ปัจจัยที่มีผลต่อภาวะเตี้ยในเด็กก่อนวัยเรียนชาวเขาในประเทศไทย

ดารารัตน์ สร้อยวงค์ จักรกฤษณ์ วังราษฎร์ อักษรา ทองประชุม
คณะสาธารณสุขศาสตร์ มหาวิทยาลัยเชียงใหม่

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บทคัดย่อ

เด็กก่อนวัยเรียน (0 - 5 ปี) มีการเปลี่ยนแปลงอย่างรวดเร็วในด้านอายุ ร่างกาย จิตใจ สังคม อารมณ์ และสติปัญญา การเปลี่ยนแปลงดังกล่าวเป็นผลมาจากปัจจัยทางพันธุกรรมและสิ่งแวดล้อมในช่วงตั้งครรภ์และหลังคลอด หากเกิดภาวะเตี้ยในเด็กก่อนวัยเรียน อาจส่งผลเสียต่อสุขภาพทั้งระยะสั้นและระยะยาว การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อภาวะเตี้ยในเด็กก่อนวัยเรียนที่เป็นลูกชาวเขาในอำเภอแม่แจ่ม จังหวัดเชียงใหม่ เป็นการศึกษาเชิงวิเคราะห์แบบภาคตัดขวางระหว่างเดือนกรกฎาคม - ตุลาคม 2563 กลุ่มตัวอย่างคือเด็กก่อนวัยเรียนชาวเขาอายุ 3 - 5 ปี จำนวน 170 คน เป็นเพศชายจำนวน 35 คนและเพศหญิงจำนวน 135 คน โดยใช้ข้อมูลตั้งต้นจากข้อมูลทุติยภูมิของเด็กอายุ 3 - 5 ปี ที่ได้รับการวัดส่วนสูงและบันทึกผลจากสถานบริการสาธารณสุขจำนวน 7 ตำบลในเดือนตุลาคม - ธันวาคม 2562 เครื่องมือที่ใช้ในการวิจัยคือ แบบสัมภาษณ์มีโครงสร้างคำถามปลายปิด ใช้สัมภาษณ์ในผู้ปกครองของเด็ก ตรวจคุณภาพของเครื่องมือพบ ค่าดัชนีความตรงของเนื้อหาทั้งฉบับ (content validity index) เท่ากับ 1 และค่าสัมประสิทธิ์อัลฟาของครอนบัค 0.85 วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนาและวิเคราะห์หาความสัมพันธ์โดยสถิติถดถอยโลจิสติกส์ ผลการศึกษาพบว่า ปัจจัยด้านมารดา ได้แก่ ส่วนสูงของมารดา ชาติพันธุ์ การได้รับบุหรี่มือสองจากบุคคลในครอบครัวขณะตั้งครรภ์ และการได้รับบุหรี่มือสองจากบุคคลในครอบครัวช่วงหลังคลอดและให้นมเด็ก ปัจจัยด้านเด็ก ได้แก่ เพศ พฤติกรรมการบริโภคของเด็ก หลังจากอายุ 6 เดือน จนถึงอายุ 2 ปี ดื่มนมวัว ผลการศึกษาสามารถใช้ข้อมูลเพื่อวางแผนการแก้ไขปัญหาเด็กเตี้ย การจัดกิจกรรมส่งเสริมสุขภาพหรือการวางนโยบายในการขับเคลื่อนการดำเนินงานร่วมกันของหน่วยงานสาธารณสุข องค์การปกครองส่วนท้องถิ่น สถานศึกษา ภาคประชาชนในด้านการส่งเสริมสุขภาพด้านการเจริญเติบโตในเด็กก่อนวัยเรียนที่เหมาะสม

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ผู้นิพนธ์ประสานงาน:
จักรกฤษณ์ วังราษฎร์
คณะสาธารณสุขศาสตร์ มหาวิทยาลัยเชียงใหม่
239 ตำบลสุเทพ อำเภอเมืองเชียงใหม่ จังหวัดเชียงใหม่ 50200
อีเมล: jukkrit.w@cmu.ac.th

