

Nutrition knowledge, attitudes, behaviours and the influencing factors among non-parent caregivers of rural left-behind children under 7 years old in China

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Abstract

Objective: To explore and compare nutrition knowledge, attitudes and behaviours (KAB) between non-parent and parent caregivers of children under 7 years old in Chinese rural areas, and to identify the factors influencing their nutrition KAB.

Design: Face-to-face interviews were carried out with 1691 non-parent caregivers and 1670 parent caregivers in the selected study areas; multivariate logistic regression models were used to identify the factors influencing nutrition KAB in caregivers.

Results: The awareness rate of nutrition knowledge, the rate of positive attitudes and the rate of optimal behaviours in non-parent caregivers (52.2%, 56.9% and 37.7%, respectively) were significantly lower than in the parent group (63.8%, 62.1% and 42.8%, respectively). Multivariate logistic regression modelling showed that caregivers' family income and care will, and children's age and gender, were associated with caregivers' nutrition KAB after controlling the possible confounding variables (caregivers' age, gender, education and occupation).

Conclusions: Non-parent caregivers had relatively poor nutrition KAB. Extra efforts and targeted education programmes aimed to improve rural non-parent caregivers' nutrition KAB are wanted and need to be emphasized.

Keywords
Left-behind children
Non-parent caregivers
Nutrition knowledge, attitudes
and behaviours
Influencing factors

In recent years, the nutrition and health of left-behind children has become a social and public health problem in China^(1–3). When parents are unable to take care of their children, the responsibility falls to non-parent caregivers, either grandparents or other relatives^(4,5). Some studies have reported that Chinese children under 7 years old who lived with non-parent caregivers received less care and faced many nutrition-related problems, such as low intake of some nutrients and poor physical growth and development^(3,6,7). Although there are various possible reasons for the nutrition-related problems of left-behind children, it is certain that caregivers' nutrition knowledge, attitudes and behaviours (KAB) is an important factor.

Non-parent caregivers play a very important role in the daily care of rural left-behind children^(3,8); thus their nutrition KAB will be associated with the nutrition of rural left-behind children⁽⁹⁾. There is some literature on this topic^(10,11). One study reported that because of non-parent caregivers' poor nutrition knowledge, rural left-behind children tended to be malnourished⁽¹⁰⁾. Another study revealed that non-parent caregivers' low knowledge regarding vitamin A was a critical factor for children's vitamin A

deficiency⁽¹¹⁾. However, these studies were mostly limited in scope and conducted with a small population, and there are few papers on non-parent caregivers' nutrition KAB in China. Clearly, such studies seem important because non-parent caregivers' nutrition KAB may enhance or impede the implementation and eventual success of a nutrition programme for left-behind children. Therefore, the purposes of the present study were to explore and compare nutrition KAB between non-parent and parent caregivers of children under 7 years old in Chinese rural areas, and to identify the factors influencing their nutrition KAB. The results of the study should provide information to develop tailored education programmes that meet the nutrition education needs of non-parent caregivers.

Methods

Subjects and sampling

The study population comprised non-parent and parent caregivers of children below 7 years of age living in Chinese rural areas.

In our study, left-behind children were defined as those whose parents were farmers but were working out of the home town for at least 6 months up to the interviewing day. All of the left-behind children were under 7 years old and had been living in the same home town for the past 6 months. One of the child's principal caregivers in the family or extended family was selected as the study population.

This survey was a sub-project of the 'Investigation of left behind children's nutrition and health in Chinese rural areas'. Multistage stratified cluster and random sampling were adopted. First, seven representative provinces including Jiangxi, Sichuan, Hunan, Hubei, Guizhou, Henan and Anhui were selected randomly from the thirteen provinces that had the majority of the left-behind children (more than 80%) according to data of the geographical distribution of left-behind children provided by the Population and Development Center of China⁽¹⁾. Second, three counties were selected randomly from each chosen province based on economic status, which was typical of good, fair and poor economic condition, respectively (twenty-one counties in total). Finally, in the same way, three towns were selected randomly from each chosen county (sixty-three towns in total). According to the definition of left-behind children, we ascertained the name list of left-behind children under 7 years old from the local government population register system and then randomly selected thirty left-behind children and their non-parent caregivers in each selected town after considering the distribution of children's age and gender.

