Factors Related to Hemoglobin Levels among Infants Aged 6-12 Months after the COVID-19 Outbreak

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Abstracts: When a baby is 6-12 months years old, hemoglobin is a key predictor of Anemia. This Cross-sectional Analytic Study aimed to study factors related to Anemia in 96 infants 6-12 months and 96 caregivers during October 2022-March 2023. Data were collected by data copy form, and questionnaires. Data were analyzed by descriptive statistic, and Chi-squared Test. The findings revealed that the majority of caregivers are female 89.6%, the mean age was 36.33 years (SD.=13.47), experience in raising infants was 76.0 %, and caregivers were parents of infants 77.1%. According to the findings, the most infants aged 6-12 months were males 62.5 % average age 9.24 months (SD: 2.161), average gestational age of mothers 38.04 weeks (SD: 1.075), birth weight ≥ 2500 grams of 88.5% (Mean: 2,952.88, SD: 425.716), normal labour 82.2 %, and hemoglobin <11 g/dl of 27.1% (Mean: 11.436; SD: 0.9961). In addition, factor related to Anemia with statistically significant at .01 level were caregiver relevance, Health Belief patterns, Perceived Susceptibility, Perceived Severity, and Cues to Action. Factors related to Anemia with statistically significant at .05 level were caregiver age, parental status, and birth weight of infant. These factors can be used to improve maternal and child health work for benefit later.

Keywords: Anemia, Hemoglobin, Infant 6-12 months, COVID-19 Outbreak

1. INTRODUCTION

Anemia is a condition which the amount of erythrocytes or hemoglobin in the blood is less than normal.(1) The slightest abnormality in hemoglobin levels in the blood can cause abnormal symptoms, fatigue and fatigue. The age ranges at risk of Anemia include: 6-24 month old infants and babies, school-aged children and pregnant women.(2,3) However, anemic infants and preschoolers are considered no less important than other ages, since chronic Anemia in children of this age affects development. Level of intelligence and ability to learn,(4,5) where the causes of Anemia can occur for a variety of reasons. It has been found that the most common cause of anemic infants is the lack of certain nutrients such as iron. Foliate and vitamin B12 was mainly caused by iron deficiency.(6) If untreated, it has many more detrimental effects on the development of baby. The baby might be slower brain functioning, loss of appetite, low eating, malnutrition, and health outcomes, resulting in unhealthy health, easy illness, slow growth, bones not strong, easily brittle, and shorter than children of the same age.(7,8,9,10,11)

The anemic infant is a global public health problem. According to previous studies, the prevalence of Anemia in children varies from age to age and area of study. A 2012 World Health Organization reported that 53.8% of Southeast 6-59 month-old Asian children had Anemia. (12,13,14) The studies of 6 Southeast Asian countries revealed that the 6-12 month-old infants had Anemia 48.9 %.(15) The infants with average age of 5.2 months had Anemia 47.40-54.00 %.(14) It was found that this condition is classified as a serious public health problem (less than 5.00 % pale is considered not a public health problem, 5.00-19.90 % pale is a minor public health problem, 20.00-39.90 % pale is a moderate public health problem, and pale 40.00 % or more is considered a serious public health problem). (16) Thailand aims to develop people in all dimensions and at all ages to be good, talented and quality people. Achieving the development goals of people in all dimensions and at all ages must begin to develop from early childhood or the first 8 years old.(17) According to the 5th Thailand Food and Nutrition Survey 2003, the Department of Health's Division of Nutrition found that the prevalence of Anemia of 6 month - 5 year old children was 25.9 %. (18) The prevalence of Anemia was high in rural areas, 41.7 % in urban areas, and 26.0 % in urban areas, and overall Anemia situation in Thai children is not likely to decline.(19)

