The Study of Child Development Norms of Thai Children Age from Birth to 5 Years using Child Development Assessment Tools Developed by the Mental Health Department, Ministry of Public Health, Thailand

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Abstract

This study aims to determine the development norms of Thai children age from birth to 5 years and to compare the assessment items of a child development assessment tool for children age from birth to 5 years, developed by the Department of Mental Health, Ministry of Public Health, Thailand, and Denver development screening test (DDST) assessment form. Participants were 2,079 Thai children age from birth to 5 years sampling by multi-staged stratified random sampling method. The tool used was the child development assessment form for children age from birth to 5 years developed by the Mental Health Department, Ministry of Public Health, Thailand. There were 654 question items in the assessment form which were classified into 5 skills area include 1) gross motor skills 2) fine motor skills 3) Receptive language skills 4) Expressive language skills and 5) Personal and social care skills. The analysis was based on multiple logistic regressions to determine the development norms of Thai children and a single group mean test was used to compare child development norms by the assessment form for children age from birth to 5 years developed by the Mental Health Department, Ministry of Public Health, Thailand, and Denver development screening test (DDST) assessment form. The results showed that 651 of 654 items (99.54%) of child development assessment form for children age from birth to 5 years developed by the Mental Health Department, Ministry of Public Health, Thailand, were able to identify development norms of Thai children. The items for which the development norms could not be assessed were 1) the child physical reaction when hearing sound 2) the child stop crying when held by parents and 3) the child can look at other face for 1-2 seconds. However, it was found that all Thai children who were assessed could pass the behavioral assessment. To compare between child development assessment form for children age from birth to 5 years developed by the Mental Health Department, Ministry of Public Health, Thailand, and Denver development screening test (DDST) assessment form, it was found that there was no different in gross motor movement skills and expressive language skills. In fine motor movement skills, there was no different found at 75 percentile. In receptive language, there was no different found at 25 and 50 percentile. And in personal and social skill there was no different found at 90 percentile.

Keywords: *Development norms, Child development, Comparison of development norms, DDST, Child development assessment form, T-DSI*

Introduction

The period from birth to 5 years of age is the most important stage of life. It is a fundamental development of child's physical, emotional and intelligence and it is also important to enhance quality of life of the country's population. Thai government has given first priority to prepare and empower the development of children at very early childhood, as can be seen clearly from the 8th and 9th National Social and Economic Development Plan that set the goal for appropriate child development in the area of physical, intelligence, mental, emotional social, and spiritual. Nowadays, the 11th National Social and Economic Development Plan are still realized that child development is very important to increase the quality of life of the population. So its policy has focused on diseases control and prevention. It places the important to each stage and area of child development, that are physical, intelligence, mental, emotional, social, and spiritual. The result of this plan will be the well development of children who will help developing the country in the future. From the survey of children age from birth to 5 years in the year 2010, it was found that 70% of children had appropriate development, while 30% of them had inappropriate development. (Bureau of Health Promotion, Department of Health, Ministry of Public Health, Thailand, 2010)

For assessing child development in Thailand, many researchers from many institutes who work on child health care had translated and developed child development assessment tools from western countries [i.e the assessment form developed by Department of Health the Denver development screening test (DDST) assessment tool, the Diagnostic Inventory for screening Children (DISC), etc]. These tools were used and evaluated regularly in order to compare with the development of Thai children. From the survey of the Department of Health in 1,558 children age 1-3 years and 4-5 years sampling from all around the country, by using Modified Denver development screening test (DDST) assessment tool, it was found that the percentage of children with standard development scores in 4 area; gross motor skills, fine motor skills, expressive language skills and personal and social skills in the year 1998, 2004 and 2007 were 71.0, 72.0 and 67.7 respectively. However, Modified Denver development screening test (DDST) has only 125 items that were less accuracy than other standard assessment test, for instance; Bayley scales of infant and toddler development 3rd edition (549 items) and Battelle developmental inventory (450 items) that can report more accurately and clearly on how much the children have delayed development. At present, the most effective child development assessment tools are 1) Developmental Skill Inventory (DSI) developed by Rajanukul hospital (this hospital is under the supervision of the Department of Mental Health) 2) Diagnostic Inventory for Screening Children (DISC) that was translated into Thai language by Samai Sirithongtavorn and Amporn Hatsiri (1991), this screening tool has high reliability of 99.19%, 3) Denver development screening test (DDST) that was translated into Thai language by Nittaya Kotchapakdi and others (2003), the Denver development screening test (DDST) was developed from DDST (The Denver Developmental Screening Test).