Children in the parent caregivers' group were selected at the ratio of 1:1. Inclusion criteria included: the same residential area as the left-behind children (the same village or an adjoining village), the same gender, close age (age gap of less than 2–3 months) and other conditions such as similar birth weight and birth situation. According to the inclusion criteria, we first found these children in the local government population register system and then randomly selected them to match the sample of rural left-behind child by age and sex. These children's parents were also enrolled as a comparative group.

Measurements

The questionnaire was based on items used in various published studies^(12,13) and was developed by twelve experts through three waves of consultation (Delphi method). Our experts were from the departments of Nutrition Science, Child Health, Epidemiology and Statistics of different national universities, and they were all outstanding in their field. The questionnaire had been used in a pilot study⁽⁸⁾, and corresponding revision of two items was made according to the results of the pilot study. All topics in the questionnaire were strongly associated with the total score of KAB ($r=0.71-0.90$). We re-investigated 300 caregivers two weeks after the first investigation, and the Cronbach's α coefficient was computed to be 0.80.

The questionnaire was divided into four sections and comprised a series of questions pertaining to socio-demographic characteristics, basic nutrition knowledge, attitudes towards nutrition behaviours and behaviour characteristics with regard to children's nutrition.

The sociodemographic part of the instrument included questions on caregivers' age, gender, occupation and education level, and children's age and gender. For assessing basic nutrition knowledge, respondents were asked ten questions (see Table 2). If the answer was correct, a score of 1 was assigned. The maximum accumulated score was 10. For attitudes towards nutrition behaviour, respondents were asked to use a 2-point ordinal scale (rating scale from 0 to 2, 2 = 'agree' and 0 = 'disagree') in a limited number of questions exploring respondents' agreement/disagreement. This section had five questions (see Table 2) and the total score was 10. In the fourth set of questions, we assessed nutrition behaviours (see Table 2). This section also had five questions, and each question had five answers. The score of 4, 3, 2, 1 or 0 was assigned to the answer of 'strongly care', 'care', 'uncertain', 'do not care' and 'strongly do not care', respectively, and the maximum score was 20. We classified the 'strongly care' and 'care' as the healthy behaviour, which meant 'yes' to the questions; the remaining three answers were classified as unhealthy behaviour, which meant 'no' to the questions.

The summation of knowledge, attitude and behaviour grades was equal to the total score of respondents. The rates of nutrition knowledge, positive attitude and optimal behaviour for each question were computed as the ratio of the number of people who gave a correct (positive) answer in the total answers.

Protocol

From October 2007 to September 2008, we carried out face-to-face interviews by using the questionnaire in the selected study areas. Before the formal investigation started, we organized a series of training programmes at nation, province and county level. The questionnaire was administered in the Chinese language. Caregivers voluntarily joined in this investigation. During the interview, interviewers read a list of questions, and caregivers listened to and answered each question honestly (10–15 min). After caregivers completed the questionnaire, their children received a free health examination as an incentive. If caregivers were reluctant to participate, we replaced them with others (same living area, gender, age, birth condition). Fortunately, most of our caregivers chose to accept interview, and the response rate was 96.24%.

Ethical committees from the Health Department of Jiangxi, Sichuan, Hunan, Hubei, Guizhou, Henan and Anhui provinces and all twenty-one chosen counties approved the research protocol; and informed, oral consent was obtained from the non-parent and parent caregivers.

Data analysis

Chinese Version Epidata 3.0 (<http://www.epidata.dk>) was used to establish the database. The χ^2 test was conducted to test for differences in sociodemographic characteristics and response rates of nutrition KAB between the two groups. Multivariable logistic regression modelling was used to identify the factors influencing KAB among caregivers (backward method: LR $\alpha_{in} = 0.05$, $\alpha_{out} = 0.10$). The significance level for variables entering the models was set at 0.05 and for removing at 0.10. Associations between the independent and dependent variables were expressed as odds ratios, adjusted odds ratios and 95% confidence intervals. The level of significance was set at 0.05 and all *P* values were interpreted in a two-tailed manner.