Factors associated with stunting among hilltribe pre-school children in Thailand

Dararat Sroywong, Jukkrit Wungrath, Aksara Thongprachum
Faculty of Public Health, Chiang Mai University

Abstract

Pre-school children (0-5 years) are undergoing rapid changes in physical, mental, social, emotional, and intellectual age. Such changes are the result of hereditary and environmental factors during the period of pregnancy and post-birth. If stunting occurs in pre-school children, it can have negative influences on both short-and-long-term health. The research objective was to study factors associated with stunting among hilltribe pre-school children in Mae Chaem District in the Chiang Mai Province. The study was a cross-sectional analytical study conducted between July to October 2020. The sample consisted of 170 hilltribe children aged between 3-5 conducted from July to October 2020, using primary data from the secondary data on children aged 3-5, who were measured in terms of height and recorded from seven healthcare facilities from October to December 2019. The research tool were structured interviews with closed-ended questions, which was used to interview the parents of these children and to test the quality of the tool. The content validity index (CVI) was 1, and the Cronbach's alpha coefficient was 0.85. The statistical tools for analysis included descriptive statistics and logistic regression analysis. The results of the research were as follows: the maternal factors consisted of height, ethnicity, and exposure to secondhand smoke from family members while pregnant and exposure to secondhand smoke from family members after childbirth and during breastfeeding. The factors related to the children consisted of the consumption behavior of children from six months to two years and drinking cow's milk. The results of the study can be applied to plan solutions of stunting issues in children by organizing health promotion activities or formulating policies to drive the cooperation of public health agencies, provincial administrative organizations, educational institutes, and the public sector for an appropriate implementation of the health enhancement among pre-school children.

Keywords: hilltribe, pre-school children, stunting, consumption behavior, maternal factor

Corresponding Author:
Jukkrit Wungrath
Faculty of Public Health, Chiang Mai University
239 Sutep Sub-district, Muang District, Chiang Mai 50200, Thailand.
E-mail: jukkrit.w@cmu.ac.th

Introduction

Pre-school children, aged 0-5 years, are undergoing rapid changes in physical, mental, social, emotional and intellectual age. Such changes are the result of hereditary and environmental factors during the period of pregnancy and post birth.[1] The United Nations (UN) has established Sustainable Development Goals (SDGs), the goals evolved from the Millennium Development Goals (MDGs) to address global population problems and improve the basic quality of life of the population by considering various dimensions of the issue. It is the Sustainable Development Goals (SDGs) source comprising 17 main goals and 169 goals, which are set to achieve by 2030.[2] By 2025, the international agreement must be reached on stunting and wasting in children below 5 years old.[3]

The Ministry of Public Health has therefore constructed an operational framework that is aligned with the SDGs and has set Objective and Key Results (OKRs) by specifying pre-school children to have less than 10% of the stunting state. In addition to meet international standards, Thailand has adopted the 2006 World Health Organization Growth Criteria for newborn children until 5 years in the male-female growth curve.[4,5] Likewise, the growth assessments were performed every 3 months, thus Thai children had desirable characteristics of being healthy children and complete growth according to the 3 standard criteria: weight-for-age, height-for-age, and weight-for-height.[1]

According to the Thai Health survey, it was found from physical examination in the years 1995, 2001, 2008-2009 and 2014 that stunting of children was at 9.7%, 6.3%, 5.3% and 5.7%, respectively[6]. The 4th Thai Health Survey[7] (2008-2009) reported that children aged 1-5 years had a lower prevalence than the criteria by 6.3%; likewise with the 5th report on 2014, they had a shorter prevalence than the criteria by 5.7%.[8] According to the situation of children and women in Thailand 2005-2009, 2012, 2015-2016, the prevalence of nutritional status was found in below 5-year-old stunting children of 11.9%, 16.3% and 10.5%, respectively.[9]

