A Cross-sectional Survey to Evaluate Knowledge, Attitude and Practice (KAP) regarding Measles Vaccination among Ethnic Minorities

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Objective: Vaccines have prevented the spread of many diseases. However, lower vaccination rates have been found among the minority nationalities of China. We carried out this research to assess the knowledge, attitude and practice (KAP) in Xunhua Salar Automous County, of childhood immunization, particularly in regard to vaccination to prevent measles.

Methods: A close-ended questionnaire was designed to evaluate KAP among 240 primary caregivers sampled by using the probability proportional to size method. The chi-square test and the logistic regression were used for statistical analysis to explore the potential risk factors associated with childhood under-immunization.

Results: We found the majority of primary caregivers (80%) did not know their children could be immunized for free under the Expanded Program on Immunization (EPI) when they left the permanent resident areas. More than 95% of caregivers believed vaccines were effective. However, 34.6% of the children missed opportunities for vaccination or delayed vaccination. Our results showed that the potential risk factors associated with the increasing likelihood of a child missing or delaying immunization were: inadequate supplies of vaccine service; lacking information on immunization program; and lower educational level of caregivers. More than 70% of caregivers expected to acquire immunization information from village doctors or local religious leaders.

Conclusions: To increase immunization rates among minority children, more immunization services are strongly suggested. Local religious leaders were encouraged to play a vital role in improving caregivers' awareness of the immunization program, especially for those without formal schooling. (*Ethn Dis*. 2015;25[1]:98–103)

Key Words: Attitude, Measles-Containing Vaccine, Immunization, Ethnic Minorities

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Introduction

Measles, a highly contagious viral disease, which affects mostly children, is an important public health issue in China. Previous studies showed that measles incidence was higher in minority children than Han children in China.[1,2] Furthermore, compared to school-aged children, preschool-aged children are at higher risk for measles' serious complications, including blindness, encephalitis, severe diarrhea, ear infection, pneumonia, and a higher risk of hospitalization and death from measles.[3]

Measles is preventable by vaccine. Measles-containing vaccine (MCV) immunization is considered as one of the most cost-effective public health interventions to prevent and control measles among children.[4–6] The World Health Organization (WHO) recommends that all susceptible children should receive MCV. Since 1980's, MCV has been included in the Expanded Program on Immunization (EPI) of China, which recommends that all preschool-aged children are immunized with two doses of MCV. In 2006, China set a goal to eliminate measles, which requires that ≥95% of children receive two doses of MCV in every district. Yet, the MCV coverage rate varied from province to province and was documented to be lower in the western provinces than others,[7,8] especially, among minority children[9] compared to the Han majority.[8] There is a paucity of literature regarding MCV coverage rates among minor ethnic groups, as well as their beliefs and behaviors concerning it. Our study was designed to explore knowledge, attitude, and practice (KAP) related to MCV immunization among the Salar people living in Xunhua County, Qinghai Province, China. Our goal was to gather data to plan future interventions and immunization strategies aimed at increasing MCV immunization rate among Chinese ethnic minorities.

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Methods

Our study was a cross-sectional survey conducted in Salar Autonomous County of Xunhua (Xunhua County), from August to November 2013. Xunhua County, comprising eight townships, is the only county in China where the Salar ethnic group resides. A probability-proportional-to-size sampling method was used. First, all eight townships were selected. Second, all the villages within each selected township were divided into three-level strata (near, intermediate, far) by distance from the selected township. Third, one village was randomly sampled from one level of strata. Finally, in each selected village, ten households with children

aged 0–6 years old (ie, born between July 1, 2006 and June 31, 2013) were systematically sampled and were determined to be representative of the Salar population in this region.

After a brief introduction about the purpose of the study, our trained investigators conducted face-to-face surveys of the children's primary caregivers. The survey was voluntary and the questionnaire was checked for completeness. A completed form was taken as oral consent to participate in the survey. This study was approved by ethics committee of Qinghai Provincial Center for Disease Control and Prevention (Qinghai CDC).

The questionnaire consisted of 24 items and was designed to test the KAP of caregivers about the immunization program, measles, and measles vaccination. The questionnaire asked about background of the responders (ie, ethnicity, education, household gross income, and family size), child immunization information (ie, whether or not dose 1 and 2 of MCV had been received), and the reasons related to missed opportunities for immunization or delayed immunization. The majority of the questions were close-ended, except the variables of a child's name, date of birth, family size, and household gross income. General attitudes about vaccination were elicited by asking caregivers to rank their agreement with five statements using a Likert-type scale numbered from 1 (strongly disagree) to 5 (strongly agree). Their responses were analyzed by recording the values 1 or 2 as disagree, the value 3 as neutral, and the values 4 or 5 as agree. Emigration was based on verbal information of prior movement of parents from one place of dwelling to another over the last year.