Results

Basic situation

A total of 3800 questionnaires were returned. Among these questionnaires only 3361 were valid (88.45%), and the remaining 439 were excluded from the analysis because of missing data. Among the 3361 respondents, 1691 (50.3%) were non-parent caregivers and 1670 (49.7%) were parent caregivers. There were significant differences in gender, age, occupation and education between non-parent and parent caregivers. Compared with parent caregivers, there were more females, farmers, seniors and low-educated persons in the group of non-parent caregivers. As for the children, the mean age and

the age and gender distributions of the left-behind children were similar to those of the comparative group; none of the between-group comparisons were statistically significant (Table 1).

Comparison of pass rates on child nutrition knowledge, attitudes and behaviours between non-parent and parent caregivers

As illustrated in Table 2, there were significant differences in the answers to the questions of nutrition KAB between non-parent and parent caregivers. For example, the rates of correct answers to the ten nutrition knowledge questions were significantly lower in non-parent caregivers than in parent caregivers. Similarly, compared with parent caregivers, the rates of positive attitudes and the rates of healthy nutrition behaviours were also significantly lower in non-parent caregivers, except for three questions (Table 2).

Multivariable logistic regression analysis on the factors influencing caregivers' nutrition knowledge, attitudes and behaviours

Six variables that showed a significant difference for caregivers' KAB in the univariate analyses, including caregiver's family income and care will, child's age and gender, type of guardianship and child's living fee paid by parents, were selected to be independent variables. Whether the total score passed or not was taken as the dependent variable (0 = passed, 1 = failed) and then

Table 1 Comparison of caregivers' and children's demographic characteristics, rural China (Jiangxi, Sichuan, Hunan, Hubei, Guizhou, Henan and Anhui provinces), 2007–2008

Characteristic	Non-parent caregivers		Parent caregivers		χ^2	<i>P</i>
	<i>n</i>	%	<i>n</i>	%		
Caregiver's gender						
Male	534	31.6	642	38.4	17.404	0.000
Female	1157	68.4	1028	61.6		
Age group (years)						
≤35	507	30.0	999	59.8	713.671	0.000
36–50	294	17.4	505	30.3		
≥50	889	52.6	165	9.9		
Occupation						
Farmer	1594	94.3	1427	85.4	76.466	0.000
Businessman	39	2.3	129	7.7		
White-collar worker	39	2.3	85	5.1		
Other	19	1.1	29	1.7		
Education level						
Illiterate or semi-literate	533	31.5	166	9.9	294.476	0.000
Elementary school	568	33.6	518	31.0		
Junior middle school	508	30.0	843	50.5		
High school or above	82	4.8	143	8.6		
Child's age group (years)						
<3	306	18.1	294	17.6	0.263	0.967
3–	583	34.5	586	35.1		
5–	603	35.7	598	35.8		
7	199	11.8	192	11.5		
Child's gender						
Male	873	51.6	871	52.2	0.094	0.782
Female	818	48.4	799	47.8		

Table 2 Comparison of parent and non-parent caregivers' pass rates for child nutrition knowledge, attitudes and behaviours (KAB), rural China (Jiangxi, Sichuan, Hunan, Hubei, Guizhou, Henan and Anhui provinces), 2007–2008

