

RESEARCH PAPER



Measuring childhood vaccination acceptance of mother in Zhejiang province, East China

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ABSTRACT

Background: The aim of this study was to evaluate the vaccine hesitancy among mothers and examine risk factors associated with mother's intention to vaccination in Zhejiang province.

Methods: A provincial sample of mothers of children aged 24–35 months was surveyed (N = 770) in August, 2017. Demographic information, perception on the past childhood vaccination, knowledge on vaccination, information searches and needs, trust in different institutions on vaccination were collected. Based on the theory of planned behaviour (TPB), attitudes toward vaccination, perceived social support, perceived behavioural control as well as mothers' intention to immunize their child were constructed. Descriptive statistics were generated for all variables. Univariate and multivariate analyses were performed to identify differences between mothers who had strong intentions to immunize their children in future and those with weaker intentions.

Results: Of the participants, 79.6% had a positive attitudes towards vaccination, 77.5% had a high perceived social support, 63.2% had a high perceived behaviour control and 87.3% strongly intended to have their child vaccinated. Strong intention to vaccination was significantly associated with the positive behavioral attitudes [adjusted odds ratios (AOR) = 3.2, 95% CI: 2.3–5.7], the high perceived social support (AOR = 2.8, 95% CI: 1.8–3.6), the perceived ease of undergoing vaccination (AOR = 2.1, 95% CI: 1.6–3.3), respectively.

Conclusions: It was recommended that interventions focused on trust-building, promoting social norms, changing the negative attitude would be effective to enhance the maternal acceptance on vaccination.

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Introduction

Vaccination is generally considered as one of the most effective public health interventions and also regarded as one of the greatest achievements in public health. However, the number of parents who are delaying or refusing one, many or even all vaccinations for their children is increasing in recent years.^{1,2} Up to date, this phenomenon is called as “vaccine hesitancy” and the concept is widely used in the scientific literatures. In 2015, the strategic advisory group of experts working group has defined the vaccine hesitancy as “delay in acceptance or refusal of vaccines despite availability of vaccine services. Vaccine hesitancy is complex and context specific varying across time, place and vaccines”.³

China started Expanded Program on Immunization (EPI) in 1978 with four vaccines to prevent five vaccine-preventable diseases (VPDs). The incidence of VPDs among children has been significantly reduced through EPI, which has saved tens of thousands of children's lives. Chinese EPI has played an extremely important and beneficial role for children's health and the society. Governments at all administrative levels had made great efforts to improve the efficiency and sustainability of EPI in China. In 2007, the Chinese EPI was expanded by adding vaccines to prevent another 5 infectious diseases, resulting in 14 vaccines to prevent 15 VPDs.⁴

Zhejiang is a mid-developed, east-coastal province of China, with an area of 1105.5 square kilometers and a population of approximately 70 million. Administratively, it is divided into 11 cities, 90 counties, and 1319 towns. The annual birth rate is around 1.1% in the last five years, with an estimated 726,511 births in 2016. The vaccines and disposable syringes included in EPI are funded by Chinese central government and the vaccination service is provided at 1628 vaccination clinics at township levels for free. Center for disease control and prevention (CDC) at provincial, city, and county levels funds the cold chain equipment and assists the vaccination clinics in planning, monitoring and evaluating the EPI performance. In Zhejiang province, all the 11 cities and 90 counties have their own CDCs.

Although most of the parents choose to have their children immunized with the vaccines included in the EPI, a recent research from one county of Zhejiang province showed that a proportion of them were susceptible of the vaccine safety or were not convinced by the science of herd immunity, and as a result of not having their children been vaccinated.⁵ However, it is difficult to assess the degree of the vaccine hesitancy at provincial level due to the absence of data on knowledge, attitudes and beliefs of vaccination among parents, especially among mothers. Without validated measures of the vaccine hesitancy, it will remain very challenging to identify the

Table 1. Demographics of the surveyed mothers (N = 770).

