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Growth, Cognitive Development and Psychosocial Stimulation of Preschool Children in Poor Farmer and Non-Farmer Households

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ABSTRACT

Introduction: This study aimed to analyse factors that influence cognitive development of preschool children. **Methods**: Four hundred and two children were recruited by purposive methods from poor farmer and non-farmer households. Nutritional status data were obtained through anthropometric measurements and processed by using the WHO Anthro 2005 software. Child cognitive development was measured using the instrument developed by the Department of National Education of Indonesia. Meanwhile, psychosocial stimulation was measured by using the instrument of Home Observation for Measurement of the Environment (HOME) Inventory. **Results:** The nutritional status data show that in farmer households, 28.6% children were underweight, 12.1% wasted, and 30.7% stunted, while in non-farmer households 31.3% children were underweight, 15.3% wasted, and 35.5% stunted. However, no statistical differences were found ($p>0.05$). The percentage of children who reached cognitive development in the high category in the farmer household was 8% and in the non-farmer group, it was 17.4%. Nevertheless, more than half of the children in farmer and non-farmer households had cognitive development scores in the low category (<60%). Most children in farmer and non-farmer households had psychosocial stimulation in the moderate category (30-45). The correlation test showed that length of mother's education ($p<0.01$), psychosocial stimulation ($p<0.01$), participation in early childhood education ($p<0.01$), nutritional status based on the index of weight for age ($p<0.01$) and height for age ($p<0.01$) respectively, had a positive and significant relationship with cognitive development of children. This means that the better the education of mothers, as well as psychosocial stimulation, participation in early childhood education and nutritional status will improve cognitive development of children. **Conclusion:** The nutritional status of children in farmer and non-farmer households was not different. The nutritional status and psychosocial stimulation as well as the participation of children in early childhood had an important role in the cognitive development of children.

Key words: Children's nutritional status, cognitive development, psychosocial stimulation

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INTRODUCTION

Based on the conceptual framework of UNICEF (UNICEF, 1998), three aspects need to be considered to improve the quality of life of children, namely food consumption (nutrition), health, and psychosocial stimulation. Rapid growth and development of a child occurs below the age of five (Khomsan, 2004). Even the phase of rapid growth (growth spurt) of the brain only takes place until the age of 18 months. Malnutrition in the period of children under five will result in a delay in physical growth, motor development, and disorders in cognitive development. The negative impact on cognitive ability happens not only in children with malnutrition (severe underweight), but also in short children (stunted) due to a chronic malnutrition at an early age (Jalal, 2009). Studies in several countries reveal that malnutrition at early age affects children's physical growth and brain development (Nwuga, 1997; Martorell, 1995; Grantham-McGregor, Fernald & Sethurahman, 1999). Results of the Basic Health Research 2007 published by Ministry of Health, Republic of Indonesia (2008) showed that the prevalence of children suffering from malnutrition (mild and severe underweight) was 18.4%, while 36.8% of children under five were stunted.

The word cognitive is defined as the chain of events and thinking process of a person that is formed through a process of organisation and adaptation (Santrock, 2007). Meanwhile, Sardjunani & Saliyo (2006) defined cognitive development as the intellectual ways a person adapts to her/his environment. Two factors affect cognitive development, that is, innate and environmental (Papalia, Olds & Fieldman 2008). The innate factors can refer to the genetic factors existing from the time of the foetus in the womb, while the environmental factors are those other than genetic factors, which can help the cognitive development of children such as nutritional status and psychosocial stimulation (Jalal, 2009; Mayza, 2008).

Psychosocial stimulation is the educational stimulation that helps develop cognitive, physical and motoric, and social-emotional abilities of children (Ministry of National Education, Republic of Indonesia 2002). The quality of the brain is not only determined by nutrient intake but also affected by the quality of environmental stimulation. The more frequent and varied the stimulation received by babies in the womb (gestational age of 6 months) until the age of 2-3 years, the better and stronger will be the relationship between the synapses of cells in the right and left brain (Mayza, 2008).