The report of Bueng Kan Province in 2020-2023, the 6-12 month-old infants had been screened Anemia from Complete blood count (CBC) which checked hemoglobin(Hb) level for Anemia using Hb < 11 g/dL.(20) The screening results showed that the 6-12 month-old infants had Anemia 37.9 %, 33.4 %, 35.60 % and 40.8 %, respectively, as shown in Figure 1.(21,22) Sophisai Hospital is a community hospital in Bueng Kan Province where

had screening results. It showed that the 6-12 month-old infants had Anemia 45.8 %, 29.7 %, 31.8 % and 30.3 %, respectively in the year 2020-2023.(23,24) It was likely to increase after the COVID-19 outbreak. The causes of Anemia among infants were iron deficiency from perinatal hemorrhage, preterm birth, twin blood transfusions or bleeding of the baby and mother. The risk factors of iron deficiency Anemia were low gestational age, very low birth weight infants, and infants of diabetic mothers.(22,23,24) In addition, during COVID-19 pandemic, it had affected the livelihood of women while pregnant. Restrictions on health care activities and daily activities, including restrictions on attending a doctor for a pregnancy check-up, are due to legal measures promulgated to control the spread of emerging communicable diseases in both the public sector and government services.(25,26,27,28)

In addition, when the infants are 6 months old, they will be fed milk and other food.This led to a study on the factor related to Anemia among 6-12 months infants after the COVID-19 pandemic.

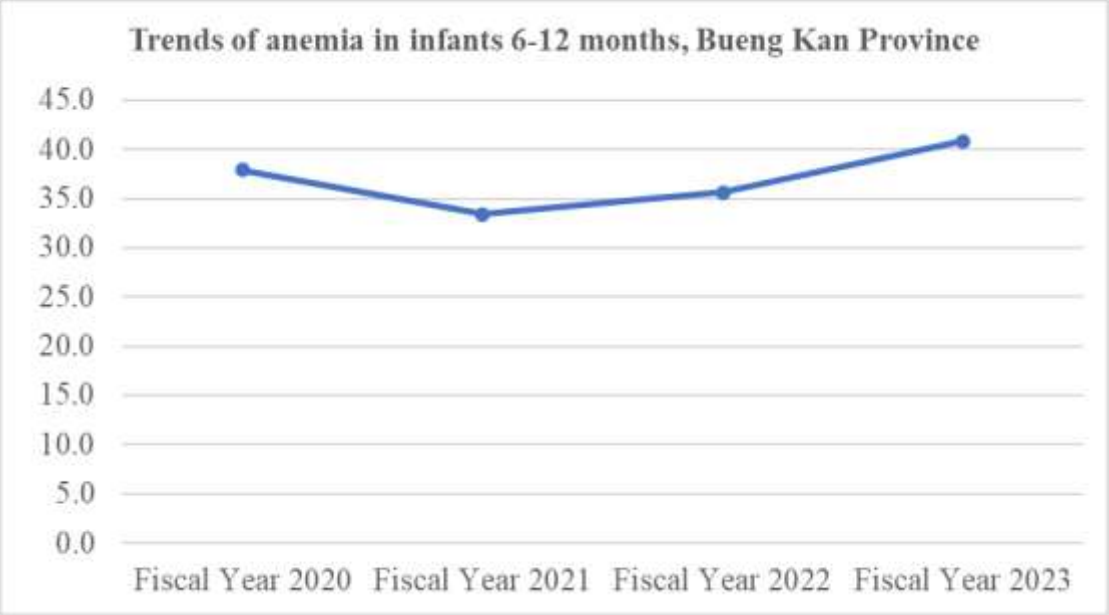

Figure 1. Trends in Anemia among infants 6-12 months in Bueng Kan Province.

2. METHODOLOGY

This research design was Cross-sectional Analytic Study during October 2022 - March 2023. The samples were 192 persons which were 96 infants 6-12 months and 96 caregivers. They were screened for Anemia at a Well Child Clinic, Sophisai Hospital, Bueng Kan Province. The sampling was as shown in Figure 2.