When analyzing pre-school children's stunting data in the province for the past 5 years from 2015-2019, it was found that Chiang Mai Province had 16.7% of children aged 0-5 years with stunting at 16.7%, 16.0%, 14.8%, 15.9%, and 21.1%, respectively.[10] Mae Chaem District is mostly forest and mountainous area located in a valley away from prosperity, 120 kilometers away from Chiang Mai downtown. With 20% hillside flat area, it is hard to travel and with only 10% of flat area by having 7 sub-districts and 104 villages. The population includes both local and ethnic people: Karen, Hmong, and Lua. The main occupation is agriculture. For the past 5 years from 2015-2019, it was found that there were children aged 0-5 years with stunting at 17.4%, 16.6%, 13.0%, 22.2% and 30.6%, respectively, which was higher than the average of Chiang Mai Province and tended to be higher in the future.[10] Moreover, the situation of school children (aged 6-14 years) was found stunting at 9.2%, 12.0%, 14.4%, 10.8% and 11.9%

respectively, which they ultimately become small and short adults. Various factors contribute to pre-school children's stunting; moreover, in Mae Chaem District, there was no official report on pre-school stunting children issue.[10] Causes and factors were not particularly studied in the area. Therefore, the researchers were interested in studying the factors associated with the stunting of the hilltribe pre-school children in Mae Chaem district to understand the context of the area and recognize the causes of children stunting. The data obtained were used to analyze the growth situation of pre-school children to plan solutions in short-term problems and formulate policies to drive cooperation of public health agencies, provincial administrative organization, educational institute, and public sector for an appropriate implementation of the health enhancement in hilltribe pre-school children.

Materials and Methods

The study was a cross-sectional analytical study conducted from July to October 2020. The sample consisted of 170 children aged 3-5 years had their height measured and recorded at health care facilities in 7 districts from October-December 2019.

Population and Sample

The population of the study included 1,502 hilltribe children aged 3-5 years.

The sample size was obtained by calculating the Wayne formula[11] and preventing the loss of the sample. It was calculated an additional 10% for 170 people.

$$n = \frac{N(Z_{\alpha/2})^2 P(1-P)}{(N-1)d^2+(Z_{\alpha/2})^2 P(1-P)}$$

by n = Sample size

N = Population size

p = The proportion value of stunting children from 482 children aged 3-5 years (p=0.32)

d = The approximation accuracy is 0.07.

$Z_{\alpha/2}$ = The standard value under the normal curve is 1.96.

Purposive selection was applied within subdistricts from children aged 3-5 years old, there were 3 places in high prevalence: 71.3% in Pang Hin Fon subdistrict, 36.7% in Mae Nachon subdistrict, and 30.5% in Ban Thap subdistrict. To perform simple random sampling, compute the sample percent of each district that all sample units have the same probability as shown in Table 1.

Table 1 Population and sample

Subdistrict	Population (person)	Sample (person)
Pang Hin Fon	268	52
Mae Nachon	384	74
Ban Thap	226	44
Total	878	170

Inclusion criteria

1. Children aged 3-5 years old who have parents that can provide detailed information about the child.

2. Children and their parents who have stayed in Mae Chaem more than or equivalent to 1 year.

3. Children who do not have genetic stunting, including Terner syndrome and Skeletal dysplasia.

4. The parents of the child who are sound-minded, able to communicate and understand Thai language, agree and voluntarily participate in research project.

Exclusion criteria

Children with chronic malnutrition, bone diseases, pituitary gland disease such as pituitary tumors.

Ethical considerations

This study was approved by the Ethics Committee of Faculty of Public Health, Chiang Mai University (ET018/2563). The informed consent was obtained from patients or a person legally responsible for each patient.

Research instrument

A structured interviewing form with a close-ended question, which the researcher created and developed by literature review. Calculated Content Validity Index was 1.00. The reliability was tested with the Cronbach's coefficient and delivered total reliability of 0.85.

Statistical analysis

The personal data analysis was descriptive statistics, frequency, percentage, mean, and standard deviation. Logistic Regression Analysis was analyzed to test the factors associated with stunting among hilltribe pre-school children.

Results

General information of parents sample

Most of the samples were female 79.4. Having maternal relation with the child was 79.4%. Having a marriage status was 91.8%. Family income < 5,000 baht per month was 71.2%. Mostly were Karen ethnic group as 72.4%. Mother is 97.6% greater than or equal to 145 centimeters. They had a lower secondary education level of 32.9% and most worked in agriculture filed was 79.4.