The Rajanagarindra Institute of Child Development (RICD), Department of Mental Health, Ministry of Health, Thailand, is a tertiary care mental health facility with a main mission to support technical knowledge and provides services on mental health promotion, prevention, treatment, and rehabilitation to children with delayed development. Its main policy is to promote child development age from birth to 5 years. The Institute paid much attention to study the development norms of Thai children age from birth to 5 years in order to find the standard norm of Thai children and to promote children development continuously. Therefore,

the Institute has developed a child Development assessment tool which has accuracy sensitivity and specificity to assess Thai child development. The RICD in collaborated with 3 organizations in Thailand that were, Mahidol University, Chulalongkorn University and the Department of Health developed a child development assessment tool for children age from birth to 5 years by using the 3 tools mentioned above as a model. The new assessment tool has high content validity of 0.85, and inter-rater reliability of 0.80 which are in an appropriate level. After that, there was a study to find the norm of Thai children development from this assessment tool in order to provide appropriate development promotion to the delayed development children effectively.

Objectives

1. To study the development norms of Thai children age from birth to 5 years by using child development assessment tool developed by the RICD, Department of Mental Health, Ministry of health, Thailand.

2. To compare development norms of children age from birth to 5 years between using the child developmental assessment tool developed by the RICD, Department of Mental Health, Ministry of health, Thailand, and Denver development screening test (DDST) assessment tool.

Methodology

Population and sample group

The population of this study was Thai children age from birth to 5 years who live in 76 provinces of Thailand which can be divided into 5 parts of Thailand.

Sample Group

From the predicted number of Thai children age from birth to 5 years in the year 2010 (with 2.5% variation), there would be at least 1,600 children as a sample group. This sample group was added with another 15% (or 240 children) by non-replacement sampling, so the sample group in this study was 2,079 children. From the national census on the number of children age from birth to 5 years all over the country, it can be divided into 5 parts that were; north, central, south, northeastern, Bangkok Metropolitan City and other nearby provinces. The sample group from the 5 parts of the country was sampling by using Multi-stage random sampling as the process mentioned below:

1. Provinces in each part of the country were random by the number of children, one province with the high number of children and another province with low number of children and the results were as follows;

I. The provinces in the northern part of Thailand were Chiang Mai and Lumphun

II. The provinces in the central part of Thailand were Lop Buri and Sing Buri

III. The provinces in the northeastern part of Thailand were Khon Kaen and Nongbualamphu

IV. The provinces in Bangkok Metropolitan City and the province nearby were Bangkok and Samut Prakan

V. The provinces in the southern part of Thailand were Songkhla and Surat Thani

VI. Two districts in each random province were selected by purposive sampling that were the district in the urban area and another district in the rural area

2. The number of the sample group was divided into 60 age groups (the age range is 1 month) (The number of each group can be seen in Table 1 below)

3. The number of male and female sample group was equal.

Table 1: Number of the sample group divided into 60 age groups

Age	Number	Age	Number	Age	Number
1	39	21	33	41	36
2	39	22	32	42	31
3	39	23	37	43	33
4	38	24	28	44	34
5	44	25	32	45	32
6	37	26	31	46	30
7	35	27	29	47	32
8	37	28	28	48	33
9	41	29	30	49	33
10	42	30	33	50	32
11	39	31	39	51	32
12	38	32	32	52	36
13	37	33	36	53	31
14	37	34	32	54	31
15	39	35	34	55	40
16	37	36	35	56	28
17	33	37	38	57	30
18	38	38	34	58	35
19	38	39	40	59	31
20	35	40	33	60	31
		total		**2,079**	

Inclusion criteria of the sample group were as follows;

1. Children age from birth to 5 years who were registered in the government citizen record.

2. Parents or care takers had to sign the consent form to allow the researchers to assess their child development and cooperated to give information on their child's history of illness and medical treatment.

3. Parents or care takers had to sign the consent form to give the researchers their personal data and the history of the family's member illness and medical treatment.

