Paediatrica Indonesiana

p-ISSN 0030-9311; e-ISSN 2338-476X; Vol.63, No.4(2023). p.282-9; DOI: https://doi.org/10.14238/pi63.4.2023.282-9

Original Article

Factors associated with cognitive and communication delay in children aged 0-3 years using the Battelle-Developmental Inventory, 2nd edition

Florentina Febrina[1], Veronika Cendana Pinasthika Lawalata[1], Yetty Ramli[2]

Abstract

Background The first years of life are crucial in cognitive and communication development. Delayed functional development impedes children's future academic and occupational performance. Therefore, early detection is important for effective resolution in order to minimize further impairment.

Objective To evaluate cognitive and communication developmental delay in children under 3 years of age in Jakarta using the *Battelle Developmental Inventory, 2nd edition (BDI-2)*.

Methods A cross-sectional study was conducted in Jakarta in 2020, including children aged under 3 years of age without chronic medical conditions that hinder cognitive and speech function. We collected subjects' demographic characteristics, evaluated their communication and cognitive development using the BDI-2, and analyzed for risk factors of delays.

Results Of 121 children, 34 (28.1%) had cognitive delay and 21 (17.4%) had communication delay. Bivariate analysis revealed that male gender (P=0.048) and non-exclusive breastfeeding (P=0.003) were significantly associated with communication delay, while only male gender was associated with cognitive delay (P=0.015). Multivariate analysis revealed that significant risk factors for communication delay were male gender (P=0.043) and non-exclusive breastfeeding (P=0.023).

Conclusion Male gender and non-exclusive breastfeeding are significant risk factors for delayed communication development, and only male gender is a significant risk factor for cognitive delay. Socioeconomic status, primary caregiver, and breastfeeding duration, are not found to be risk factors for delays. **[Paediatr Indones. 2023;63:282-9; DOI: https://doi.org/10.14238/pi63.4.2023.282-9**].

Keywords: *Battelle Developmental Inventory II; cognitive development; communication development; developmental delay*

Child development occurs from the beginning of life, with an increase in body structure and function to a more complex system. These changes stimulate the appearance of development in basic skills such as physical, motor, cognitive, and communication functions, as well as independence, emotional, and social abilities. Several basic skills in child development to note are gross and fine motor skills, language and communication, socialization and autonomy, cognitive skills, creativity, and moral-spiritual skills.[1-3] Cognitive ability is the degree of competence to think, reason, learn, solve problems, as well as understand and remember information.[4] The clinical manifestation of cognitive development may vary depending on the child's age. For instance, in pre-school children, a commonly noticed delay is in language development. Signs of such as delay would include difficulties in learning new words and following instructions, as well as

From the Faculty of Medicine[1] and Department of Neurology[2], Universitas Indonesia/Dr. Cipto Mangunkusumo Hospital, Jakarta, Indonesia

Corresponding author: Florentina Febrina, Pulomas Barat 1 No.23, Pulogadung, Jakarta Timur, 13210; Telp. +6281213291415; Email: flofebyryna@gmail.com.

Submitted September 25, 2021. Accepted August 14, 2023.

getting easily distracted.[5] Children need language to communicate and adapt to their daily environment. Language ability can be differentiated into expressive and receptive communication. Language development in children may be influenced by two factors: intrinsic (e.g., organ function or cognitive delay) and extrinsic (e.g., environment).[6]

In Indonesia, the prevalence of cognitive development delay in small children in 2018 was 44.8%, while that of speech and language delay in 2006 was 10.13%.[7,8] A child's cognitive and language development is predictive of their future cognitive competence, as manifested by academic achievement and occupational success.[5] Around 71-86% of children with language delay have a significant, long-term risk of low level intelligence and poor reading performance.[9] Nevertheless, almost 60% of communication delay cases resolve during the first 3 years of life.[10] During this golden period, development peaks for both the brain and physical growth. Early detection of problems is crucial for effective resolution while the child is still in the prime development time period, in order to minimize damage from the delay.[2] As such, we aimed to estimate prevalence and identify risk factors of cognitive and communication delay. Factors assessed in this study included gender, socioeconomic status, and primary caregiver. Additional factors evaluated separately in each developmental domain were nutritional status for cognitive skill and breastfeeding for communication ability.