Table 2 General information (n = 170)

General information	Amount (person)	Percentage
Sample's gender		
Male	35	20.6
Female	135	79.4
Relationship with children		
Father	35	20.6
Mother	135	79.4
Status		
Single (married without registration)	13	7.6
Married	156	91.8
Separated	1	0.6
Monthly family income		
Below 5,000 baht	121	71.2
5,001 - 10,000 baht	34	20.0
10,001 - 15,000 baht	6	3.5
15,001 - 20,000 baht	5	2.9
20,001 - 25,000 baht	3	1.8
25,000 baht above	1	0.6
Mother's height (centimeters)		
< 145 centimeters	4	2.4
≥ 145 centimeters	166	97.6
Mean of height = 154.38 centimeters, S.D. = 6.013		
Mother's ethnic		
Karen	123	72.4
Hmong	36	21.2
Lua	6	3.5
Others, such as locals	5	2.9
Mother's education level		
Uneducated	14	8.2
Primary education	44	25.9
Lower secondary education	56	32.9
High school / Vocational	41	24.1
Diploma	4	2.4
Bachelor's Degree	10	5.9
Postgraduates and above	1	0.6

Table 2 (con.)

General information	Amount (person)	Percentage
Mother's primary occupation		
Unemployed	9	5.3
Agriculture	135	79.4
Government service / State enterprise	4	2.4
Freelance	17	10.0
Merchant	5	2.9
Being exposed to secondhand smokers from a family member while pregnant		
Yes	36	21.2
No	134	78.8
Being exposed to secondhand smokers from family members during the postpartum period and breastfeeding		
Yes	37	21.8
No	133	78.2

General information of the children sample

The sample was male and female in similar proportions was 50.6% and 49.4%, respectively. Mostly were 4-year-old age at 46.5%. The average child's weight and height was 95.90 centimeters and 13.88 kilograms, respectively. Most of the birth's weight of the child was ≥ 2,500 grams was 88.8%. 95.9% of them had no congenital diseases. The sample who received only breast milk for minimum 6 months was 78.2%. As consumption behavior after 6 months to 2 years, the breast milk, food by age, and formula were given as well as other meals, and 84.1% had less than or equal to 11 hours of sleep per night.

Table 3 Children's general information (n = 170)

General information	Amount (person)	Percentage
Gender		
Female	84	49.4
Male	86	50.6
Age (year)		
3	73	42.9
4	79	46.5
5	18	10.6

Table 3 (con.)

General information	Amount (person)	Percentage
Weight's mean = 13.88 kilograms, S.D. = 1.885		
Height's mean = 95.90 centimeters, S.D. = 5.641		
Weight at birth		
< 2,500 grams	19	11.2
≥ 2,500 grams	151	88.8
Congenital diseases		
Yes	7	4.1
No	163	95.9
Duration of breast milk consumption		
Less than 6 months	23	13.5
6 months	14	8.2
More than 6 months	133	78.2
Consumption behavior after 6 months to 2 years		
Breast milk + food by age + formula	74	43.5
Others	96	56.5
Hours of sleep per night		
> 11 hours	27	15.9
≤ 11 hours	143	84.1

Factors associated with stunting in hilltribe pre-school children

From the relationship analysis by logistic regression statistics, as shown in Table 4, it was found that maternal and children factors associated with stunting in hilltribe pre-school children as follows;

1. Children with a maternal height of fewer than 145 centimeters had a ratio of 10.83 times that of children without stunting (OR = 10.83, 95%CI = 1.09-107.31), indicating that mothers with a height of fewer than 145 centimeters were related with a risk factor for their children's stunting.

2. Stunting children had a ratio of ethnic Hmong to non-Hmong mothers at 10.08 times that of non-Hmong children (OR = 10.08, 95%CI = 4.29-23.70), which Hmong ethnicity was associated with a risk factor for children's stunting.