Another factor that also has an important role in cognitive development of children is the socio-economic condition of the family. It will affect either directly or indirectly the mental and physical lives of children in the family. Gunarsa (1990) stated that low income or poor households are more likely to provide less psychosocial stimulation than the non-poor. In poor households, children often receive less attention, less appreciation, and less praise.

Various studies indicate that the most rapid phase of intellectual development is at the age of the first four to five years of life (Padmonodewo, 1993). Thus, the preschool age is the best time to provide a environmental enrichment programme in order to maximise future intellectual development. This study was conducted to (i) identify the socioe-conomic characteristics of families, (ii) analyse the nutritional status and cognitive development of preschoolers, (iii) identify psychosocial stimulation of preschoolers, and (iv) analyse the factors that influence the cognitive development of children at preschool ages.

METHODS

This cross-sectional study was conducted to determine the nutritional status, psychosocial stimulation and cognitive

development of preschool children in poor farmer and non-farmer households. This study was carried out in Subang District, West Java Province, Indonesia.

Sampling and measurement tools

The population of this area consisted of poor farmer and non-farmer households (per capita income of less than USD2 per day). The sample consisted of mothers/caregivers with their pre-school children and who volunteered to participate. The inclusion criteria for school children were: ages 3-5 years, living with mothers, and living in Subang district. The sample size was calculated using the Slovin formula with a value error of 0.05 so that the number of sample was 402 children and their mothers or caregivers. The Slovin formula is as follows:

$$n = \frac{N}{1 + N(e)^2}$$

where

n = the size of sample that will be studied

N= total population that meets the criteria of inclusion

e = confidence interval/error (0.05)

Data collected included the socio-economic aspects of households (level of mother's education, nutritional knowledge of mothers and family income per capita), participation of children in *Pendidikan Anak Usia Dini* or Early Childhood Education (PAUD), nutritional status, cognitive development of children at preschool age and current psychosocial stimulation. The socio-economic conditions of family and nvolvement of child in early childhood education was obtained through questionnaire interview .

The data on children's nutritional status, that is, Z score of weight for age (WAZ), Z score of weight for height (WHZ) and Z score height for age (HAZ) was obtained through direct anthropometric measurement of body weight and height and processed by using the WHO Anthro 2005 software. Body weight was measured with CAMRY Mechanical Personal Scale BR9015B made in Indonesia, while height was measured with microtoise STATURE METER 2M.

The cognitive development of children was measured using an instrument for the development of children developed by the Indonesia Department of National Education. For the measurement of cognitive development in this study, the children were divided into three age groups, namely 2.5 - 3.4 years, 3.5 - 4.4 years and 4.5 - 5.4 years. The measurement of cognitive development was conducted using educative aids in the forms of games, designed according to the concepts that were being measured. The commonly used tools included wooden blocks, origami paper, various geometrical shapes, colored cards, maze pictures, paper, pencils and crayons.

Psychosocial stimulation was measured using the instrument of Home Observation for Measurement of the Environment (HOME) Inventory for the ages 3-6 years, developed by Caldwel and Bradley (Zevalkink, Walraven & Bradley, 2008). This instrument consisted of 55 items of statements related to 8 aspects: (1) toys and learning materials (learning stimulation), (2) language stimulation, (3) academic stimulation, (4) pride and affection, (5) acceptance (positive punishment), (6) modeling, (7) variety of stimulation, and (8) physical environment. The measurements were carried out through interview and observation. Observation was conducted at the same time when the enumerators interviewed respondents.

Statistical analysis

The scores of the question items for each variable were summed up and categorised into intervals according to the reference. Mother's education was divided into four categorisations namely elementary school,

junior high school, senior high school and university or college.