The Kuesioner Praskrining Perkembangan (KPSP) is a commonly used developmental screening tool recommended by the *Indonesian Ministry of Health*, with specificity of 92% and sensitivity of only 60%. In addition to its lack of sensitivity, this tool cannot be conducted in children older than 24 months.[11] On the contrary, the BDI-2 is a set of developmental appraisal tools, with >80% sensitivity and specificity, for children aged 0-7 years. The BDI-2 tool is divided into several major developmental domains: adaptive, personal-social, communication, motor, and cognitive. The domains make it possible for the development screening to be done separately.[12,13] Hence, we used the BDI-2 communication and cognitive domains of this newly developed questionnaire in Indonesia as it has been demonstrated to have good sensitivity and specificity.

Methods

This cross-sectional study was conducted at Aliyah Hospital Pondok Bambu and Husada Hospital Mangga Besar, Jakarta, from February to August 2020 and included 121 children under 3 years of age. Children diagnosed with any chronic medical condition which may hinder developmental function were excluded from the study. This study was approved by the Ethics Committee of the Faculty of Medicine, University of Indonesia. Minimum required sample sizes of 93 children for cognitive analysis and 76 for communication analysis were calculated using Lemeshow's formula, and the final minimum of 120 subjects was determined based on rule of thumb.

Developmental delays (communication and cognitive) were assessed by interviewing guardians and/or observing children's capabilities on several tasks in the BDI-2 questionnaire. Sociodemographic status (age, gender, parental education level, occupation, and household income), caregiver (mother vs non-mother), breastfeeding duration and pattern were recorded from the subjects' personal details form. Subjects' height and weight were measured directly. Socioeconomic status was classified using the *Kuppuswamy scale* into upper, upper middle, lower middle, upper lower, and lower, based on the parental education level, occupation, and monthly income.[14]

Subjects with developmental quotient scores under 80 according to the BDI-2 measurement guideline were considered to have communication and cognitive delay.[13] Subjects who were given liquid or food other than breastmilk within the first 6 months of life were categorized as having non-exclusive breastfeeding. Nutritional status was classified based on the WHO height-for-weight guidelines into obese (>+3 SD), overweight (>+2 SD to 3 SD), possible risk of overweight (>+1 SD to 2 SD), normal (-2 SD to +1 SD), wasted (-3 SD to -2 SD), and severely wasted (<-3 SD) categories.[15]

Bivariate analysis was conducted on categorical data using Chi-square or Fisher's exact tests. Results with $P<0.25$) were further analyzed by multivariate logistic regression method. The significance level of both tests was $P<0.05$. Data analyses were done with *IBM SPSS statistic v.24* software.

Results

Subjects were 121 children under the age of 3 years, of whom 64 (52.9%) were female and 57 (47.1%) were male. Subjects were distributed amongst three age groups in the range of 0-36 months, with the majority aged 13-24 months (52 subjects; 43%). All 121 children came from homogenous socioeconomic backgrounds, with 85 (70.2%) in the upper middle socioeconomic class. The majority of subjects' parental education level attained were Bachelor's degree (51.2%) and high school graduate (33.1%). Demographic data of the subjects are shown in **Table 1**.

Of 121 subjects, 21 children (17.4%) had communication delay and 34 children (28.1%) had cognitive delay, based on BDI-2 communication and cognitive domain assessment. Among the children with delays, 13 had both communication and cognitive delays (10.7%). The result of The BDI-2 assessment is reported in **Table 2**. Bivariate analysis of communication outcomes and variables revealed that 2 out of 5 variables were significant: male gender (OR=2.651; 95%CI 0.985 to 7.134; P=0.048) and non-exclusive breastfeeding history (OR=4.444; 95%CI 1.585 to 12.462; P=0.003). The other factors, primary caregiver, socioeconomic status, and breastfeeding duration, were not significant (P>0.05) (**Table 3**).