4. Children's age were limit only in 60 age groups (can +/- for only 7 days)

Exclusion criteria of the sample group were as follows;

1. Children who couldn't participate throughout the assessment process.

2. Children who got sick or had physical or mental symptoms that obstruct them to come for assessment at the heath care facilities.

Research tools

1. The development assessment form for children age from birth to 5 years developed from the Developmental Skills Inventory (DSI), Diagnostic Inventory for Screening Children (DISC) and Denver Developmental Screening Test II (Denver II) by the Department of Mental Health, Ministry of Public Health, Thailand. These tools were adapted and developed to be the assessment form for assessing the development of Thai children, it was divided into 6 age groups, with 654 items in 5 different area as follows;

1.1 Gross Motor Skills (GM) consisted of 155 items to assess the skills such as body balancing, walking, running, climbing, playing with a ball, jumping, riding a bicycle, etc.

1.2 Fine Motor Skills (FM) consisted of 162 items to assess the skills such as looking at object, picking up an object, stabilize an object, placing or putting an object in a container, hand skills, drawing, reading, problem solving, and puzzle completing, matching and classifying objects and pictures, selecting objects and pictures.

1.3 Receptive Language Skills (RL) consisted of 105 items to assess the skills such as listening and attention, response to simple command such as "send an object to his/her mother", understanding adjective words such as big/small, understanding location of an object such as on/under, understanding other grammatical words such as mine/yours, etc.

1.4 Expressive Language Skills (EL) consisted of 104 items to assess the skills such as making voice, vocal interaction, speaking interaction, vocal imitation, action imitation, speaking meaningful words, using one word, phrases, sentence or grammar such as belonging words, clearly speech, etc.

1.5 Personal and Social Skills (PS) consisted of 128 items to assess the skills such as social skills and playing, eating and drinking, dressing, toileting, body cleaning, etc.

2. Materials for assessing child development age from birth to 5 years: The large size material contains 1,024 pieces (268 devices) and can be divided into 5 area as follows;

2.1 Gross Motor Skills (GM) consisted of 39 pieces of material

2.2 Fine Motor Skills (FM) consisted of 395 pieces of material

2.3 Receptive Language Skills (RL) consisted of 220 pieces of material

2.4 Expressive Language Skills (EL) consisted of 312 pieces of material

2.5 Personal and Social Skills, (PS) consisted of 58 pieces of material

Data collection forms consisted of consent form, questionnaire for parents on the risk factors that affect child development, (this questionnaire consisted of child's general information, and a medical examination form done by a medical doctor), and the form to collect the demographic data of parents or care takers (this form consisted of home address, the distance between their home to the nearest hospital, parent's or care taker's occupation, total income of family, parent's or care taker's education level, rights for medical care, house appearance, child's number of order in the family etc.

Research Methodology and Data collection

This research study aims to develop child development assessment form in order to find the developmental norms of Thai children age from birth to 5 years by the process as follows;

1. Literature reviewed and research framework development

I. Literature reviewed on how to develop development norms in children and how to find the development scores of Thai children

II. Conceptual framework of the research

2. Randomly selected sample group from

Thai children age from birth to 5 years who were registered in the citizen record of Thailand

3. Contacted with the health personnel in the target area of the research study as mentioned before and prepared the materials used for the child development assessment. The items of the assessment forms were varied by the age of the children, that were 89 items for children age from birth to 6 months, 97 items for children age 6 – 12 months, 112 items for children age 1 – 2 years, 125 items for children age 2 – 3 years and 3 – 4 years, and 106 items for children age 4 – 5 years. The assessment forms were composed of 5 skills area, that were of gross motor skills, fine motor skills, receptive language skills, expressive language skills and personal and social care skills. There were 714 pieces of the materials used for child development assessment and development promotion.

4. Provided 2 days training course for general practitioners, psychologists, nurses, and public health personnel who involved in this research study on how to use the child development assessment tools. These groups of people were assigned to work with the researchers from the RICD to collect data of the sample group.

5. Collected data from the sample group. The process of data collection were as follows;

5.1 The RICD team contacted the health personnel in the target area for the name list of the sample group, then developed a data collection plan, and invited the sample group to meet at the District Health Promotion Hospital near their home for development assessment.