KAB item	Correct (positive) answer	Non-parent caregivers		Parent caregivers		χ^2	P
		n	%	n	%		
Knowledge							
1. Which nutrient ingredient can be supplemented if children often eat fresh fruits and vegetables?	vitamins and dietary fibre	774	45.8	1061	63.5	106.93	0.000
2. Does it affect health if children eat fried food too much?	yes	991	58.6	1169	70.0	47.22	0.000
3. Is it necessary for children to be afforded a variety of tonics frequently?	no	761	45.0	863	51.7	15.12	0.000
4. Is it able to fully meet the needs of growth and development as long as children eat more meat, fish and eggs?	no	836	49.4	1050	62.9	61.59	0.000
5. Which has more nutrition value, rough flour or refined flour?	rough flour	764	45.2	866	51.9	14.99	0.000
6. What is the best way to prevent children calcium deficiency?	basking and supplement calcium	519	30.7	734	44.0	63.38	0.000
7. Is it reasonable for children have a poor breakfast but a rich lunch and dinner?	no	880	52.0	1066	63.9	48.23	0.000
8. Is the nutrition value of milk substitute equal to milk?	no	990	58.5	1169	70.0	47.70	0.000
9. Is it better to wash the rice as many as possible while cooking?	no	1031	61.0	1258	75.3	79.36	0.000
10. Should children often eat fast food, such as McDonald's and KFC?	no	1278	75.6	1416	84.8	44.44	0.000
Subtotal		8824	52.2	10 652	63.8	464.14	0.000
Attitudes							
1. Will you give priority to the nutrition value when you choose food for children?	agree	1099	65.0	1191	71.3	15.30	0.000
2. Do you agree with your child eating the low nutrition value food too much?	disagree	1129	66.8	1223	73.3	16.96	0.000
3. Do you remind your child of food diversification, not being choosy in food and monophobia while eating?	agree	1284	75.9	1392	83.4	28.52	0.000
4. Do you think children should drink milk every day?	agree	906	53.6	971	58.2	7.21	0.004
5. Is it necessary to prepare separate food for children under 7 years old?	agree	426	25.2	409	24.5	1.546	0.462
Subtotal		4810	56.9	5186	62.1	47.47	0.000
Behaviours							
1. Do you prepare breakfast for your child every day?	yes (5–7/week)	1154	68.2	1280	76.6	2.71	0.054
2. Do you prepare milk or soya milk for your child every day?	yes (5–7/week)	504	29.8	580	34.7	9.33	0.001
3. Do you prepare calcium for your child every day?	yes (5–7/week)	151	8.9	161	9.6	0.51	0.258
4. Do you remind your child of food diversification, not being choosy in food and monophobia while eating?	yes (5–7/week)	808	47.8	891	53.4	10.43	0.001
5. Do you try to change your child's diet in order to enhance nutrition?	yes (5–7/week)	526	31.1	663	39.7	27.15	0.000
Subtotal		3143	37.7	3575	42.8	55.71	0.000

For knowledge, *n* represents the number of people with the correct response; for attitudes, *n* represents the number of people in a positive attitude; for behaviours, *n* represents the number of people with the correct behaviour.

multivariable logistic regression analysis was conducted. After controlling for possible confounding variables, caregivers' family income and care will, and children's age and gender, were associated with caregivers' KAB (Table 3).

Discussion

Status of nutrition knowledge, attitudes and behaviours among non-parent caregivers

In the present study we found that the awareness rate of nutrition knowledge, the rate of positive attitudes and the rate of correct behaviours in non-parent caregivers were significantly lower than in parent caregivers (52.2% *v.*

63.8%, 56.9% *v.* 62.1% and 37.7% *v.* 42.8%, respectively). These rates were also lower than those in parent caregivers in Zhuhai, Guangdong Province, China, in whom the rates of nutrition knowledge, positive attitudes and correct behaviours were 72.21%, 82.49% and 67.4%, respectively⁽¹⁴⁾. Our findings indicated that there was a significant lack of nutrition KAB among the non-parent caregivers.

According to the theory of knowledge–attitude–practice or knowledge–attitude–behaviour–practice, we know that knowledge is the foundation of a correct behaviour and a positive attitude is the driving force of a correct behaviour; if a person is to perform a particular behaviour, he or she must know what the behaviour is (knowledge of the behaviour)

Table 3 Multivariable logistic regression analysis on the factors influencing caregivers' nutrition knowledge, attitudes and behaviours, rural China (Jiangxi, Sichuan, Hunan, Hubei, Guizhou, Henan and Anhui provinces), 2007–2008

	<i>P</i>	Crude OR	95% CI	<i>P</i>	Adjusted OR	95% CI
Guardianship type	0.000			0.464		
Parents' guardianship		1.000	reference		1.000	reference
Inter-generational care	0.000	1.596	1.285, 1.982	0.653	0.943	0.728, 1.220
Other	0.564	0.788	0.350, 1.773	0.223	0.591	0.254, 1.376
Family income (RMB Yuan/year)	0.000			0.000		
≤2000		1.000	reference		1.000	reference
2001–4000	0.001	0.754	0.635, 0.894	0.043	0.832	0.697, 0.994
≥4000	0.000	0.489	0.410, 0.584	0.000	0.589	0.489, 0.710
Care will	0.007			0.019		
Very pleased		1.000	reference		1.000	reference
Pleased	0.005	1.350	1.095, 1.664	0.007	1.349	1.086, 1.677
Unwilling	0.023	1.743	1.079, 2.816	0.095	1.522	0.929, 2.493
Child's age (years)	0.000			0.000		
<3		1.000	reference		1.000	reference
3–	0.508	1.071	0.874, 1.312	0.497	1.076	0.871, 1.328
5–	0.037	1.241	1.013, 1.520	0.272	1.125	0.912, 1.390
7	0.000	1.981	1.507, 2.604	0.000	1.848	1.390, 2.475
Child's gender	0.008			0.003		
Male		1.000	reference		1.000	reference
Female	0.008	1.210	1.050, 1.393	0.003	1.250	1.079, 1.448