Multivariate analysis using a logistic regression model was performed on the four variables with P<0.25 in bivariate analysis and communication. Two variables, male gender (OR 3.049; 95%CI 1.038 to 8.961; P=0.043) and non-exclusive breastfeeding status (OR 6.879; 95%CI 1.308 to 36.184; P=0.023), retained significance (**Table 4**). For cognitive development, bivariate analysis revealed that only one variable, gender, was significantly associated with cognitive delay (OR 0.367; 95%CI 0.161 to 0.837; P=0.015) (**Table 5**). Socioeconomic status, primary caregiver, and nutritional status were not significantly associated with cognitive delay (P>0.05). The analysis did not proceed to multivariate analysis, because only one out of the four variables were significant, and the other P values were >0.05.[16]

Table 1. Demographic data of study subjects

Characteristics	(N=121)
Age, n (%)	
0-12 mo	38 (31.4)
13-24 mo	52 (43.0)
25-36 mo	31 (25.6)
Gender, n (%)	
Male	57 (47.1)
Female	64 (52.9)
Socioeconomic status, n (%)	
Upper	0
Upper middle	85 (70.2)
Lower middle	33 (27.3)
Upper lower	3 (2.5)
Lower	0
Parental education, n (%)	
High school (*SMA/ SMK*)	40 (33.1)
Diploma (*D3*)	12 (9.9)
Bachelor's degree (*S1*)	62 (51.2)
Master's degree (*S2*)	7 (5.8)
Caregiver, n (%)	
Mother	79 (65.3)
Other than mother	42 (34.7)
Nutritional status, n (%)	
Obese	6 (5)
Overweight	3 (2.5)
Possible risk of overweight	7 (5.8)
Normal	103 (85.1)
Wasted	2 (1.7)
Severely wasted	0
Breastfeeding history, n (%)	
Yes	112 (92.6)
Never	9 (7.4)
Breastfeeding duration, n (%)	
≥ 6 months	79 (65.3)
< 6 months	42 (34.7)
Breastfeeding pattern, n (%)	
Exclusive	70 (57.9)
Not exclusive	51 (42.1)

Discussion

A 2018 study in Semarang, Central Java, Indonesia, reported that 41.8% of subjects experienced cognitive delay.8 We noted a lower cognitive delay prevalence of 28.1%. In addition, there was a communication delay prevalence of 17.4% among our subjects as assessed by BDI-2, which was lower than that of an Indian study in 2016 (27%) as assessed by a different tool.[7]

Table 2. Prevalence of communication and cognitive development delay

BDI-2 result	Communication (N=121)	Cognitive (N=121)
Delayed, n (%)	21 (17.4)	34 (28.1)
Not delayed, n (%)	100 (82.6)	87 (71.9)

Table 3. Bivariate analyses of possible risk factors and delayed communication development

Variables	Delayed (n=21)	Not delayed (n=100)	OR (95%CI)	P value
Gender, n (%)				
Female (REF)	7 (10.9)	57 (89.1)	2.651 (0.985 to 7.134)	0.048*
Male	14 (24.6)	43 (75.4)		
Socioeconomic status, n (%)				
Lower	0 (0.0)	0 (0.0)		0.051
Upper lower	2 (66.7)	1 (33.3)		
Lower middle	7 (21.2)	26 (78.8)		
Upper middle	12 (14.1)	73 (85.9)		
Upper	0 (0.0)	0 (0.0)		
Primary caregiver, n (%)				
Mother (REF)	13 (16.5)	66 (83.5)	1.195 (0.451 to 3.161)	0.720
Other than mother	8 (19.0)	34 (81.0)		
Breastfeeding duration, n (%)				
<6 months (REF)	10 (12.7)	69 (87.3)	2.448 (0.942 to 6.366)	0.061
<6 month	11 (26.2)	31 (73.8)		
Breastfeeding pattern, n (%)				
Exclusive (REF)	6 (8.6)	64 (91.4)	4.444 (1.585 to 12.462)	0.003*
Not exclusive	15 (29.4)	36 (70.6)		