The instrument for measurement of nutritional knowledge consisted of 15 questions and covered three aspects namely nutrition and food, nutrients and growth, and nutrition and development. Every correct answer was scored 1 and wrong answer 0. The total score was converted into percentages for the categorisation of low (<60), moderate (60-79) and high (>80) scores.

The nutritional status data were analysed using the indices of weight for age (WAZ), weight for height (WHZ), and height for age (HAZ). The standard used to determine the nutritional status of children under five was the World Health Organization (WHO) ANTHRO 2005 Child Growth Standards.

The cognitive development data of children were measured by circling the appropriate answer which then was scored. A higher score of each task indicated better cognitive development of the child. The total score was categorised according to the reference: low (<60), moderate (60-79) and high (>80) (Warsito *et al.*, 2012).

Psychosocial stimulation data were processed by summing the score of each dimension. Each item of all dimensions consisted of a positive statement which scored 1 if the answer was "yes" and 0 if "no" The total score was then categorised into low (0-29), moderate (30-45) and high (46-55) (Hastuti, 2008). A higher composite score of each dimension and total score would indicate better psychosocial stimulation of the children.

The data was processed through descriptive and inferential analyses and are presented in the forms of tables. Chi-square test was used to analyse the relationship between cognitive development and participation in early childhood education (PAUD). Meanwhile, other variables were analysed by Pearson correlation.

RESULTS

Socio-economic characteristics of respondents

Based on the number of years of study of mothers, the education of the non-farmer households was relatively better than of the farmer households ($p<0.01$). More than half of mothers (64.9%) in farmer households completed their education up to elementary school, but none completed high school. There were more mothers who studied up to junior high, senior high or university in non-farmer households (52.1%) than in the farmer households (35.1%) (Table 1).

The economic characteristics of the households included income and expenditure, for foods and or non-foods. Table 1 shows that the mean income of the non-farmer households was higher ($p<0.01$) than of the farmer households (IDR 300,245 vs IDR 229,760); whereas the percentage of food expenditure of the farmer households was higher than the non-farmer households. Rice was the highest food expenditure for farmer households, that is, 15.6% of total expenditure, followed by street food (14.8%) and side dishes (11.3%). In non-farmer households, street food was the highest food expenditure, that is, 15.4%, followed by rice (10.9%) and side dishes (10.8%).

The distribution of non-food expenditure showed that the percentage of educational expenditure among the farmer households (6.3%) was higher than among the non-farmer ones (4.8%). Cigarette expenditure was the second highest non food expenditure in both farmer and non-farmer households; however, cigarette expenditure of the farmer households was slightly higher (9.7%) than that of the non-farmer households (8.2%). The highest percentages of non-food expenditure for the two types of households were miscellaneous expenditures that included transportation, house rent/maintanance, social contribution, etc.

Table 1. Category and distribution of household samples (n= 402)

Variable category	*Farmer*		*Non-farmer*		*p-value of t-test*
	N	%	*N*	%	
Mother's education					0.004
Elementary school	85	64.9	125	47.9	
Junior High school	33	25.2	102	39.1	
Senior High school	13	9.9	30	11.5	
University	0	0	4	1.5	
Mean ± sd (yrs)	7.2 ± 2.0		7.8 ± 2.2		
Income (IDR/cap/month)	229,760 ± 115,554		300,245 ± 123,577		0.000
Expenditure (IDR/cap/month)					
Food	202,838 ± 70,862		234,925 ± 87,095		0.000
Non-food	160,551 ± 86,334		219,226 ± 116,956		0.000
Ratio of expenditure to (%)					
Food	57.3 ± 12.2		53.2 ± 12.3		0.002
Non-food	42.7 ± 12.2		46.8 ± 12.3		0.002
Mother's nutritional knowledge					0.000
Low (<60)	72	51.4	100	38.2	
Moderate (60-79)	61	43.6	114	43.5	
High (≥80)	7	5.0	48	18.3	
Mean ± sd	54.3 ± 15.6		60.8 ± 16.3		