5.2 The health personnel who involved in this research study contacted the sample group, inform them about the research study, having the parents signed the consent form, and brought their children to the District Health Promotion Hospital on the appointment date.

5.3 The leader of the field researchers' team informed the parents of the sample group on the objectives of the research study and the duration of the assessment time that was around 1 – 2 hours. After that, the health personnel began to assess the child development.

5.4 Assessment process was as follows;

The health personnel began the process by greeting the child and the parent with small talk to make the child felt comfortable and had trust on him/her. Then the health personnel will start the assessment process step by step as follows;

1) Asking the child's birth date from the parent and then calculate the child's age by the steps as follows;

I. Putting the date, month, and year of the assessment day minus by the date, month, and year of the child's birth date.

II. If the number of assessment days were less than the number of the child's birth date, then add 1 more month (30 days).

III. If the number of the assessment months were less than the number of the child's birth month, then add 1 more year (12 years).

2) Beginning to assess the child's development area by area for examples, beginning with personal and social care skills then other skills, or beginning with receptive language skills then other skills, etc.

3) Starting to assess the child's development by using the first item of the assessment form by the age range of the child. If the age range of the form is divided into sub-periods, starting with the first item of that sub-period. For example, the assessment forms for the children age from 1-2 years are divided into 3 sub-periods that are; 12-15 months, 15 months and 1 day-18 months, 18 months and 1 day-24 months, etc.

4) Assessing every sub-skills in each main skills, for example; the gross motor skills have jumping as one of its sub-skills, the health personnel has to finish assessing the jumping skill before moving to assess other sub-skills.

5) Go on assessing the children item by item, though the assessment form may beyond the child's age, until the child is unable to do the

assessment for 3 consecutive items, then, stop the assessment.

6) In Case that the child cannot pass the first item of the sub-skills assessment, return to assess the skill in the same age range or the younger age range until the child can pass the 3 consecutive items, then stop the assessment. If that sub-skills have less than 3 items, then go on the assessment in the sub-skills next to the item that the child cannot pass until the child can pass 3 consecutive items, then stop the assessment.

7) Assessed all the skills area in the actual age of the child.

8) The leader of the field researchers' team thanked the parent and the child for their cooperation and then reported the assessment results to them whether the child was in a normal range of development or not. If not, the leader provided them how to promote his/her child development.

Statistics Analysis

1. Analyzed general information of the sample group that consisted of general information of the children and their parents by using computer program. Then presented the results in the forms of frequency, percentage, mean and standard deviation.

2. Analyzed the normal norms of Thai children development in 5 area by using Logistic Regression Analysis computer program. The analysis steps were as follows;

Step 1: Selected the independent variables (age of the children) and the dependent variables (child development scores). Then analyzed the correlation between the 2 variables by using Chi-square test. It was found that 651 items from 654 assessment items of the age variable (X) was correlated with the development variable (Y) with statistical significance.

Step 2: Checked the conditions of the Logistic Regression Analysis.

Step 3: Tested the goodness of fit of the model by considering the scores of -2 log likelihood (-2LL) and the Hosmer-Lemeshow goodness-of fit scores.

Step 4: Created the Logistic Response Function equation and verify the results by using pseudo R2 (Cox&Snell and Nahelkerke) scores and the Wald Statistic scores. The equation was shown as follows;

$$P(y) = \frac{1}{1 + e^{-\beta_0 - \beta_1 x}}$$

Used the Log equation to find the norms (child's age) in the percentile level, as follows;

$$x = [\ln(\frac{1}{P(Y)} - 1] + \beta_0] / \beta_1$$

Then, analyzed the data by using SPSS computer program, and created the Logistic Response Function equation by Microsoft Excel program.

3. Compared the children development norms between the scores from DSI and Denver development screening test (DDST) assessment forms by using one sample T-test computer program and presented the analyzed data in the form of frequency, mean, standard deviation, t-value, and degree of freedom. The significant level was at 0.05.