The MCV immunization status was determined by the children's immunization record book or immunization card. Missing records in the immunization book or on the immunization card were indicated as missed opportunities for immunization. Delayed vaccination was defined as children aged ≥9 months were administered with the first dose of MCV.

All data were input using Epidata V.3.1 software and were analyzed with the statistical package for the social sciences (SPSS, version 16.0, Chicago, IL, USA). Chi-square test was performed to compare between categorical variables and immunization status. Binary logistic regression models were applied to demonstrate the potential impact factors of caregivers' KAP associated with children's missed opportunities for vaccines or delayed vaccination. Odds ratios (ORs) were determined by stepwise forward elimination of variables with $P > .10$. Analyses where P value is ≤.05 were determined to be statistically significant.

Table 1. Characteristics of the responders

Characteristics		*n*	%
Relationship to the study child	Mother	86	35.8
	Father	11	4.6
	Grandparents	143	59.6
Ethnicity	Salar	142	59.2
	Tibitian	81	33.8
	others	17	7.1
Religion	Islam	231	96.3
	Others	9	3.7
Schooling	No schooling	150	62.5
	Primary school (≤5 years)	57	23.8
	Middle school (6–9 years)	19	7.9
	High school and above (≥10 years)	14	5.8
Being emigrant worker(s)	Only father	66	27.5
	Only mother	5	2.1
	Both	104	43.3
	Neither	65	27.1
Family size	≤ 3	35	14.6
	4–6	170	70.8
	≥ 7	35	14.6
Household gross income (Yuan/per person/2012)	≤ 999	19	7.9
	1000–4999	189	78.8
	5000–9999	29	12.1
	≥ 10000	3	1.3

RESULTS

Baseline Characteristics on the Study Responders

A total of 687 households were investigated. Of the total, 447 households had invalid visits and were excluded due to < 50% of questions were answered. Therefore, 240 eligible households with 315 children aged < 6 years were identified and visited.

The characteristics of 240 responders are presented in Table 1. There was a higher proportion (59.58%) of grandparent caregivers. The majority of caregivers (86.25%) had no formal schooling or had only finished primary school. Compared with per capita annual income of rural households of China,[10] most of caregivers (86.67%) had a lower economic status, with a household gross income of less than 5000 Yuan per person in 2012. Of the 240 responders, 231 (96.3%) had Islamic religious affiliation.

Knowledge, Attitude, and Practice on Immunization, Measles and MCV

Of the 315 children, 170 (54.0%) were boys and 145 (46.0%) were girls. Yet, 110 children (34.9%) were identified as under-immunization, with 47 children (14.9%) identified as having

Table 2. MCV Immunization status

Immunization status	MCV (%)
Immunization on time	206 (65.4)
Delayed immunization	63 (20.0)
Missed opportunities for immunization	47 (14.9)
Total	315 (100.0)

missed opportunities for immunization and 63 children (20.0%) were identified as having delayed immunization (Table 2).

Table 3 shows the KAP on immunization, measles and MCV among 240 caregivers. As to knowledge, less than half of caregivers knew they needed to obtain a child immunization book within one month after s/he was born. Nearly 70% of responders were aware that checking children's vaccination records were required on the first day of the school year. Only approximately 20% of caregivers knew that their children could be vaccinated for free when being out of the dwelling place. About 60%–70% of caregivers were aware of the symptoms and causes of measles. The majority of responders (97.1%) agreed that ''vaccine is good to your child,'' and 81.3% believed that ''MCV is the efficient way to prevent measles.'' However, 79.6% of responders were less likely to require their children to be immunized without getting information on vaccination.

Logistic regression statistic results showed that knowledge that ''A child can be immunized for free when they live outside of the dwelling place'' and attitude that 'MCV is effective' were significantly likely to increase the chance of the child being vaccinated (Table 4).

Barriers to immunization

In total, 109 under-immunized children were observed in 52 households. The 52 caregivers in these households identified these specific barriers for not being able or delaying to vaccinate their children: 1) caregivers were busy on the day of immunization (42.3%); 2) caregivers didn't know when or where to have their children immunized (21.2%); 3) caregivers believed vaccine was not effective (3.9%); and 4) caregivers considered it was too far to access the immunization station (1.92%) (Table 5).

The potentially influential factors on inadequate immunization of the children are presented in Table 6. Caregivers with lower education were more likely to have their children under-vaccinated. Those caregivers who calculated the time of immunization were more likely to have children who missed opportunities of immunization or delayed immunization while caregivers who received information from village doctors were less likely to have their children under-immunized.

Preferable sources of obtaining information on vaccination are shown in Table 7. More than 90% of responders expected to get immunization information from village doctors. More than 70% of them were willing to obtain information via local religious leaders and 53.8% via village cadres.