Variables	Total sample (N = 770)		Weak intention to vaccination (N = 98)		Strong intention to vaccination (N = 672)		p
	n	%	n	%	n	%	
Age (years)							< 0.001
< 30	489	63.5	44	44.9	445	66.2	
≥ 30	281	36.5	54	55.1	227	33.8	
Maternal education level							0.02
< senior middle school	135	17.5	9	9.2	126	18.8	
≥ senior middle school	635	82.5	89	90.8	546	81.3	
Maternal employment status							0.011
Home fulltime	226	29.4	18	18.4	208	31.0	
Employed	544	70.6	80	81.6	464	69.0	
Residence							< 0.001
Urban	361	46.9	67	68.4	294	43.8	
Rural	409	53.1	31	31.6	378	56.3	
Immigration status							0.003
Resident	477	61.9	74	75.5	403	60.0	
Migrant	293	38.1	24	24.5	269	40.0	
Household income per month							0.428
< 5000 CNY	82	10.6	14	14.3	68	10.1	
5000–10,000 CNY	496	64.4	62	63.3	434	64.6	
> 10,000 CNY	192	24.9	22	22.4	170	25.3	
Number of children at home							< 0.001
1	256	33.2	22	22.4	234	34.8	
2	452	58.7	56	57.1	396	58.9	
≥ 3	62	8.1	20	20.4	42	6.3	

individuals who are hesitant on vaccination, and measure the prevalence of the vaccine hesitancy, and detect the association between the vaccine hesitancy and the vaccination coverage, and monitor the trend of the vaccine hesitancy over a long time period.

Efficient strategies to address the vaccine hesitancy are crucially needed to ensure and sustain the success of EPI, with an important prerequisite of understanding of the underlying factors of the vaccine hesitancy or acceptance.⁶ The theory of planned behaviour (TPB) thinks that the intention is predicted by the positive attitudes toward a specific behaviour, the approval of the other significant subjective norms and a perceived behavioural control.⁷ The TPB has been shown to predict the intention to adopt various health behaviours in both its original or modified versions, including the intention to vaccination.^{8,9} Furthermore, Schmid suggested that the TPB could be further increased by integrating the concepts of risk perception, past behaviour, knowledge, and experience into the model when they reviewed the barriers of the influenza vaccination intention and behavior.¹⁰

In this context, we evaluated the vaccine hesitancy among mothers of children aged 24–35 months and examine the risk factors associated with mother's intention to vaccination on the basis of the TPB.

Results

Demographics of the surveyed mothers

Totally, 770 mothers agreed to participate in this survey after 866 households with children aged 24–35 months were approached. Most surveyed mothers were under 30 years of age (63.5%). Most of the surveyed mothers had a senior middle school or above level of education (82.5%). Most of the participants had jobs (70.6%) and half of them were living in the rural areas (409, 53.1%). Over half of the surveyed mothers were resident (61.9%) and a similar proportion of the surveyed households had a monthly income of 5000–10,000 CNY

(64.4%). Only 62 mothers (8.1%) had more than three children. There were 672 (87.3%) mothers strongly intended to have their child vaccinated in future (Table 1).

Past vaccination behaviours and accessibility to vaccination

Most of the mothers reported that their children received all recommended vaccines (84.0%) and received these vaccines on time (80.3%). A small proportion of the surveyed mothers encountered difficulties to get a vaccination appointment due to the incompatible time for their work (15.2%) or to find the time to call the clinic (11.2%). Of the surveyed mothers, 19.5% reported that vaccination was inconvenient and/or waiting time at the clinic was unreasonable, and 24.9% did not know the due time of vaccinations (Table 2).

Perceived knowledge, information searches and needs, and trust in different institutions

Of the participants, 57.0% thought themselves to be knowledgeable on vaccines, and 74.4% thought the information they received was useful and helpful, and 33.1% asked for information on vaccination very often, and 89.0% agreed for mothers should be responsible for questioning the vaccines. Overall, the proportions of mothers who could trust the doctors or the government to do what was in the best interest of the public were 74.9% and 74.4%, respectively. However, only 46.6% agreed that they could trust the media to report fairly and accurately on vaccination (Table 3).

Intention to vaccination and TPB constructs

Of the surveyed mothers, 79.6% had a positive attitudes towards vaccination, and 77.5% had a high perceived social support, and 63.2% had a high perceived behaviour control (Table 4).

Table 2. Past vaccination behaviours and ease of accessibility to vaccination (N = 770).