Results

1. General information

a) The results of 2,079 children's general information were shown as follows;

Frequency and percentage of children's had seen in this study was found the number of boys and girls were equal. And most of the children 47.52% were the first child of their family. Forty five point four five percent (45.45%) had birth weight more than 3,000 grams. Education status, most of them (24.63%) had already gone to school

and the children (83.79%) had no underlying disease. Most of them (16.98%) lived in Samut Prakan Province, and 55.99% of all the children lived in the city area. Most of the children (59.07%) cooperated well throughout the assessment period. Most of the children (77.87%) didn't fear of the researcher and 46.42% of them had good concentration and attention throughout the assessment period.

b) The results of 2,079 parent's general information were shown as follows;

General data was found that the main occupation of the parents were employees (45.6%), and 15% of them were farmers. Most of them (42.1%) had total income below 10,000 Bath/month, and 31.3% of them earned 20,000-10,000 Baht/month. Most of fathers and mothers educational level were in secondary school level (22.0 and 26.3% respectively). For the right for medical care, most of them (63.0 %) had universal health care card provided by the government, 14.6 % of them had Social Welfare Insurance. And most of them (82.0 %) lived in their own homes.

For the development of the norms for Thai children development, it could be concluded that the norms could be developed through the percentile of each responded assessment item. For the gross motor skills, the child had to complete all 155 items. For the fine motor skills, the child had to complete all 162 items. For receptive language skills, the child had to pass 104 out of 105 items. However, there was 1 item that couldn't be found the development norm because all the children could pass this item, it was item 54 (in sub-skill of listening and attention); this item assessed the child's physical reaction when hearing sound. For expressive language skills, the child had to complete all 104 items. For the personal and social skills, the child had to pass 126 out of 128 items. There were 2 items that couldn't be found the development norm because all the children could pass these 2 items. They were item 75 and 76 (in sub-skills social and play skills); item 75 assessed the ability of the child to stop crying when being held by his/her parent and item 76 assessed the ability of the child to look at other face for 1 - 2 seconds. After finding the norms of Thai children development by using percentile rank, the researchers had determined the norm of Thai children development in each assessment item with 75 – 90 percentile rank in order to find the items to use for assess Thai children development by age range (month) in 5 skills area.

2. For the comparison between DSI and Denver development screening test (DDST) assessment forms on 5 development skills. The researcher team put the items from DSI and Denver development screening test (DDST) assessment forms that had similar issue for matching. The development norms of children in each item were classified by percentile rank of 25, 50, 75, and 90. Then the different scores of the 2 assessment forms were analyzed by using one sample t-test. It can be concluded as follows;

Gross Motor skills

Table 2: Statistical data of the test between the average mean scores of the development norms between DSI and Denver development screening test (DDST) assessment forms in gross motor skills

No.	Data	test value = 0					
		Number (n)	Mean ($\bar{x}$)	Standard deviation (s.d.)	t-value	df	Sig -value (2-tailed)
1	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 25%	30	-.018	5.26	-.019	29	.985
2	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 50%	30	-.084	4.60	-.100	29	.921
3	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 75%	31	-.804	5.25	-.852	30	.401
4	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 90%	32	-1.059	5.38	-1.114	31	.274

* significant level at 0.05

From Table 2: it was found that there was no statistical significant different at 0.05 between DSI and DENVER DEVELOPMENT SCREENING TEST (DDST) in all 4 levels (25, 50, 75 and 90 percentile) of the gross motor skills.

Fine Motor Skills and Intelligence

Table 3: Statistical data of the test between the average mean scores of the development norms between DSI and Denver development screening test (DDST) assessment forms in fine motor skills and intelligence

No.	Data	test value = 0					
		Number (n)	Mean ($\bar{x}$)	Standard deviation (s.d.)	t-value	df	Sig -value (2-tailed)
1	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 25%	27	1.404	3.29	2.220	26	.035*
2	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 50%	28	1.200	2.77	2.294	27	.030*
3	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 75%	29	.138	3.43	.217	28	.830
4	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 90%	29	-2.153	4.94	-2.347	28	.026*

* significant level at 0.05

From Table 3: it was found that there was statistical significant different at 0.05 between DSI and DENVER DEVELOPMENT SCREENING TEST (DDST) assessment forms at 25, 50 and 90 percentile. However, there was no statistical significant different found at 0.05 for the 75 percentile.

