. Pupils from low-income families should be inoculated free of

charge. The system should be implemented once it is set down and approved by the Price Bureau, and measures should be taken to avoid the misinterpretations and abuses of the system.

The regulation of checking immunization record at enrollment to school and kindergarten is one of the main measures to prevent the outbreak and prevalence of the diseases targeted by EPI in many developed countries and regions^[5-9]. For instance, the US Government requires that every child be checked his or her immunization record at enrollment to school and kindergarten in all the States in 1990. Moreover, a special law has been enacted, stipulating that children who have failed to be inoculated should be re-inoculated before they are admitted to a school or kindergarten. As a result, the immunization coverage rate among American school-age children rose significantly from 11%-58% in the 1970s to 71%-96% in recent years^[10]. Hong Kong adopted a similar measure in 1989 and the immunization rate of the school-age children increased from 85%-91% to 96%-99% in 1999. Needless to say, the outbreaks of diseases targeted by EPI were terminated in schools^[11].

This study found that the Health Departments in Qiandongnan District holds a positive attitude towards the certificate checking scheme and they are capable of providing the re-vaccination service to those who have not completed the procedure. The Education Department also regards the scheme as necessary, but still worries about its effects on the enrollment rate. More than 95.0% of the keepers thought the immunization certificate were useful; 94.8% of them viewed it important to check the immunization certificate at enrollment. 86.4% supported the view that certificate check would not exert a negative impact on enrollment to schools or kindergartens. Therefore, if the practice conforms to the law, supported by all parties concerned, and the Health Departments are competent to provide the vaccination services, we strongly recommend that the immunization certificate checking regulation be implemented in an all-round way at enrollment to guarantee the overall children's high immunization rate and achieve the aim of controlling or even eliminating the diseases targeted by the EPI.

ACKNOWLEDGEMENTS

We thank all the colleagues working at the EPI Department of Chinese Center for Disease Control and Prevention, Center for Diseases Control and Prevention of Guizhou Province, Health Bureau of Qiandongnan District, Center for Diseases Control and Prevention of Qiandongnan District, Health Bureau of

Kaili City, Center for Diseases Control and Prevention of Kaili City, Health Bureau of Taijiang County, Center for Diseases Control and Prevention of Taijiang County, Education Bureau of Qiandongnan District, Education Bureau of Kaili City, Education Bureau of Taijiang County, No. 8 Primary School of Kaili City and Primary School of Taijiang County for their great support in the survey.

REFERENCES

1. Wang X J, Zhang R Z (1997). Research on the status quo of the floating children's immunization and factors influencing. *Chin J Epidemiol*, **18**(2-B), 244-226.
2. Zeng G (1994). Modern epidemiologic approaches and application. Press of Beijing Medical University and Peking Union Medical College. pp. 57-58.
3. Yuan Y (2001). Guide to application of qualitative research methods-key groups symposia. Nanjing University Press, pp.10.
4. Jin P H (1992). Medical statistics methods. Medical University Press, pp. 153-154.
5. Orenstein W A, Hinman A R (1999). The immunization regulation in the United States –the role of school immunization laws. *Vaccine* **17**(Suppl 3), S19-24.
6. Lester R, Nolan T (1993). Proof of immunization status required for school entry. *Med J Austr* **159**, 564-565.
7. Vernon T M, Conner J S, Shaw B S, *et al.* (1976). An evaluation of three techniques for improving immunization levels in elementary schools. *AJPH* **66**, 457-460.
8. Anthony N, Reed M, Leff A M, *et al.* (1977). Immunization: public health programming through law enforcement. *Am J Public Health* **67**, 763-764.
9. Middaugh J P, Zyla L D (1978). Enforcement of school immunization law in Alaska. *JAMA* **239**, 2128-2130.
10. Zell E R, Dietz V, Stevenson J, *et al.* (1994). Low levels of US preschool children and school-age children. Retrospective assessment of vaccination coverage. *JAMA* **271**, 833-839.
11. Chuang S K, Lau Y L, Lim W L, *et al.* (2002). Mass measles immunization campaign: experience in the Hong Kong Special Administrative Region of China. *Bull WHO* **80**, 585-595.

(Received October 11, 2006 Accepted July 27, 2007)