REF=reference variable

Table 4. Logistic regression analysis of communication development and subjects' variables

Variables	OR (95%CI)	P value
Male gender	3.049 (1.038 to 8.961)	0.043*
Low socioeconomic status	7.788 (0.569 to 106.528)	0.235
Duration of breastfeeding < 6 months	0.495 (0.102 to 2.413)	0.385
Pattern of breastfeeding not exclusive	6.879 (1.308 to 36.184)	0.023*

*significant P value < 0.05

Table 5. Bivariate analyses of subjects' variables and cognitive development

Variables	Delayed (n= 34)	Not delayed (n= 87)	OR (95%CI)	P value
Gender, n (%)				
Female (REF)	12 (18.8)	52 (81.3)	0.367 (0.161 to 0.837)	0.015*
Male	22 (38.6)	35 (61.4)		
Socioeconomic status, n (%)				
Upper	0	0		
Upper middle (REF)	24 (28.2)	61 (71.8)		
Lower middle	8 (24.2)	25 (75.8)	1.230 (0.487 to 3.103)	0.300
Upper lower	2 (66.7)	1 (33.3)	0.197 (0.017 to 2.272)	
Lower	0	0		
Caregiver, n (%)				
Mother (REF)	24 (30.4)	55 (69.6)	1.396 (0.592 to 3.289)	0.444
Other than mother	10 (23.8)	32 (76.2)		
Nutritional status, n (%)				
Obese	2 (33.3)	4 (66.7)	0.784 (0.136 to 4.514)	
Overweight	0	3 (100)	0	
Possible risk of overweight	2 (28.6)	5 (71.4)	0.980 (0.180 to 5.337)	0.834
Normal (REF)	29 (28.2)	74 (71.8)		
Wasted	1 (50)	1 (50)	0.392 (0.024 to 6.476)	
Severely wasted	0	0	0	

REF: reference variable; *significant P value < 0.05

Gender can influence child development by having different physical development and function. For example, boys generally develop gross motor skills faster than girls, while girls tend to have more advanced development in cognitive, social, and emotional areas.[17] In agreement with such findings, we found a significant correlation between male gender and delayed cognitive development (OR=0.367; 95%CI 0.161 to 0.837; P=0.015). Furthermore, male gender was a significant risk factor for delayed communication development (OR=2.651; 95%CI 0.985 to 7.134; P=0.048). Previous studies also found that boys had more speech delays than girls. Early brain tissue maturation which predominantly affects language and speech function may help explain female language acquisition.[7,18]

Children's primary caregivers also play an important role in child development, as they are responsible for providing stimulation and nutrition.[19,20] A previous Indonesian study reported a significant association between non-mother primary caregiver and developmental delay in children. This finding is likely related to non-mothers often being an inadequate replacement for mothers in educating and stimulating children according to their age.[21] However, in our study, primary caregiver was not significantly correlated with child cognitive development (P=0.444). Children whose primary caregivers were not their mothers were 1.396 more likely to experience delay compared to children with their mothers as primary caregivers (95%CI 0.593 to 3.289), but the difference was not significant. A possible explanation for lack of correlation is that the mothers in Indonesia are often replaced by other female family members who already possess a thorough understanding of child-raising and providing stimulation for child development. A shift in mothers' role from housewife to a double role as housewife and career woman, usually resulting in grandparents filling in the parenting role.[22]

No significant correlation was observed between primary caregiver and communication delay in our study either (OR 1.195; 95%CI 0.451 to 3.161; P=0.720). Previous studies also had similar findings, nevertheless, children cared for by pengasuh or babysitters may have increased chance of communication delay.[23,24] During our data collection process, we also anecdotally observed similar patterns of slower communication development in children cared for by babysitters and with two working parents. However, in our opinion, communication development may also be influenced by the rate of communication and social interactions received by the child daily.[13]

Previous studies showed that socioeconomic status had a significant correlation with cognitive development, since socioeconomic factors may influence children's prenatal factors, parental care, nutrition, stress, toxins, drug exposure, and cognitive stimulation.[8,19,20] In contrast, a 2011 study reported no correlation between child development and family socioeconomic background.[25] We also found no significant correlation between the variables (P=0.300), similar to the 2011 study. Subjects from upper lower socioeconomic class were 0.197 times more likely to develop cognitive delay compared to children from the upper middle class (95%CI 0.017 to 2.272). This finding may be explained by the similar backgrounds of most of our subjects' families. In our study, 70.2% of subjects belonged to the upper middle socioeconomic class, while only a small proportion belonged to the lower middle and upper lower socioeconomic classes.