Variables	Total sample (N = 770)		Weak intention to vaccination (N = 98)		Strong intention to vaccination (N = 672)		p
	n	%	n	%	n	%	
	Since birth, my child has						
Received all recommended vaccines	647	84.0	71	72.4	576	85.7	< 0.001
Received only some vaccines	100	13.0	17	17.3	83	12.4	
Received no vaccine	23	3.0	10	10.2	13	1.9	
My child has received his/her vaccines on time							< 0.001
Yes	618	80.3	64	65.3	554	82.4	
No	119	15.5	26	26.5	93	13.8	
Don't know	33	4.3	8	8.2	25	3.7	
Difficult to obtain a vaccination appointment because it was not available at a time that worked for me							0.037
Yes	117	15.2	23	23.5	94	14.0	
No	629	81.7	71	72.4	558	83.0	
Don't know	24	3.1	4	4.1	20	3.0	
Difficult to obtain a vaccination appointment because it was difficult to find the time to call the clinic							0.042
Yes	86	11.2	18	18.4	68	10.1	
No	652	84.7	75	76.5	577	85.9	
Don't know	32	4.2	5	5.1	27	4.0	
Vaccination was inconvenient and/or waiting time at the clinic was unreasonable							0.013
Yes	150	19.5	28	28.6	122	18.2	
No	592	76.9	64	65.3	528	78.6	
Don't know	28	3.6	6	6.1	22	3.3	
Did not know when the vaccines were due							0.022
Yes	192	24.9	35	35.7	157	23.4	
No	522	67.8	55	56.1	467	69.5	
Don't know	56	7.3	8	8.2	48	7.1	

Table 3. Perceived knowledge, information searches and needs, and trust in different institutions (N = 770).

Variables	Total sample (N = 770)		Weak intention to vaccination (N = 98)		Strong intention to vaccination (N = 672)		p
	n	%	n	%	n	%	
	How knowledgeable do you consider yourself to be about vaccines						
Very well	439	57.0	48	49.0	391	58.2	< 0.001
Moderate	247	32.1	23	23.5	224	33.3	
Knowing nothing	84	10.9	27	27.6	57	8.5	
How useful was the information you got about vaccines, when deciding whether to vaccinate your baby							< 0.001
Very helpful	573	74.4	64	65.3	509	75.7	
Moderate	171	22.2	19	19.4	152	22.6	
Not at all helpful	26	3.4	15	15.3	11	1.6	
When your child was a baby, how often did you look for or ask for information about vaccines							< 0.001
Very often	255	33.1	25	25.5	230	34.2	
Moderate	463	60.1	54	55.1	409	60.9	
Never	52	6.8	19	19.4	33	4.9	
It is my role as a mother to question vaccines							0.07
Disagree	33	4.3	8	8.2	25	3.7	
Moderate	52	6.8	9	9.2	43	6.4	
Agree	685	89.0	81	82.7	604	89.9	
Most of the time we can trust doctors to do what's in the best interest of the public							0.002
Disagree	178	23.1	35	35.7	143	21.3	
Moderate	233	30.3	31	31.6	202	30.1	
Agree	359	46.6	32	32.7	327	48.7	
Most of the time we can trust the government to do what is in the best interest of the public							0.001
Disagree	59	7.7	15	15.3	44	6.5	
Moderate	138	17.9	23	23.5	115	17.1	
Agree	573	74.4	60	61.2	513	76.3	
Most of the time we can trust the media to report fairly and accurately							0.19
Disagree	57	7.4	11	11.2	46	6.8	
Moderate	136	17.7	20	20.4	116	17.3	
Agree	577	74.9	67	68.4	510	75.9	

Risk factors of mother's intention to vaccination

The strong maternal intention to vaccination was significantly associated with all TPB constructs, with the crude odds ratios (CORs) of 3.5 (95% CI: 2.4–6.6) for the positive behavioral

attitudes, 3.1 (95% CI: 2.1–5.2) for the high perceived social support, 2.6 (95% CI: 1.8–4.8) for the perceived ease of undergoing vaccination, respectively. In the multivariable logistic regression analysis model, the adjusted odds ratios (AORs) for the three TPB

Table 4. TPB constructs (N = 770).

Variables	Total sample (N = 770)		Weak intention to vaccination (N = 98)		Strong intention to vaccination (N = 672)		p
	n	%	n	%	n	%	
Attitudes towards vaccination							< 0.001
Negative	157	20.4	38	38.8	119	17.7	
Positive	613	79.6	60	61.2	553	82.3	
Perceived social support							0.004
Low	173	22.5	33	33.7	140	20.8	
High	597	77.5	65	66.3	532	79.2	
Perceived behaviour control							0.014
Difficulty of undergoing vaccination	283	36.8	47	48.0	236	35.1	
Ease of undergoing vaccination	487	63.2	51	52.0	436	64.9	

constructs were 3.2 (95% CI: 2.3–5.7), 2.8 (95% CI: 1.8–3.6), 2.1 (95% CI: 1.6–3.3), respectively.