Nutritional knowledge of mothers

More than half (51.4%) of the mothers from the farmer households had low nutritional knowledge, while less than half (43.5%) of the mothers from the non-farmer households had moderate nutritional knowledge (Table 1). Mothers with high nutritional knowledge (scores e"80) were more frequently found in the non-farmer households. The average score of the nutritional knowledge for the mothers in the farmer households was 54.3 while for the mothers in the non-farmer households, it was higher, that is, 60.8 (Table 1). The results of the *t*-test showed that there was a very significant difference ($p<0.01$) between the nutritional knowledge of the mothers in the farmer households and in the non-farmer households.

Child participation in early childhood education

The number of preschool children in farmer and non-farmer households who had not participated in the Early Childhood Education was a whopping 76.8%.

Nutritional status of children

In terms of the body weight for age (WAZ), children with normal nutritional status in the farmer households was 71.4% and those in the non-farmer households was 67.6%; children with underweight status was high, that is, >25.0% both in farmer and non-farmer households. The percentage of stunted children based on the HAZ indicator was 30.7% in farmer households and 35.5% in non-farmer households (Table 2).

Psychosocial stimulation

Compared by household types, mothers or caregivers from both groups, provided psychosocial stimulations in the moderate category with the percentages being 63.6% and 75.6%, respectively (Table 3).

Table 2. Distribution of children's nutritional status

Nutritional status	*Farmer*		*Non-Farmer*	
	N	%	*N*	%
WAZ (Weight for Age)				
WAZ < -2 sd (underweight or severe)	40	28.6	82	31.3
-2 sd > WAZ <+2 sd (normal)	100	71.4	177	67.6
WAZ > +2 sd (overweight)	0	0	3	1.1
WAZ mean ± sd	-1.01 ± 0.848		-0.996 ± 1.098	
p-value of t-test	0.865			
WHZ (Weight for Height)				
WHZ < -2 sd (wasted)	17	12.2	40	15.2
WHZ >-2 sd (normal)	123	87.8	222	84.8
WHZ mean ± sd	-0.457 ± 1.055		-0.461 ± 1.258	
p-value of t-test	0.970			
HAZ (Height for Age)				
HAZ < -2 sd (stunted)	43	30.7	93	35.5
HAZ > +2 sd (normal)	97	69.3	169	64.5
HAZ mean ± sd	-1.064 ± 0.92		-1.179 ± 0.987	
p-value of t-test	0.246			

Table 3. Distribution of children's psychosocial stimulation and cognitive development scores

Variables	*Farmer*		*Non-Farmer*	
	N	%	*N*	%
Psychosocial stimulation scores				
0-29 (Low)	48	34.3	61	23.3
30-45 (Moderate)	89	63.6	198	75.6
46-55 (High)	3	2.1	3	1.1
Mean ± sd	31.9 ± 5.6		33.4 ± 5.3	
p-value of t-test	0.052			
Cognitive development scores				
< 60 (low)	85	61.6	153	59.0
60-79 (moderate)	42	30.4	61	23.6
≥ 80 (high)	11	8.0	45	17.4
Mean ± sd	53.5 ± 18.9		57.4 ± 20.6	
p-value of t-test	0.06			

Among the aspects of psychosocial stimulation, more than half the sample in farmer households had low score in aspects of learning stimulation and variety of stimulation. Meanwhile, the scores of language stimulation, physical stimulation, warmth and acceptance, modeling, academic stimulation generally fell into the moderate category, while positive punishment fell in the high category. This finding was not very different from non-farmer households where most of the children had moderate category in learning stimulation, physical stimulation, warmth and acceptance, and modeling. Meanwhile, for linguistic stimulation and positive

Table 4. Cognitive development score of children mapped to categories of variables

Variables	*Cognitive development*
Participation in early childhood education	
Participant	64.4
Non participant	53.5
Psychosocial stimulation	
Low (0-29)	50.0
Medium (30-45)	57.6
High (46-55)	68.3
Nutritional status	
Height for Age	
- stunted	52.7
- normal	57.6
Weight for Age	
- underweight	51.3
- normal	58.2
Weight for Height	
- wasted	51.4
- normal	56.8

punishment, most children fell into the high category.