Previous studies have reported a possible correlation of low socioeconomic status with communication delay.[9,26-28] Lower socioeconomic status children had inferior performance of verbal skills and word problems than those with higher socioeconomic status. Parents from different socioeconomic strata also interact with and talk differently to their children, which influences the rate in which children acquire language. However, we found no such association (P=0.051). Socioeconomic status may increase the chance of communication delay, as correlated with a poor home environment that deprives children of needed stimuli.9,26-28 However, as home environment was not assessed in our study, no correlation can be deduced.

Surprisingly, nutritional status had no correlation with cognitive development delay (P=0.834). This result contradicted much previous study, as nutrition plays an important role in brain development and cognitive function.[8,29] The explanation for this difference could be the homogenous background of our subjects, as 85.1% of subjects had normal nutritional status. Another explanation could be

the existence of other unexamined factors, such as caregiver stimulation that also plays an important role in a cognitive skill development. Children with wasted nutritional status had 0.392 higher odds of cognitive delay compared to children with normal nutritional status, with a wide confidence interval (0.024 to 6.476). This finding may have been due to the limited number of wasted subjects, both for normal development and delayed cognitive development. Our subjects' nutritional status was a one-time measurement, and did not include birth weight or maternal body weight during pregnancy, which might have influenced the result. Further study is needed to evaluate factors with a more heterogeneous population in order to improve accuracy. Future study should also be done in a broader age range to above 5 years, so that the cognitive development status can be more visible and any developmental delay can be examined more accurately.

Non-exclusive breastfeeding history had a significant correlation with communication delay (OR 4.444; 95%CI 1.585 to 12.462; P=0.003). Similarly, a study stated that infants who received exclusive breastfeeding for 6 months had greater communication development and social interactions than those not exclusively breastfed.[30] In contrast to breastfeeding pattern, breastfeeding duration of less or more than 6 months did not yield the same significant result in communication development (OR 2.448; 95%CI 0.942 to 6.366; P=0.061). In contrast, previous studies reported that infants with longer duration of breastfeeding more quickly reached adequate developmental milestones. These studies also stated that long chain polyunsaturated fatty acid (PUFA) substances, particularly two long chain polyunsaturated fatty acids, which are omega-3 (docosahexaenoic acid) and omega-6 (arachidonic acid), present in breastmilk are crucial for promoting neural and white matter development, which yield notable developmental growth of language and cognitive abilities in infants.[24,30,31] To be noted, breastfeeding duration results in our study may have been influenced by recall bias of parents.

In conclusion, of 121 children aged 0 to 3 years in Jakarta-area private hospitals, the proportions of cognitive delay and communication delay are 28.1% and 17.4%, respectively. For cognitive delay, only male gender is a significant risk factor. The other factors of socioeconomic class, primary caregiver, and nutritional status, show no significant association with cognitive development. Communication delay is significantly associated with male gender and non-exclusive breastfeeding patterns. However, breastfeeding duration (more or less than 6 months) is not correlated to communication delay. In addition, lower socioeconomic status and non-mother primary caregiver are not associated with either delay.

Conflict of interest

None declared.

Acknowledgements

We thank dr. Johanus Edwin, SpA for assistance in demographic data acquisition. We thank Professor Dr. dr. Saptawati Bardosono, M.Sc for comments and suggestions on the manuscript.