Receptive Language skills

Table 4: Statistical data of the test between the average mean scores of the development norms between DSI and Denver development screening test (DDST) assessment forms in receptive language skills

No.	Data	test value = 0					
		Number (n)	Mean ($\bar{x}$)	Standard deviation (s.d.)	t-value	df	Sig -value (2-tailed)
1	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 25%	7	-3.307	6.587	-1.328	6	.232
2	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 50%	7	-3.716	5.36	-1.835	6	.116
3	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 75%	7	-3.929	3.74	-2.783	6	.032*
4	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 90%	7	-8.513	5.86	-3.840	6	.009*

* significant level at 0.05

From Table 4: it was found that there were statistical significant different at 0.05 between DSI and DENVER DEVELOPMENT SCREENING TEST (DDST) assessment form at 75 and 90 percentile. However, there was no statistical significant different found at 0.05 in the 25 and 50 percentile.

Expressive Language skills

Table 5: Statistical data of the test between the average mean scores of the development norms between DSI and Denver development screening test (DDST) assessment forms in expressive language skills

No.	Data	test value = 0					
		Number (n)	Mean ($\bar{x}$)	Standard deviation (s.d.)	t-value	df	Sig -value (2-tailed)
1	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 25%	15	1.706	4.17	1.583	14	.136
2	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 50%	15	.435	4.64	.363	14	.722
3	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 75%	16	-1.580	6.03	-1.049	15	.311
4	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 90%	14	-2.024	5.53	-1.370	13	.194

* significant level at 0.05

From Table 5: it was found that there was no statistical significant different at 0.05 between DSI and DENVER DEVELOPMENT SCREENING TEST (DDST) assessment forms of all the 4 levels (25, 50, 75 and 90 percentile).

Personal and Social skills

Table 6: Statistical data of the test between the average mean scores of the development norms between DSI and Denver development screening test (DDST) assessment forms in personal and social skills

No.	Data	test value = 0					
		Number (n)	Mean ($\bar{x}$)	Standard deviation (s.d.)	t-value	df	Sig -value (2-tailed)
1	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 25%	25	3.836	6.17	3.108	24	.005*
2	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 50%	26	4.352	6.91	3.213	25	.004*
3	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 75%	27	2.930	6.36	2.395	26	.024*
4	DSI vs DENVER DEVELOPMENT SCREENING TEST (DDST) at 90%	27	2.394	6.89	1.804	26	.083

* significant level at 0.05

From Table 6: it was found that there were statistical significant different at 0.05 between DSI and DENVER DEVELOPMENT SCREENING TEST (DDST) assessment forms at 25, 50 and 75 percentile. However, there was no statistical significant different found at 0.05 in the 90 percentile.

Discussion

From the general information found in the children sample group, it was found that most of the children are the first child of the parents. This is congruence with the study of Waraporn Sayananon (1995) on the parents' knowledge on child development for child rearing. This research study found that most of the sample groups were the first child of the parents. It was also found that there are no different of total income of the family in the year 1995 and this research year. In the year 1995, most of the family had moderate total income level (3,000-5,000 Bath/month), while this research also found that most of the families' total income was less than 10,000 Bath/month. Both research studies show that the total income of the family in the last 17 years and nowadays are still in the same level, though the economic conditions of the country are higher than in the past. Furthermore, the education level of most parents are still in secondary school, while current compulsory education for all Thai people have been promoted to be at least high school level. It is also found that the majority of parents' occupations are employees which may not have enough time to take care of their children; therefore the parents have to leave their child at nursery schools or child care centers rather than taking care by themselves that leads to the problem of less relationship between parents and children.

From the development norms of Thai children development that used the age range of children and children's ability in each skill as the variables for the logistic regression analysis, 651 items (or 99.54%) of the total 654 items of