3. Stunting children whose mother had no exposure to secondhand smokers from family members during pregnancy had a ratio to mothers who had an exposure secondhand smokers from family's individuals during pregnancy was 0.24 times that of children without stunting (OR = 0.25, 95%CI = 0.071-0.86), which mothers who were not exposed

to secondhand smokers from family members during pregnancy were associated with preventive factors against children's stunting.

4. Stunting children whose mothers were not exposed to secondhand cigarette from family members after postpartum and breastfeeding had a ratio of 0.15 times that of mothers who had an exposure to secondhand cigarette from their families after postpartum and breastfeeding of children without stunting (OR = 0.15, 95%CI = 0.15-0.65), which mothers who were not exposed to secondhand cigarette from family members during postpartum and breastfeeding were associated as a preventive factor against children's stunting.

5. Stunting children had a male to female gender ratio of 2.37 times of children without stunting (OR = 2.37, 95%CI = 1.12-5.01), which male sex was a risk factor for stunting in children.

6. Stunting children had the consumption ratio behavior after 6 months to 2 years of other food intakes to breast milk + formula + food by age were 2.36 times that of children without stunting (OR = 2.36, 95%CI = 1.08-5.13), which the consumption behavior of children after 6 months to 2 years of receiving other food was associated with a risk factor for children's stunting.

7. Stunting children had a ratio of no cow's milk intake to those who had cow's milk intake at 2.98 times of those without stunting (OR = 2.98, 95%CI = 1.27-6.97), which no cow's milk intake was associated with a risk factor for children's stunting.

Table 4 Factors associated with stunting in hilltribe pre-school children (n = 170)

Variables	Children Amount (percentage)		Odds ratio	95%CI	*p*-value
	Without-stunting (n = 131)	Stunting (n = 39)			
1. Maternal factor					
1.1 Mother's height					
≥ 145 centimeters	130 (78.3)	36 (21.7)	1.00		
< 145 centimeters	1 (25.0)	3 (75.0)	10.83	1.09-107.31	0.042
1.2 Maternal ethnic's factor					
Karen	108 (87.8)	15 (12.2)	1.00		
Hmong	15 (41.7)	21 (58.3)	10.08	4.29-23.70	<0.001
Other	8 (72.7)	3 (27.3)	2.70	0.64-11.31	0.174
1.3 Exposed to secondhand smokers from a family member while pregnant					
Yes	33 (91.7)	3 (8.3)	1.00		
No	98 (73.1)	36 (26.9)	0.25	0.07-0.86	0.028

Table 4 (con.)

Variables	Children Amount (percentage)		Odds ratio	95%CI	*p*-value
	Without-stunting (n = 131)	Stunting (n = 39)			
1.4 Exposed to secondhand smokers from family members during the postpartum period and breastfeeding					
Yes	35 (94.6)	2 (5.4)	1.00		
No	96 (72.2)	37 (27.8)	0.15	0.15-0.65	0.011
2. Children factor					
2.1 Gender					
Female	71 (54.2)	13 (33.3)	1.00		
Male	60 (45.8)	26 (66.7)	2.37	1.12-5.01	0.024
2.2 Consumption behavior after 6 months to 2 years					
Breast milk + formula + food by age	63 (85.1)	11 (4.9)	1.00		
Others	68 (70.8)	28 (29.2)	2.36	1.08-5.13	0.030
2.3 Cow's milk intake					
Yes	114 (80.9)	27 (19.1)	1.00		
No	17 (58.6)	12 (41.4)	2.98	1.27-6.97	0.012

Discussions

Pre-school children are undergoing rapid changes in physical, mental, social, emotional and intellectual age. Therefore, the nutritional condition becomes an important part of childhood. If a pre-school child has a stunting issue, short-term and long-term health effects could occur, as well as social and economic issues, which the studied results can be discussed as follows.