Funding acknowledgement

The authors received no specific grants from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. Wati DE. Pengetahuan guru PAUD tentang KPSP (Kuesioner Pra Skrining Perkembangan) sebagai alat deteksi tumbuh kembang anak. J Varidika. 2016;28:7. DOI: https://doi.org/10.23917/varidika.v28i2.3028.
2. Anggraini W. Keterlambatan bicara (speech delay) pada anak (studi kasus anak usia 5 tahun) [thesis]. [Semarang]: Universitas Negeri Semarang; 2011.
3. Kolb B, Fantie BD. Development of the child's brain and behavior. In: Reynolds CR, Fletcher-Janzen E, editors. Handbook of clinical child neuropsychology. 3rd ed. New York: Springer; 2009. p. 813.
4. MAL-ED Network Investigators. Early childhood cognitive development is affected by interactions among illness, diet, enteropathogens and the home environment: findings from the MAL-ED birth cohort study. BMJ Global Health. 2018;3:e000752. DOI: https://doi.org/10.1136/bmjgh-2018-000752.

5. Simms MD. Language development and communication disorders. Kliegman RM, Stanton BF, St. Geme J, Schor NF. Nelson textbook of pediatrics. 20th ed. Philadelphia: Elsevier; 2016. p. 207-16.
6. Gunawan G. Gambaran perkembang bicara dan bahasa anak usia 0-3 tahun. Sari Pediatri. 2011;13:5. DOI: https://doi.org/10.14238/sp13.1.2011.21-5.
7. Beyeng R, Soetjiningsih, Windiani T. Prevalensi dan karakteristik keterlambatan bicara pada anak prasekolah di TPA Werdhi Kumara I dengan Early Language Milestone Scale-2. J Ilmu Kesehatan Anak. 2012;1:13-6.
8. Zhamaroh LAN, Suhartono S, Nugraheni SA. Analisis faktor yang berhubungan dengan perkembangan kognitif balita umur 2-3 tahun di wilayah Puskesmas leyangan Kabupaten Semarang. J Manajemen Kesehatan Indonesia. 2018;6:8. DOI: https://doi.org/10.14710/jmki.6.3.2018.171-178.
9. Silva PA, Williams S, McGee R. A longitudinal study of children with developmental language delay at age three: later intelligence, reading and behaviour problems. Dev Med Child Neurol. 1987;29:630-40. DOI: https://doi.org/10.1111/j.1469-8749.1987.tb08505.x.
10. Busari JO, Weggelaar NM. How to investigate and manage the child who is slow to speak. BMJ. 2004;328:272-6. DOI: https://doi.org/10.1136/bmj.328.7434.272.
11. Simangunsong SW, Machfudz S, Sitaresmi MN. Accuracy of the Indonesian child development pre-screening questionnaire. Paediatrica Indonesiana. 2012;52:4. DOI: https://doi.org/10.14238/pi52.1.2012.6-9.
12. Elbaum B, Gattamorta KA, Penfield RD. Evaluation of the Battelle Developmental Inventory, 2nd Edition, screening test for use in States' child outcomes measurement systems under the Individuals With Disabilities Education Act. J Early Intervention. 2010;32:255-73. DOI: https://doi.org/10.1177/1053815110384723.
13. Nuraini ND. Uji validasi pemeriksaan Batelle Development Inventory II versi Indonesia untuk penilaian profil tumbuh kembang anak usia 0-7 tahun 11 bulan. [thesis]. [Jakarta]: Universitas Indonesia;2019.
14. Wani RT. Socioeconomic status scales-modified Kuppuswamy and Udai Pareekh's scale updated for 2019. J Family Med Prim Care. 2019;8:1846-9. DOI: https://doi.org/10.4103/jfmpc.jfmpc_288_19.
15. WHO. WHO child growth standards: training course on child growth assessment. 2008. [cited 2020 Jan 27]. Available from: https://www.who.int/publications/i/item/9789241595070.