Cognitive development of children

The results showed that in general, children's achievement of cognitive development was in the low category, being 61.6% and 59% in the farmer and non-farmer household groups, respectively (Table 3). Aspects of cognitive development which fell into the low category (<60) related to using symbols and understanding identity, cause-effect, numbers and concepts. Only one aspect, namely ability to classify, was in the high category.

The average score of the cognitive development achievement was slightly higher in the non-farmer household group than in the farmer group, though its difference was not significant. The percentage of children who reached cognitive development in the high category was 17.4% in the non-farmer household group, twice higher than that in the farmer group (8%). The result of the *t*-test showed that cognitive developments in both groups were not significantly different ($p>0.05$).

Correlations of various variables with cognitive development

Table 4 presents the mapping of various scores/levels of children's cognitive development related to categories of variables.

Participation in early childhood education and children's cognitive development

The result of the Chi-square test (Table 5) show a correlation between participation in early childhood education and children's cognitive development ($p<0.01$). Children with early childhood education tended to have higher cognitive development than those without. The results of this test are also supported by the results of the *t*-test that showed significant difference between the cognitive development of the children of PAUD members and non-PAUD members ($p=0.00$), where the average cognitive development achievement for children of PAUD members was higher (64.4%) compared to non-PAUD members (53.5%) (Table 4).

Table 5. Chi-square test of cognitive development score and involvement in PAUD

Variables	*Cognitive development score*					
	Low (<60)		*Moderate (60-79)*		*High (≥ 80)*	
	N	*(%)*	*N*	*(%)*	*N*	*(%)*
Involvement in PAUD [1]						
Yes	38	16.8	26	28.6	22	40.7
No	188	83.2	65	71.4	32	59.3

[1] Significance as determined by X^2 test, *p*-value=0.000

Table 6. Pearson correlation test of cognitive development and various variables

Variables	*r*	*p-value*
Length of mother's education	0.254	0.000
Psychosocial stimulation	0.293	0.000
Nutritional status by index WAZ	0.137	0.009
Nutritional status by index HAZ	0.152	0.002

Mother's education and children's cognitive development

The result of Pearson Correlation test ($p<0.01$) showed a significant positive relationship between the length of mother's education and children's cognitive development (Table 6). The score or level of cognitive development of children increased in line with increased level of education of the mother.

Nutritional status and children's cognitive development

Based on the HAZ (height for age) index, severely stunted children had lower scores in the cognitive development (52.7%), which increased with better nutritional status. Similarly, the index of WAZ (weight for age) showed increased score in cognitive development in line with the increased nutritional status of children (Table 6). This could be seen from the difference in the scores of cognitive development between children with malnutrition and those with good nutrition. Children with underweight status had a cognitive development score of 51.3%, much lower than those with normal nutritional status (58.2%) (Table 4). As for the WHZ index, no significant relationship was found between nutritional status (WHZ) and cognitive development.

Psychosocial stimulation and children's cognitive development

The lowest cognitive development was found in children who received low psychosocial stimulation, while children with high psychosocial stimulations scored the highest in cognitive development (Table 4). The psychosocial stimulation correlated significantly with cognitive development of children ($p<0.01$) (Table 6). The higher the psychosocial stimulation given, the higher the cognitive development achieved by the children.

DISCUSSION

Pearson correlation test results showed that factors correlated to the cognitive development of the children were length of mothers' education, psychosocial

stimulations and nutritional status by index WAZ and HAZ. Meanwhile based on Chi-square test, involvement in PAUD was also found to correlate with cognitive development.