the DSI assessment from, can be the norms of Thai children development. It shows that the age range of the children is related to the children's ability in each area. This finding is consistent with the research studies by Nittaya Kachapakdi (2000), Patcharee Suankaew (1993), and Sucha Chan-ame (1997) who defined development as the continuity change process of systems' maturity and person him/herself, starting from birth to maturity. It will increase the ability of systems or persons to perform more difficult and complex tasks, as well as additional new skills. It will enhance people to progress in physical, intelligence, emotional and social ability. The ability to adjust oneself to the new status is an ongoing process that begins from birth to maturity, and in many cases, development will be continued throughout person's life time. In general, while the children grow up physically, their cognitive and behavior will also developed. It is also consistent with the research study done by Anupan Suwannapan (1997) and Sirisara Lipipan (2008) that children's age is an important factor that related to the development of Thai children. Furthermore, it is not only the age of the children that has affected on child development. From the research study by Tharnthip Prasarnsap (1994) on the direct and indirect factors that have influence on the intelligence development in the 2 years old children who had birth weight less than 2,000 grams and were born during the year 1982-1988 at Ramathibodi Hospital. This study found that the factors that have directly influence on the intelligence level of children at the age of 2 years were mothers' occupations, other factors during pregnancy, marital status, other factors at the early birth period, disability or disorder, family characteristics, and the length of head circumference at 8 months old. For the factors that have indirect influence on the intelligence level of the 2 years old children were parent's education level, the factors during labored, child rearing types, and the child's weight at 8 months old. Ladda Ahamad-Mahidi (2004) studied the comparison of the development of the boys and girls in the international kindergarten where the learning program focused on direct experiences and practices. The result of this study showed that the boys and girls who studied by the learning program that focused on direct experiences and practices had high to highest development scores, when considered the average scores of the 4 behavior activities. Also, when considered the graph of the scores, it was found that the development scores of the children became continually higher. Ariyaporn Kongnawang (1999) studied the trend and change in the children's writing skills development in early school age children who were trained on writing activities in the different period of time. The sample groups in this study were school boys and girls age between 5 - 6 years. This study found that the children's writing skills development in each training activity and writing practice were likely to develop to a higher level. Writing development during the first 1 - 2 weeks had slightly increased but still unclear. However, during the period of 3 - 9 weeks, writing development was increased obviously. It showed that both genders of children age under 6 years who received additional training had increased development equally.

From the comparison of the children's development norms between using DSI and Denver development screening test (DDST) assessment forms in fine motor skills, it was found that there were statistic significant different in 25, 50 and 90 percentile rank. This might be because of the different culture between Thai and foreign children whom received different child rearing styles and being in different environment that might lead to the difference kinds of using fine motor skills. Apaporn Rattawat (2003) had done a research study on the intelligence development and factors that influence intelligence development in school age children by comparing between the children who were raised by their grandmothers/

grandfathers (the first group) and by their father/ mother (the second group) in the rural area; Paisalee District, Nakhon Sawan Province. It was found that there was no difference found on intelligence development between the 2 groups. When the data were analyzed by Multiple Logistic Regression, it was found that the first group had factors that influence on the children's intelligence development with statistic significantly that were parenting style that promoted intelligence development and the adequate family income. While in the second group, the factors that influence significantly on the children's intelligence development were parenting style that promoted intelligence development, children's order number in the family, and the adequate family income. This research study recommended that parents or the persons who took care of the children should use parenting style that promotes intelligence development in school age children, while public health personnel should provide parents and children's caretakers the program on child rearing style that will promote children's intelligence development. Wisitsri Tungcornyothin (1995) studied the conditions and problems in promoting children's writing skill development in kindergartens that are under the supervision of the Office of the Private Education Commission, Bangkok. This study focused on the objectives, teaching and learning activities, teaching and learning materials, and measurement and evaluation. The results showed that most of the administrators and teachers had their objectives to promote children's eyes - hands muscles coordination through teaching and learning activities. Each kindergarten promote children's writing skill through 5 teaching and learning activities that were 1) preparation forms for calligraphy and writing, 2) combination of preparation forms and natural forms for calligraphy and writing, 3) calligraphy and writing forms, 4) preparation forms, and 5) preparation forms and natural forms. For the teaching and learning activities, it was found that the administrators focused on encouraging the children to compare what were the same and what were the different, while the art teachers encouraged the children to play with their art works. For teaching and learning materials, it was found that most of the administrators and teachers used the work books on calligraphy or hand writing exercises books, which the owners of the kindergartens bought for the children. For the measurement and evaluation, it was found that the administrators and teachers measured and evaluated the children by checking their work books and observing the children's attention. They measured and evaluated every teaching and learning activities in every time that they were held. For the problems that the administrators and teachers found important were children's problem (the children were not ready to learn); the teachers' problem (the teachers had less experience in arranging the teaching and learning activities for the children); the management problems (the administrators considered that there was the lack of coordination with the parents, while the teachers considered that there was the lack of coordination between the administrators and the teachers); materials problems (the administrators considered that the teachers didn't like to use the teaching and learning materials, while the teachers considered that the amount of materials were not enough and they could not make the materials by themselves); and other problems (the administrators and teachers considered that parents were lack of knowledge to promote their children learning development.)