1. Maternal factors: According to the study results, children who had maternal height below 145 centimeters with stunting had a ratio to the maternal height above 145 centimeters as 10.83 times of children without stunting (OR = 10.83, 95% CI = 1.09-107.31), which mothers whose height was less than 145 centimeters were associated with a risk factor for stunting in for children's stunting. According to Suthatworawut et al.[12], the mother's height below 145 centimeters had a narrow pelvis, causing limited fetal growth. Likewise, Nshimyiryo et al.[13] found that pre-school children whose maternal height was below 145 centimeters were 3.27 times more likely to develop stunting than those whose maternal height was above 145 centimeters. (OR = 3.27, 95% CI = 1.89-5.64). It correlated with the study of El Kishawi et al.[14] that pre-school children born from mothers with shortness who were 155-160 centimeters height (p=0.008) or less than 155 centimeters (p=0.008) were more likely to develop stunting than those who were born from mothers who

were more than 160 centimeters height. Sugiyanto et al.[15] also claimed accordingly that mothers whose height was greater than or equal to 150 centimeters (p=0.01) reduce the incidence of stunting in pre-school children. The height of the mother was a genetic condition that can be delivered to the child and determined the height of the future child.[16]

The Hmong ethnicity was associated with a risk factor for children's stunting. In addition, Thai Youth Encyclopedia[17] defined ethnically as having the same culture, traditions and spoken language, and it is believed to be descended from the same ancestors such as Thai, Burma, Karen, China, Lao, etc. It is characterized by being a people group who is inherited from the same ancestry with the same biological and ethnic characteristics, including cultural ancestors. Mae Chaem district is forest and mountainous areas with a diverse population, found 80% of the ethnic groups of the area, thus influencing the environment, food, beliefs, and different cultures and traditions. Referred to Pattarakaeha,[18] Hmong people eat 3 meals daily. Rice is the main dish, preferably salt seasoning. The main ingredient in vegetables is lettuce, and herbs for cooking. Srisawat[19]said that the Hmong believed that eating the offal of any animal is prohibited because it brings harm and will lead to a family dispute. Children are not allowed to eat chicken innards and paws due to unwise effect. Chicken stomachs and gut will wrap their brains into unconscious thinking, making them interfere with others' business, and eventually fail. Similar to Saeyang[20] that the Hmong tribes' children are prohibited from eating animal offal. Due to sickness, they were allowed to eat the salt and repetitive food. Thus, children were at risk of deficiency such as protein, iron and iodine, causing underweight and frequent illness. These factors thus also reflected hereditary growth expressed through genes, which also determined the growth rate.

Mothers who were not exposed to secondhand smokers from family members during pregnancy were associated with a protective factor against stunting in hilltribe pre-school children. Thai Health Promotion Foundation[21] mentioned that the effects of secondhand smokers on pregnant women and babies were likely to develop complications during pregnancy, as well as childbirth may experience preeclampsia, miscarriages, and increased ejaculation in children. In addition, Cigarettes may affect newborns by reduced body weight and length, as well as neurological abnormalities and a faulty memory system.

Secondhand smoke came from two sources: the smoke from the smoker emanated and floated from the cigarette's tip. Ignition from cigarettes produced chemicals, which were dangerous toxins in both inhaled and airborne fumes. Pourmasumi et al.[22] found that the mean length of infants in the secondhand smokers group was 48.69 ± 1.88 centimeters, and those who were not was 49.42 ± 2.13 centimeters, which was significantly different (p<0.001). Chelchowska et al.[23] studied hepcidin and iron metabolism in

pregnancy: the relationship between smoking and birth weight and length in Poland reported that the pregnant women who smoked had a lower birth weight and shorter body length than non-smokers, which was statistically significant (p<0.001). Also, Thongmuangtunyatep et al.[24] found that mothers who were exposed to cigarette smoke while pregnant were at a higher risk of giving birth to babies that were less weight than gestational age (OR = 2.10, 95% CI = 1.27-3.48), and the shorter length of infants. Exposure to cigarette smoke while pregnant alone resulted in premature birth. Mothers who were exposed to cigarette smoke while pregnant had higher levels of Xenobiotic Genes, Collagen Genes, Coagulation Genes, and Thrombosis Related Genes than mothers who did not smoke or expose to smoke, which these were substances that can affect the development of the fetus, abnormal metabolism, and less iron transport to the baby. Therefore, it caused premature birth, light weight, and shorter length of the body.