Other risk factors associated with the strong maternal intention to vaccination were being migrant, having look or ask frequently for information about vaccines, having trust the doctors to do what's in the best interest of the public. However, being employed, having ≥ 3 children in the household, having difficulty to obtain a vaccination appointment, inconvenient and/or waiting time at the clinic were negatively associated with the strong maternal intention to vaccination (Table 5). The model explains 70.2% of the variance of mother's intention to vaccination.

Discussion

Since the significant challenges existed in the understanding of the motivation to get children's vaccination among mothers, we conducted an investigation among mothers in Zhejiang province, which was informed by the TPB model. The results of this study demonstrated that all TPB constructs were associated with mother's vaccination intention. The behavioral attitudes toward vaccination was found as the strongest determinant of the mother's intention to immunize their child, though the perceived social support and the behavioural control allowed for a more robust multivariable model. It meant mothers who did not consider vaccination to be important to keep their children and community healthy, and who considered the VPDs not to be serious would not intend to vaccinate their children.

As we known, there were a few studies evaluated the vaccination intention or behavior among mothers of young children by using the TPB model. In these studies, the positive attitude or beliefs on vaccination were generally considered as the reliable determinants of the caregivers' intention to vaccination. For example, Prislun found that the caregiver's positive attitude on vaccination and the high perceived behavioural control were significantly associated with the higher vaccination coverage in two years old children in U.S.¹¹ In another study conducted in Canada, the perceived social norm and the behavioural control were the strong determinants of parental intention to the childhood vaccination against rotavirus.¹² Besides, there were two systematic reviews on the parental intention to vaccination and had identified predictors such as: the lack of the recommendations on vaccination from providers, the preference for "natural" health, the negative perception of the vaccine's efficacy and usefulness, the poor experiences of previous vaccination services, and the lack of awareness or knowledge on vaccination, etc.^{13,14} However, it was difficult to draw the conclusions about the relative strength of the influence of these risk factors as the previous studies were rarely based on theoretical models and, if so, the theoretical constructs varied greatly between studies. Furthermore, these reports were rarely from China and it might not be suitable to our factual situation and there was no significance for designing and implementing interventions under the real background of Zhejiang province.

In the multivariate analysis, we found some risk factors from the demographic characteristics, accessibility to service, and

Table 5. Risk factors of mother's intention to childhood vaccination.

Variables	AOR (95% CI)	p
Demographic variables		
Being employed	0.6(0.4–0.8)	< 0.001
Being migrant	1.6(1.2–2.8)	0.002
Having ≥ 3 children in the household	0.6(0.5–0.8)	< 0.001
Accessibility to vaccination service		
Difficult to obtain a vaccination appointment	0.8(0.6–1.9)	0.008
Inconvenient and/or waiting time at the clinic was unreasonable	0.7(0.5–0.9)	0.004
Perceived knowledge, information searches and needs, and trust in different institutions		
Having look or ask frequently for information about vaccines	1.3(1.1–1.8)	0.022
Having trust doctors to do what's in the best interest of the public	1.4(1.1–1.7)	0.014
TPB model constructs		
Positive behavioral attitudes	3.2(2.3–5.7)	< 0.001
High perceived social support	2.8(1.8–3.6)	< 0.001
Perceived ease of undergoing vaccination	2.1(1.6–3.3)	0.017