DISCUSSION

To the best of our knowledge, our study is the first to describe caregivers' KAP regarding immunization, measles and measles vaccination in minority ethnic groups. The majority of the interviewed caregivers were grandparents, as is often the case in this region when parents leave their permanent dwelling place to work as temporary

Table 3. KAP on immunization, measles and MCV among 240 responders, *n* (%)

Questions	Yes (%)	No (%)	Not Clear (%)
Knowledge			
Do you get the immunization book in one month after your baby was born?	101(42.1)	10(4.2)	129(53.8)
You must show the immunization book on your child attending the kindergarten.	169(70.4)	8(3.3)	63(26.3)
You must show the immunization book on your child attending the primary school.	183(76.3)	5(2.1)	52(21.7)
When being out of the dwelling place, your child can be inoculated free of charge.	47(19.6)	14(5.8)	179(74.6)
Measles is a highly contagious infection.	143(59.6)	19(7.9)	78(32.5)
Measles causes your child skin rashes and a fever.	173(72.1)	6(2.5)	61(25.4)
Measles can be transmitted by mosquitoes' bites.	31(12.9)	60(25.0)	149(62.1)
Attitude			
Vaccine is good to your child.	233(97.1)	4(1.7)	3(1.3)
MCV is the efficient way to prevent measles.	195(81.3)	9(3.8)	36(15.0)
Practice	Never (%)	Occasionally (%)	
Without getting any notification, you will require your child to be inoculated according to EPI schedule.	191(79.6)	49(20.4)	

Table 4. KAP among caregivers associated with children under-immunization

Variables	*B*	Wald	*P*	OR
Knowledge				
Get the immunization book in one month after your baby was born? (ref: 2 or 3 months)	.245	0.743	.741	1.278
You must show the immunization book on your child attending the kindergarten (ref: No)	1.988	2.170	1.141	7.299
You must show the immunization book on your child attending the primary school (ref: No)	−.576	0.109	.741	.562
When being out of city, your child can be inoculated free of charge (ref: No)	−1.717	4.258	.039[a]	.180
Measles is a highly contagious infection. (ref: No)	.315	0.244	.622	1.370
Measles causes your child skin rashes and a fever. (ref: No)	−.448	0.173	.678	.639
Measles can't be transmitted by mosquitoes' bites. (ref: No)	.051	0.019	.890	1.053
Attitude				
Vaccine is good to your child:				
Neutral (ref: Disagree)	−.365	0.045	.832	.694
Agree(ref: Disagree)	−.241	0.315	.575	1.272
MCV is the efficient way to prevent measles.				
Neutral (ref: Disagree)	.246	0.015	.903	1.279
Agree(ref: Disagree)	−.929	3.813	.051[a]	.395
Practice				
Without getting any notification, you require your child to be inoculated. (ref: No)	.486	0.756	.385	1.626

[a] $P \leq .05$.

emigrant workers. Most of the interviewed caregivers were from low economic status and had a low or no education level. Compared with parents as primary caregivers, grandparents were more likely to have a child who missed opportunities for vaccination or delayed immunization in our study. Though there was no significantly statistical difference, the reason for this may be linked to the availability of vaccines in China, and caregivers' awareness of immunization information.

Our results showed that most caregivers understand the benefits of immunization and are willing to get their children vaccinated. However, the results also indicate that the probability of a child getting vaccinated decreased with the lower educational level of caregivers. This is consistent with published literature. Studies in less-developed countries, such as Lao PDR, Roma, and Africa, showed that higher education is usually associated with higher immunization coverage.[11–13] Nevertheless, in developed countries, for example, United Kingdom,[14] German,[15] and Canada,[16] mothers' higher education and consciously choosing to delay or avoid vaccines for children contributed to poor vaccination rates.

China has significantly developed heterogenicity across counties. Xunhua County is poorly developed and has relatively lower income than others.[10] In local areas, vaccine delivery from townships to the immunization stations in the villages is generally made by village doctors once per month or once every other month. Compared with at least 2.5 days per week in southern developed areas of China, vaccine delivery in western areas was relatively lower. The primary reason is lack of the vaccine cold chain, which is an important system to maintain the potency of vaccines during the transport, storage, and handling of vaccines within WHO recommended temperature range of + 2 to + 8 °C.

The majority of immunization services are provided around the time when the vaccine arrives. As a consequence, caregivers generally access immunization stations monthly or bi-

Compared with parents as primary caregivers, grandparents were more likely to have a child who missed opportunities for vaccination or delayed immunization.