2. Children factors: According to the study results, Male sex were associated with a risk factor for stunting in children. Related to the study of Mzumara et al.[25] that 40% of children under five in Zambia were stunting, and 42.5% were commonly in males, compared to 37.6% of females. Ramil et al.[26] found that children aged 0-59 months had a stunting issue at 38.4% and severe stunting at 18.4%. Male was associated factor. Nshimyiryo et al.[13] similarly stated children under 5-year-old age had a 38.0% stunting prevalence. Male's associated stunting factors were 1.51 times more likely to be shorter than females. Aryastami et al.[27] mentioned that male children aged 12-23 months were 1.27 times more likely to be shorter than females. It could be that boys' childhood illness was higher than girls, and were more likely to be more inclined to move around and use excessive energy, which contributed to the increased growth. Girls were vice versa[28]. The previous study of Suwanwaha et al.[29] regarding factors associated with the nutritional condition of pre-school children: a systematic review of the literature found that girls were more nutritious than boys because girls probably had better dietary habits. According to the health condition survey 2008-2009 in children aged 2-5 years, it was found that girls consumed more healthy fruits and vegetables than boys, and boys were found to be active while eating, which can affect their nutritional condition.

The consumption behavior of children after 6 months to 2 years of receiving other food was associated with a risk factor for children's stunting. Appropriate Nutrition was essential to develop children growth, intelligence, and healthiness unless insufficient 5 groups food intake could disrupt their growth. As Yamborisut et al.[30] said that for infants and young children reaching their full potential and healthiness, it required continuous caring from parents and caregivers. Diet was one of the factors that promoted weight and height growth and provided various nutrients that supported immunity and cognitive development. Other appropriate

foods for infants aged above 6-month-old would help them also as babies grow older by the increase of various nutrients. Therefore, infants should be fed complementary foods according to their age along with breastfeeding until 1.5-2-year age. Children aged 3-5 years had an increased need for energy and nutrients, especially protein, calcium, vitamin A, iron and iodine. Children should have 3 main meals and 2 snacks daily. Katekowit[31] claimed that the consumption behavior of children was a growth potential determinant. Nutrient was also a growth factor of pre-school children. Referred to Watson et al. as cited in Krueawisen[32] found that 50% of pre-school children in Dankali were at a higher risk of developing malnutrition and 7% had low standard of stunting with a height with slow cognitive learning process due to improper dietary habits. Phiouxay and Pilavong[33] similarly found the factors associated with nutritional conditions of children aged 2-5 years of Srisattanak City, Vientiane, Lao People's Democratic Republic that breastfeeding was less than 3 months 19.6% and the first intake of food supplement at the 4-to-5-month age of 29.4% resulted in the child receiving appropriate nutrients, which stunting was caused by malnourishment. The research also found that drinking milk correlated with the height of the child. Wungrath[34] stated that milk provided protein and calcium, helped to build and strengthen bone, affects the height's growth, and helps to develop the overall body. Drinking milk should vary by age. Thai Health Promotion Foundation[35] recommended that drinking 400 milliliters of milk a day with an appropriate diet, which significantly increased their height by at least 0.4 centimeters annually.

Conclusion

From this study, it was found that maternal factors were height, ethnicity, secondhand smoke exposure from family members during pregnancy and the postpartum period, and children's factors were gender, consumption behavior of children after 6 months to 2 years and drinking cow's milk. Both factors were associated with stunting in hilltribe pre-school children. The results of the study can be appalled to plan solutions of stunting issues in children by organizing health promotion activities or formulating policies to drive cooperation of public health agencies, provincial administrative organizations, educational institutes, and the public sector for an appropriate implementation of the health enhancement in pre-school children.

Recommendation

There should be a case-control study to identify the sample differences with different demographic characteristics with the in-depth interview to find out true factors due to the diversity of population, traditions, culture, and beliefs. Furthermore, the study area should be expanded to cover other areas where other ethnic groups reside to obtain clearer information.

Limitations

1. In this research, most of the samples were hilltribe such as Karen, Hmong, Lua, thus it could not be compared with other contexts.

2. This research study was a cross-sectional analytic study that was a periodic study. The results of the primary and the dependent variable were measured at the same time. It had a limitation that made the reasoning of the factors that may not be clear.

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