Logistic regression model adjusted for caregivers' age, gender, education and occupation.

and how to perform it (skill)⁽¹⁵⁾. Thus, nutrition knowledge and attitudes appear to be important factors that drive correct nutrition behaviours. In this sense, targeted nutrition education programmes aimed to improve rural non-parent caregivers' nutrition KAB are wanted and need to be emphasized.

Factors influencing nutrition knowledge, attitudes and behaviours among non-parent caregivers

Non-parent caregivers, especially grandparents, are dependent on the economy as there is no proper financial aid from social welfare; therefore, it affects the wellness of children if these caregivers are financially unstable⁽⁶⁾. Ramadasmurthy *et al.* also found that household income was the most crucial factor limiting the dietary KAB⁽¹⁶⁾. In the current study, the family income of non-parent caregivers was significantly lower than that of the parent caregivers, and multivariate logistic regression analysis demonstrated that caregivers' family income had a positive association with nutrition KAB. This finding could be attributable to the fact that perhaps caregivers with a high-income family had more ability in children's diet/nutrition and they cared more about their nutrition knowledge in order to improve their children's nutrition status.

In multivariate logistic regression analysis, the results displayed that the weaker the care will, the lower the caregivers' nutrition KAB. In our study, about 20% of non-parent caregivers had weaker care will; of course, the weaker care would affect caregivers' learning about nutrition knowledge and their attitudes and behaviours when caring for children. These findings are in keeping with other literature, which showed that having strong care will was a driving force for a person to improve his/her nutrition KAB⁽¹⁴⁾. This factor has seldom been con-

sidered when nutrition KAB is involved; however, it should never be overlooked.

Children's age could be another factor associated with caregivers' nutrition KAB, especially in terms of nutrition attitudes and behaviours. Our study demonstrated that caregivers' nutrition KAB was better in the group of children below 3 years old and poor in the group of children aged 7 years. These results concur with several studies that have assessed the relationship of child age and caregiver's nutrition KAB^(17,18).

A significant association was also found between the child's gender and the caregiver's nutrition KAB. Specifically, the nutrition KAB was better in caregivers who looked after boys than in those who cared for girls. The result may reveal some traditional values in the grandparent caregivers, particularly in economically backward rural areas, that 'Boys are superior to girls' and 'Boys will be good labourers and can do more hard work'. This is embodied by caregivers in that they care for boys more carefully and usually they are likely to get more health nutrition KAB in order to promote their boys' health. In previous research, when discussing the factors influencing caregivers' nutrition KAB, many focused on characteristics related to the caregivers themselves, not on factors related to the children. However, these factors really impact caregivers' nutrition KAB, which should be explored in further study.

The current study has some limitations. The measurement of nutrition KAB was relatively superficial, as the caregivers' sociodemographic characteristics, especially non-parent caregivers, precluded the use of a more detailed measure. In addition, nutrition KAB was ascertained based on criteria established by experts in three waves of consultation. A standard method to evaluate

caregivers' nutrition KAB is urgently needed for future research. Another limitation is a possible bias from caregivers' answers to the questions. We adopted face-to-face interviews; however caregivers, especially some non-parent caregivers, could have misunderstood some the questions because of their old age and low education, and kept something back when reporting nutrition KAB. Thus answer bias was unavoidable in our interview-based investigation. Finally, the study population involved left-behind children below 7 years of age only, and we are not sure whether the results can be generalized to left-behind children at large.

Despite these limitations, the present study is the first to report the nutrition KAB among non-parent caregivers of left-behind children under 7 years old. In addition, we have identified the factors influencing nutrition KAB by multivariable logistic regression modelling, which bears importance in health education and health promotion programmes for left-behind children's nutrition in Chinese rural areas.

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