Table 5. Barriers to vaccination

Barriers	Yes *n* (%)	No *n* (%)
Too far to access the immunization station	1 (1.9)	51 (98.1)
Long waiting time	0 (0)	52 (100.0)
Can't understand what the doctor says	0 (0)	52 (100.0)
Don't know when and where to be immunized	11 (21.2)	41 (78.9)
Fear the vaccine's side effects	0 (0)	52 (100.0)
Believe the vaccine is not effective	2 (3.9)	50 (96.2)
Busy on the day of immunization	22 (42.3)	30 (57.7)

Table 6. Factors related to the under-immunization of children, *n* (%)

Variables		Children Under-Immunization (%)	No Children Under-Immunization (%)	Total (%)	*P*
Caregiver	Mother	41 (47.7)	45 (52.3)	86 (100.0)	.91
	Father	5 (45.5)	6 (54.5)	11 (100.0)	
	Grandparents	64 (44.8)	79 (55.2)	143 (100.0)	
Ethnicity	Salar	62 (44.0)	79 (56.0)	141 (100.0)	.73
	Tibitian	39 (47.6)	43 (52.4)	82 (100.0)	
	others	9 (52.9)	8 (47.1)	17 (100.0)	
Schooling	No schooling	83 (55.3)	67 (44.7)	150 (100.0)	.03
	Primary school	36 (63.2)	21 (36.8)	57 (100.0)	
	Middle school	8 (42.1)	11 (57.9)	19 (100.0)	
	High school and above	3 (21.4)	11 (78.6)	14 (100.0)	
Emigrant worker(s)	Only father	32 (48.5)	34 (51.5)	66 (100.0)	.42
	Only mother	4 (80.0)	1 (20.0)	5 (100.0)	
	Both	46 (44.2)	58 (55.8)	104 (100.0)	
	Neither	28 (43.1)	37 (56.9)	65 (100.0)	
Place of immunization	Village clinics	69 (45.1)	84 (54.9)	153 (100.0)	.76
	Home service	41 (47.1)	46 (52.9)	87 (100.0)	
Obtaining information	Yes	39 (46.4)	45 (53.6)	84 (100.0)	.89
	No	71 (45.5)	85 (54.5)	156 (100.0)	
Information source	Village doctors	105 (44.7)	130 (55.3)	235 (100.0)	.01
	Calculating by themselves	5 (100.0)	0 (0.0)	5 (100.0)	

monthly. The vaccine supplies run out quickly on the day of immunization, which may discourage caregivers making repeated trips to the station.

More than half of the caregivers were unaware that their children could be inoculated for free everywhere in China. About 40% of the caregivers lacked the knowledge of clinical symptoms and transmission of measles. In addition, we found that the rate of under-immunization rate was high, which may happen due to poorly informed caregivers. However, comparison of under-immunization rates between different areas remains problematic because of the differences in the ages of children and methodologies for gathering information. The logistic regression results also showed that knowledge of "MCV is effective," and "free vaccination policy related to EPI," was positively associated with vaccination status.

The caregivers expected to acquire the vaccination information from village doctors or local religious leaders, rather than from others. It is heartening to note that village doctors are responsible for informing a majority of caregivers about immunization program. However, in our study, we found that about 20% of caregivers had under-immunized their children due to lack of information. This highlights that, in addition to village doctors, religious leaders could play a positive role to promote immunization awareness among caregivers. Our observations are consistent with previous studies involving participants from differing religious regions.[17,18]

CONCLUSIONS

The supply of vaccination services in Xunhua County is inadequate. Primary caregivers are motivated and understand the importance of vaccination, but are not well-informed on the children immunization program. To remove the obstacles of vaccination and augment immunization coverage, increased

Table 7. Sources of information on children immunization, *n* (%)

Sources	Trust (%)	Don't Trust (%)	Partly Trust (%)	Don't Know (%)
Village doctors	231(96.3)	0(0.0)	9(3.8)	0(0.0)
Television or broadcast	57(23.8)	34(14.2)	53(22.1)	96(40.0)
Magazine or newspaper	30(12.5)	32(13.3)	46(19.2)	132(55.0)
Village cadres	129(53.8)	18(7.5)	48(20.0)	45(18.8)
Local religious leaders	174(72.5)	26(10.8)	6(2.5)	34(14.2)
Cultural and customs	72(30.0)	35(14.6)	26(10.8)	107(44.6)
Relatives and friends	96(40.0)	11(4.6)	45(18.8)	88(36.7)
Internet	12(5.0)	15(6.3)	22(9.2)	191(79.6)
Leaflets or posters	42(17.5)	16(6.7)	45(18.8)	137(57.2)
Short messages on phone	19(7.9)	45(18.8)	24(10.0)	152(63.3)

emphasis should be placed not only on health providers improving immunization services, but also on local religious leaders who can inform families about childhood immunization programs.

ACKNOWLEDGMENTS

Our work was supported by UNICEF/ National Health and Family Planning Commission Cooperation Project (YH702 & Health and Nutrition). We appreciate this funding and thank all caregivers who participated in this survey as well as the members from Qinghai CDC who interviewed the caregivers and collected questionnaires.

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AUTHOR CONTRIBUTIONS

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