16. Indrayan A, Malhotra RK. Medical biostatistics. 4th ed. Florida: Chapman and Hall; 2017. Chapter 19, Simultaneous consideration of several variables; p. 529-53.
17. Mariati LI. Usia dan jenis kelamin dengan kesiapan masuk sekolah dasar Seminar Nasional Spirit Entrepreneurship: menghadapi tantangan MEA. 17 Desember 2016; Gresik: Prosiding Seminar Nasional Psikologi UMG 2017. p. 331.
18. Adani S, Cepanec M. Sex differences in early communication development: behavioral and neurobiological indicators of more vulnerable communication system development in boys. Croat Med J. 2019;60:141-9. DOI: https://doi.org/10.3325/cmj.2019.60.141.
19. Ronfani L, Vecchi Brumatti L, Mariuz M, Tognin V, Bin M, Ferluga V, *et al.* The complex interaction between home environment, socioeconomic status, maternal IQ and early child neurocognitive development: a multivariate analysis of data collected in a newborn cohort study. PLoS One. 2015;10:e0127052. DOI: https://doi.org/10.1371/journal.pone.0127052.
20. Atika AN, Rasyid H. Dampak status sosial ekonomi orang tua terhadap keterampilan sosial anak. Pedagogia. 2018;7:10. DOI: https://doi.org/10.21070/pedagogia.v7i2.1601.
21. Putri DFTP, Kusbaryanto. Perbedaan hubungan antara ibu bekerja dan ibu rumah tangga terhadap tumbuh kembang anak usia 2-5 tahun. Mutiara Medika. 2012;12:143-9. DOI: https://doi.org/10.18196/mmjkk.v12i3.1032.
22. Zakaria MRA. Pengalihan peran sementara pengasuhan anak dari orang tua ke nenek dan kakek. Jurnal Sosiologi Dialektika. 2020:14:120-5. DOI: https://doi.org/10.20473/jsd.v14i2.2019.120-125.
23. Suparmiati A, Ismail D, Sitaresmi MN. Hubungan ibu bekerja dengan keterlambatan bicara pada anak. Sari Pediatri. 2013;14:4. DOI: https://doi.org/10.14238/sp14.5.2013.288-91.
24. Tan S, Mangunatmadja I, Wiguna T. Risk factors for delayed speech in children aged 1-2 years. Paediatrica Indonesiana. 2019;59:55-62. DOI: https://doi.org/10.14238/pi59.2.2019.55-62.
25. Gunawan G, Fadlyana E, Rusmil K. Hubungan status gizi dan perkembangan anak usia 1-2 tahun. Sari Pediatri. 2011;13:5. DOI: https://doi.org/10.14238/sp13.2.2011.142-6.
26. Silva GMD, Couto MIV, Molini-Avejonas DR. Risk factors identification in children with speech disorders: pilot study. Codas. 2013;25:456-62. DOI: https://doi.org/10.1590/S2317-17822013000500010
27. Campbell TF, Dollaghan CA, Rockette HE, Paradise JL, Feldman HM, Shriberg LD, *et al.* Risk factors for speech delay of unknown origin in 3-year-old children. Child Dev. 2003;74:346-57. DOI: https://doi.org/10.1111/1467-8624.7402002.
28. Sidhu M, Malhi P, Jerath J. Early language development

in Indian children: a population-based pilot study. Ann Indian Acad Neurol. 2013;16:371-5. DOI: https://doi.org/10.4103/0972-2327.116937.

29. Deoni S, Dean D, Joelson S, O'Regan J, Schneider N. Early nutrition influences developmental myelination and cognition in infants and young children. Neuroimage. 2018;178:649-59. DOI: https://doi.org/10.1016/j.neuroimage.2017.12.056. .
30. Choi HJ, Kang SK, Chung MR. The relationship between exclusive breastfeeding and infant development: a 6- and 12-month follow-up study. Early Hum Dev. 2018;127:42-7. DOI: https://doi.org/10.1016/j.earlhumdev.2018.08.011.
31. Deoni SCL, Dean DC, Piryatinsky I, O'Muircheartaigh J, Waskiewicz N, Lehman K, *et al*. Breastfeeding and early white matter development: a cross-sectional study. Neuroimage. 2013;82:77-86. DOI: https://doi.org/10.1016/j.neuroimage.2013.05.090.