AOR: adjusted odds ratio

CI: confidence interval

knowledge, information searches and needs, and trust in different institutions, associated with the intention to childhood vaccination. First, having an occupied mother was identified as a negative determinant of the mother's intention to vaccination. We assumed that these mothers might not have enough time to spend on receiving the primary healthcare of children or the opening time of vaccination clinic was conflicted with the working hours, which was also found in previous studies.¹⁵⁻¹⁷ Second, we found being migrant was a positive factor of the intention to children's vaccination. Our finding was contrary to some previous reports, which indicated the migrant people with lower socio-economic status were at the risk of under vaccination.¹⁸⁻²⁰ However, a domestic study had found that the resident people with the relatively higher economic status would come an increased concern about the quality while they had a decreased focus on the cost.²¹ In our setting, we assumed that the low intention to vaccination among resident population might be due to the mistrusts caused by some negative reports on vaccine safety in recent years and the increasing attention on vaccine safety among mothers. Third, having ≥ 3 children in the household was identified as a negative impact on the intention to vaccination. It was similar with the previous studies from Philippines²² and U.S,²³ which had indicated that the allocation of the family resources, the dedication of time and the financial expense would be dispersed due to the more children in the household, resulting a negative influence on parental intention to childhood vaccination. Parents might be busy in taking care of the young child and overlook the vaccination of the old one. Fourth, difficulties of accessing the appointments and inconvenient/waiting time at the clinic were demonstrated as the risk factors of poor intention to vaccination. These unpleasant experience definitely affected the mother's intention and the practice of vaccination, leading to the missed opportunities or the drop outs of vaccination.^{24,25} We suggested that all vaccination providers adjust the vaccination session and extend the working hours to reduce the vaccine hesitancy among mothers, which had been indicated to be effective among migrant population in Zhejiang province and might be the most beneficial to the working mothers.

As in our study, previous reports had shown that the parents' information searches on vaccination were positively associated with their intention to vaccination.²⁶⁻²⁸ These studies demonstrated that parents with the vaccine-hesitancy did not search the knowledge on vaccination actively through any channels, for example, doctors, friends, families, mass media or Internet, etc. The mother's trust in doctors were positively associated with the intention to childhood vaccination, which was consistent with a previous systematic review. The lack of trust in healthcare professionals and official sources such as public health authorities was indicated as the risk factors of the vaccine hesitancy.²⁹ Another study from Beijing also found that the coverage of influenza vaccine was higher in the rural areas as there was a close relationship between doctors and patients.²¹ Under this situation, the accurate information was easily accepted by residents and each eligible individual were willing to get vaccination. As the doctors were the authoritative source of information and their explanation was a good opportunity to correct the misinformation, we encouraged vaccination

doctors play a key role in educating mothers to improve their intention to vaccination, resulting an optimal vaccination coverage among their children.

There were several limitations of this study worth noting. First, the internal consistency of the two TPB constructs was low due to the fact of only two items were included. Second, the intention to childhood vaccination was evaluated at the time when most of the recommended vaccinations expected to be administrated. However, all TPB constructs remained significantly associated with the mother's intention even when past decisions were included in our multivariate analyses. Third, the study design was based on the face-to-face interview. As such, the potential recall and social desirability bias might not be avoided and it could affect our results.

Conclusions

In this survey, the majority of the surveyed mothers had a positive attitudes towards vaccination, and had a high perceived social support, and had a high perceived behaviour control. Furthermore, we also found the strong maternal intention to vaccination was significantly associated with all TPB constructs and other socio-demographic factors. These findings recommended that the interventions focused on trust-building between providers and mothers, promoting social norms, changing the negative attitude on vaccination would be effective to enhance the acceptance on vaccination among mothers. Furthermore, improving the vaccination service and making the vaccination appointments more easily might also have a positive influence on the acceptance on vaccination.

Methods

Target population

In this study, we conducted an investigation of mother with a child 24-35 months old (born from September 1, 2014 to July 31, 2015) in Zhejiang province in August, 2017. Mothers of the eligible children were investigated through a face to face interview by trained interviewers.

Sample size and survey procedures

The sampling size was estimated on the basis of the immunization cluster survey methods recommended by world health organization (WHO)³⁰ and the formula for the calculation was as follow:

$$N_{\min} = deff \times \frac{z_{(1-\alpha/2)}^2 \times p \times (1-p)}{d^2}$$

The parameters for the calculation were set as follow: a two-tailed α error of 5%, the expected fully coverage (p) of 90%, a permissible error (d) of 0.1 and a design effect (deff) of 2. As such, the final sample size was 70 for each city, with 10 households in each cluster and 7 clusters in each city, and the total sample size was 770 for the entire province.

There were three steps of the field survey and we considered each town as a cluster. First, we selected 7 towns from the list of

towns (with population size of each town) for every city by using the probability proportional to population size method. Second, the first community was chosen by simple ballot from the list of communities of the selected town. Third, the first household was chosen from the list of household in the selected community, using the random number table. Fourth, we surveyed the rest 9 households, by turning to the right of the first household and visiting the adjacent one. Only one eligible child per household was selected for the survey. Households were re-scheduled for another visit if there was somebody living but without any response. The closest community would be chosen to survey the rest children if we could not find enough children in the selected community.