Length of mothers' education was found to affect the cognitive development of the children. This means that the longer the duration of the mothers' education, the more able they are to improve the cognitive development of their children. Mothers who have a high education have more opportunities to gain access to information on nurturing and development of children. Based on the number of years that mothers spent on their study, the education of the non-farmer households was relatively better than of the farmer households; this means that mothers from non-farmer households had more opportunities to provide stimulations that promoted child cognitive development. These result are supported by the results of mapping between cognitive development and types of household. Children of non-farmer households had higher cognitive development (57.4%) than children of farmer households (53.5%) (Table 3).

Sardjunani & Saliyo (2006) state that in the case of nurturing children, mothers who have high education are more open to new things because they read more frequently articles and news about children through newspapers, magazines, or television and consequently understand more about child development. This is line with the results of studies conducted by Hastuti *et al.*(2009) and Warsito *et al.*, (2012) that mothers' education is one of the factors that affects the cognitive development of children. A good nurturing practice may reflect the intelligence of the parents and may also predict the intelligence of the children (Papalia *et al.*, 2008).

Besides being associated with the opportunity to gain access to information on the development of children and be armed with sufficient knowledge to provide stimulation for the cognitive development of children, the length of mothers' education also reflects cognitive potentials of the mothers that are passed on to their children. Mothers who have a higher education possess good cognitive potentials and these potentials are possibly passed on to their children so their children possess a better level of cognitive development compared with the children whose mothers do not have good congenital cognitive potentials. Papalia *et al.*(2008) state that the development of adult males is influenced by congenital factors and environmental ones. One example of the congenital factors is cognitive potentials which are inherited, while one example of the environmental factors is psychosocial stimulations.

On the other hand, nutritional knowledge may play an important role in children's cognitive development. Warsito *et al.* (2012) state that mothers with good nutrition knowledge tend to have children with higher cognitive development scores than those with moderate or low nutrition knowledge. Mothers with higher nutrition knowledge supported by sufficient income have a tendency to provide nutritious food for their children.

The involvement of children in PAUD also affected the cognitive development of the children in this study (Table 5). This means that PUAD children were more likely to have better cognitive development. The results of this test is also supported by the results of the *t*-test ($p<0.05$) that showed significant difference between the cognitive development of PUAD children compared to non-PAUD children, with the average achievement of the cognitive development of PUAD children being higher than of non-PAUD children (Table 4). These research results are in line with the results of the research conducted by Warsito *et al.* (2012) that the involvement of children in non-formal education is a an influencing factor in the improvement of children's cognitive development. PUAD children received a range of stimulations for development,

particularly cognitive development, which was relatively more structured, consistent and monitored, compared with the provision of learning stimulations provided at home. Accordingly, PUAD children tended to be faster in achieving cognitive development tasks than the children who were not actively involved with PAUD. The school is an educational environment outside the home for children. Interaction between children and the educational environment at home and outside home functions as a positive trigger for the development of children. These research results are in line with the results of a research conducted by Hastuti *et al.*(2009) that the cognitive development of PUAD children was better than that of non-PAUD children.

The stimulation given outside the home in early childhood education is different from the psychosocial stimulation given by mothers to their children in the home environment. This psychosocial stimulation is significantly positively correlated with the cognitive development of the children (Table 6). The psychosocial stimulation given by the mothers or caregivers in the non-farmer household group was relatively better compared with that in the farmer household group. This was likely to be correlated with the average income earned by the non-farmer household which was higher than that of the farmer households, consequently the opportunity to provide facilities to support child growth and development was greater. Children who received good psychosocial stimulation were more likely to experience good cognitive development as well.

The psychosocial stimulations given in the form of the provision of physical facilities and positive responsiveness from the mothers or caregivers towards their children's learning were able to facilitate the children to develop optimally from all aspects, including the cognitive development. The earlier the psychosocial stimulations were given, the better the development achievement of the children would be. This research result was in line with Warsito *et al.* (2012) who showed that the psychosocial stimulation positively affected the cognitive development of the children significantly. This research result is also confirmed by previous studies (Rahmaulina, 2007; Mindasa 2007; Hastuti *et al.*, 2009) which found a significant and positive correlation between psychosocial stimulations and cognitive development of the children.