For the comparison on children development norms between using DSI and Denver development screening test (DDST) assessment forms in receptive language skills, it was found that there were statistic significant different in 75 and 90 of percentile rank. It might be because of the problems of education management on language

in Thailand. Sirimas Gaewjareanwong (1998) studied the conditions and problems of activities that promoted language skills in the private nurseries in the northern part of Thailand. The result of this study showed that the environment management and the activities that promoted children's language development were in moderate level. For the activities to promote language development in children age 2-3 year, it was found that the care takers in the private nurseries provided many activities to promote listening skill in children age 2 -3 years at high level, while the activities to promote speaking, reading and writing skills were at moderate level. The problems found in this study was that the children's care takers had less knowledge and understanding on providing activities that promoted children's language development. Another problem was the different languages used between children and the care takers at the nurseries. The children used local Thai language in their community, while the care takers in the nurseries used standard central Thai language. Thus, there were language problem between the children who didn't understand standard central Thai language and the care takers. The nurseries also had insufficient budget to arrange the appropriate environment and provided teaching and learning materials to promote children's development. It was found that special education or special curriculums were important for promoting children's development as the study of Prapa Wicheansing (1991) on the effect of language development stimulation compared between the children group who got stimulation (the first group) and who didn't get stimulation (the second group). The result showed that the first group had statistic significantly different in quality and quantity of language development compared to the second group. Sompong Srinuan (2003) studied the assessment of kindergarten children's development in the learning reformed schools in order to improve the students' quality. This study focused in the area of planning, implementation, the application of the assessment results, and the problems being found. The sample groups were 318 teachers from 142 learning reformed schools. It was found that the teachers were well-planned; they collected data by various methods and tools, and assessed the children's development in every area. The problems were the teachers had too much workload, however, from interviewing with the teachers, observing their teaching and learning activities, and paper reviewed; the researcher could not find any plan, note taking, conclusion, and data interpretation. For the use of assessment results found, it was found that the teacher reported the result to the parents and the administrators. It was also found that the teacher had incorrect understanding on child development assessment, for examples, they were lack of knowledge and understanding on child development, they didn't understand the test on child development, and the used of child's portfolio.

Conclusion

From the 654 items of Child development assessment form for children age from birth to 5 years developed by the Department of Mental Health, Ministry of Public Health, Thailand, it was found that 651 of 654 items (99.54%) were able to identify developmental norms of Thai children. The items that were unable to identify developmental norms of Thai children were 1) Physical reaction of a child when hearing sound, 2) The child stop crying when being held by his/her parent, and 3) The child can look at other face for 1 - 2 seconds. It was found that all Thai children who were assessed by this tool could pass these 3 items.

For the comparison between the development norms by using Child development assessment tool for children age from birth to 5 years developed by the Department of Mental

Health, Ministry of Public Health, Thailand, and Denver development screening test (DDST) assessment form, it was found that there was no statistical significant different in all percentile of gross motor skills and expressive skills, in 75 percentile rank in fine motor skills, in 25 and 50 percentile rank in receptive language skills, and in 90 percentile in personal and social care skills.

Recommendation

Recommendation for using this research results:

1. Child development assessment should be done in every month of the child's age by parents or care takers in order to compare with the development norms of Thai children.

2. Child development assessment should be done by using the assessment tools for children age from birth to 5 years developed by the Department of Mental Health, Ministry of Public Health, Thailand, in every time the child comes for service at the child development center by the health personnel such as medical practitioners, nurses, etc., in order to compare the child's results from the assessment with developmental norms of Thai children.

Recommendation for further research

1. There should be a research study to develop the effective assessment tools to measure and assess child development in monthly period and can be used in all parts of Thailand.

2. There should be a research study to develop a specific curriculum that can help promote all area of child development.

3. There should be a research study on other variables that related to Thai children development such as genders, child rearing styles, environment, etc. and develop the development norms with more details than this research study.

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Thai Language

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