Data collection

A ~15 min questionnaire was developed by Zhejiang provincial center for disease control and prevention (ZJCDC). To ensure the items of the questionnaire clarify, the questionnaire was pilot-tested with 10 mothers and the minor revisions were made. The pilot-test surveys were not included in the analysis.

There were four types of information collected in the survey. First, the demographic information of mother was collected, such as age, education background, household income per month, immigration status, residence area, race, employment status. Second, 2 and 4 items were used to collect information on mother's perception on the past childhood vaccination and the access to vaccination, respectively. Third, we used 7 items to evaluate mother's the perceived knowledge (2 items), information searches and needs (2 items), and level of trust in different institutions on vaccination (3 items), respectively. Fourth, the attitude toward vaccination, the perceived social support, and the perceived behavioural control were collected. The attitudes toward vaccination of one's child were assessed with 3 items. The assessment of the perceived social support was based on 2 items. The perceived behavioural control on vaccination was assessed by 2 items.

Measurements

As informed by TPB, three measurements such as the attitudes toward vaccination, the perceived social support, and the

perceived behavioural control were constructed. For each mother, the items of the type four data were averaged to form a single score of each measurement by category, with low scores ("1") indicating very negative perceptions toward vaccination and high scores ("7") indicating very positive perceptions. The mean score for each measurement was dichotomized with a cut-off value of 6. A mean score of 6 or greater indicated a very positive attitude toward immunizing one's child, a high perceived social support for immunizing one's child, a great degree of perceived behavioural control in performing childhood vaccination. The mothers' intention to immunize their child in the future was assessed by 2 items, using a 7-point Likert scale. These 2 items were averaged to form a single intention score for each mother, which was dichotomized with a cut-off value of 7, indicating the strong or weak vaccination intention. The cut-off values for TPB constructs and mother's intention were determined through a group discussion with experts from the 11 CDCs at city level. The items and scale anchors for each TPB constructs and the internal consistencies were presented in Table 6.

Statistical analysis

Descriptive statistics were generated for all variables. Univariate analyses using chi-square were performed to identify differences between mothers with the strong intentions to immunize their children in future and those with the weak intentions. Variables with a $p < 0.1$ in univariate analyses were included in the multi-variable logistic regression analyses. The TPB constructs were entered into the multivariable logistic regression first, then the other variables significant in univariate analyses were sequentially tested and retained when they remained statistically significant and contribute for a better fit of the model. All analyses were based on a two-tailed p -value of 0.05 as significant. Data were analyzed using STATA MP 14.0 (Stata Corp. 2015, Stata statistical software, college station, TX, USA).

Ethics considerations

This study was approved by the ethical review board of ZJCDC (T-060-S). All methods were carried out in accordance with relevant guidelines and regulations. Written

Table 6. TPB items for each constructs.

<p>Attitudes toward vaccination (Cronbach's $\alpha = 0.8$) For having a healthy life of my child, vaccinations are (not important/very important) For my community to be healthy, vaccinations are (not important/very important) The diseases vaccines protect against are (not serious/very serious)</p>
<p>Perceived social support (Cronbach's $\alpha = 0.6$) Most persons important to me suggest that children should get (no vaccines/all vaccines) Most persons with children in my community give their children get (no vaccines/all vaccines)</p>
<p>Perceived behavioural control (Cronbach's $\alpha = 0.6$) If I want to immunize a child of mine, getting the vaccination is (very difficult/very easy) I feel that I can fully choose to have my child vaccinated whether or not (strongly disagree/strongly agree)</p>
<p>Vaccination intention (Cronbach's $\alpha = 0.8$) How likely I am to get my child any future recommended vaccines (not at all likely/very likely) If I had another child, I would get him/her (no recommended vaccines/all recommended vaccines)</p>

Note: All items are on a 7-point Likert scale.

informed consent was obtained from each mother once there was a decision to participate.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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Author contributions

Yu Hu conceived and designed the experiments; Yaping Chen performed the experiments; Yu Hu and Ying Wang analyzed the data; Ying Wang contributed reagents/materials/analysis tools; Yu Hu wrote the paper.

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