Psychosocial stimulations measured by the HOME Inventory indicate that a nurturing environment provided by mothers or caregivers is able to support the development achievement of children. The provisions of a nurturing home environment which is of good quality can help children reach optimal cognitive development through the following mechanisms: (1) encouraging exploration of the environment; (2) mentoring basic and social cognitive skills such as stamping, arranging, composing, and comparing; (3) celebrating children' success (giving compliments, rewarding children's work); (4) guiding children to have practical skills and their development; (5) protecting children from improper punishments, mocks, or disagreement towards mistakes or consequences of unintentional explorations and experiments with present skills; and (6) stimulating language and other symbolic communications. The existence of the six conditions for children below the age of under five is essential for normal brain growth, which will eventually support the cognitive competence of children (Papalia *et al.*, 2008).

A good nutritional status can improve the cognitive development of an individual. Underweight children had much lower scores for cognitive development than normal children (Table 4). The results of this study support the results of a previous study which found a significant relationship between nutritional status based on the weight for age and height for age with mental

development in children under two years old (Anwar, 2002). Studies conducted in several countries have revealed that malnutrition suffered by children at an early age had an effect on physical growth and brain development (Martorell, 1995; Grantham-McGregor *et al.*, 1999). Furthermore, a review showed that children with early-age nutritional problems had an Intelligence Quotient (IQ) deficit up to 15 points (Martorell, 1997). Research conducted at the Nutrition Clinic of the Center for Nutrition Research and Development of Bogor on school-age children at post-recovery of malnutrition, experienced when they were less than 3 years old, found an IQ deficit of about 11 points compared to the comparison group of normal children (Arnelia, 2002).

Malnutrition during early childhood will affect the synthesis rate of brain cells resulting in a decrease in the number of brain cells. Brain development is greatly affected by nutritional deficiency from pregnancy to the age of five. Furthermore, children suffering from under-nourishment from an early age are found to have difficulties facing the future. They have the potential towards a low physical and intellectual ability and low productivity in the future (Nagata, 2004; Malla, 2002).

This study showed that severely stunted children at preschool age had the lowest average value for cognitive development, that is, 52.7%. This deserves attention because the stunted condition describes chronic malnutrition which may not be noticed for a long time until measurement is effected. The study by Hizni, Julia & Gamayanti (2009) has shown that nutritional status (stunted) has a negative effect on fine and gross motor development and language skills. Furthermore, it has been found that children who were stunted in the first two years of life would continue to have lower cognitive development compared with normal children after the age of eight and eleven years later.

A good nutrition can help children prepare themselves to receive psychosocial stimulation optimally. However, optimal cognitive development cannot be achieved if it is only supported with good nutrition without any efforts to provide good stimulation as well. The presence of both nutritional intervention and psychosocial stimulation is expected to contribute to children's optimal cognitive development.

CONCLUSION

In summary, mother's education in farmer households was lower than in non-farmer households; so was household income, expediture and nutritional knowledge. However, children's nutritional status of both categories of households did not differ significantly. The psychosocial stimulation and cognitive development of children in farmer households tended to be lower than children in non-farmer households. However, it did not differ significantly. Factors such as mothers' education, nutritional status, participation in Early Childhood Education (PAUD) and psychosocial stimulation correlated with cognitive development of preschool children. Although good nutrition will improve children's cognitive development, psychosocial stimulation, mothers' education and involvement of children in early childhood education also played an important role as an intermediary factor in the cognitive development of preschool children. Based on this evidence, we can conclude that the nutritional status and psychosocial stimulation as well as the participation of children in early childhood has an important role in the cognitive development of preschool children.

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CONFLICT OF INTEREST

There is no conflict of interest in this research.

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