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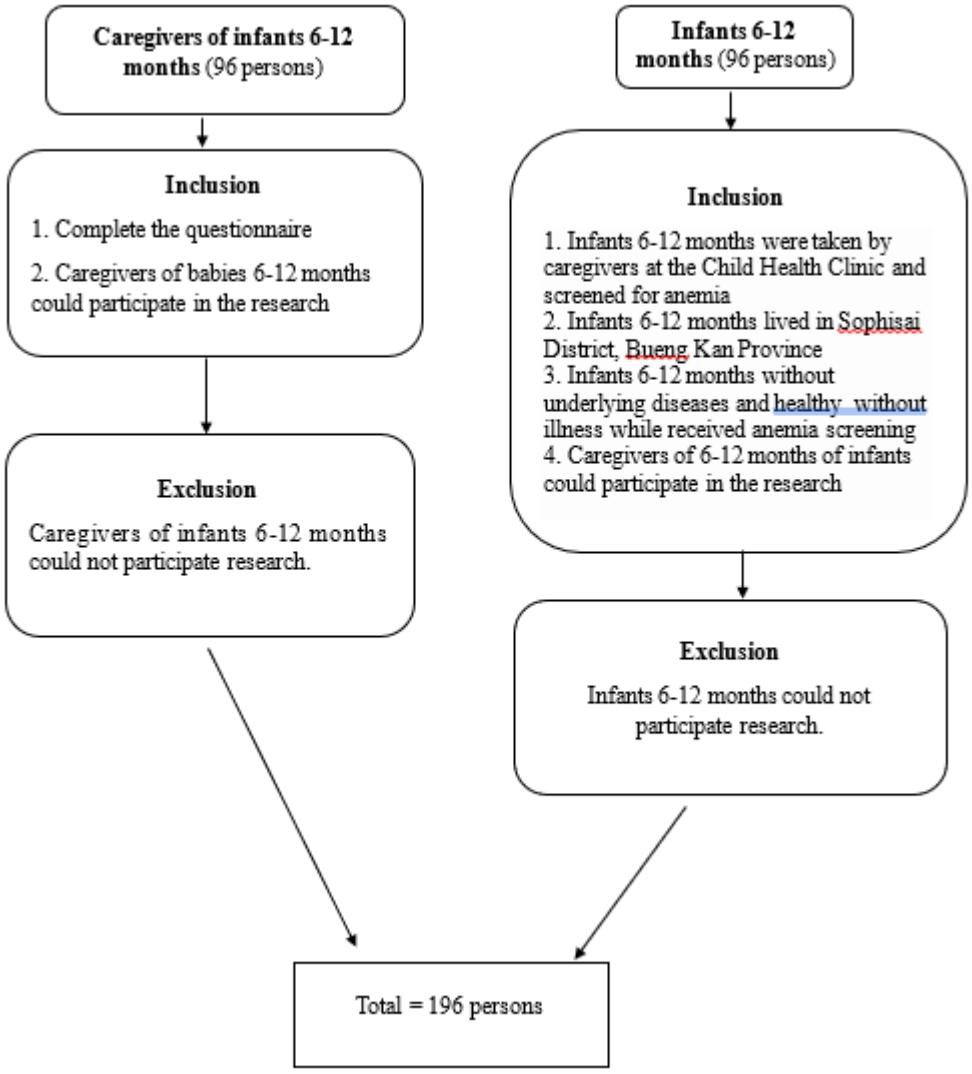

Figure 2. flowchart of the sampling process

2.1. Research Tools

1) data copy form from medical records which reported Complete Blood Counts (CBC) and hemoglobin [hemoglobin levels < 11 g/dl indicating Anemia, hemoglobin levels >11 g/dl indicating no Anemia]

2) questionnaires

The researchers created questionnaire based on Health Belief Model Theory[29] It was three parts of both closed-ended and open-ended questions.

Part 1 general data for infants 6-12 months and caregivers

Part 2 the Health Belief pattern questionnaire for caregivers

Part 3 Implementing recommendations for improving mother and child health (open-ended questions)

2.2. Data Collection

Data were collected from 96 infants 6-12 months and 96 caregivers during October 2022 - March 2023 by 1) data copy form, and 2) questionnaires.

2.3. Statistics

All data were analyzed by descriptive statistics: percentage, means ± standard deviations (SD). Inferential statistic: Chi-Square test for analyzing variable relations.

2.4. Ethical Approval

This study was conducted by the Declaration of Helsinki. All the participants provided informed consent before participating in the study. In addition, this study was the Human Research Ethics Committee of Bueng Kan Provincial Public Health Office, certificate No. BKPH 2023-001.

3. RESULT

3.1. Personal data for infant caregivers

The majority of caregivers were female of 89.6%, age 15-40 years old of 63.5% (Mean=36.33, SD.=13.47), farmer of 43.8 %, primary education of 40.6 %, income/month 57.4-602.9 USD. of 96.9 %, experienced infants care of 76.0 %. Parents were infants care of 64.6 %, and parents together of 77.1%, as shown in Figure 3.

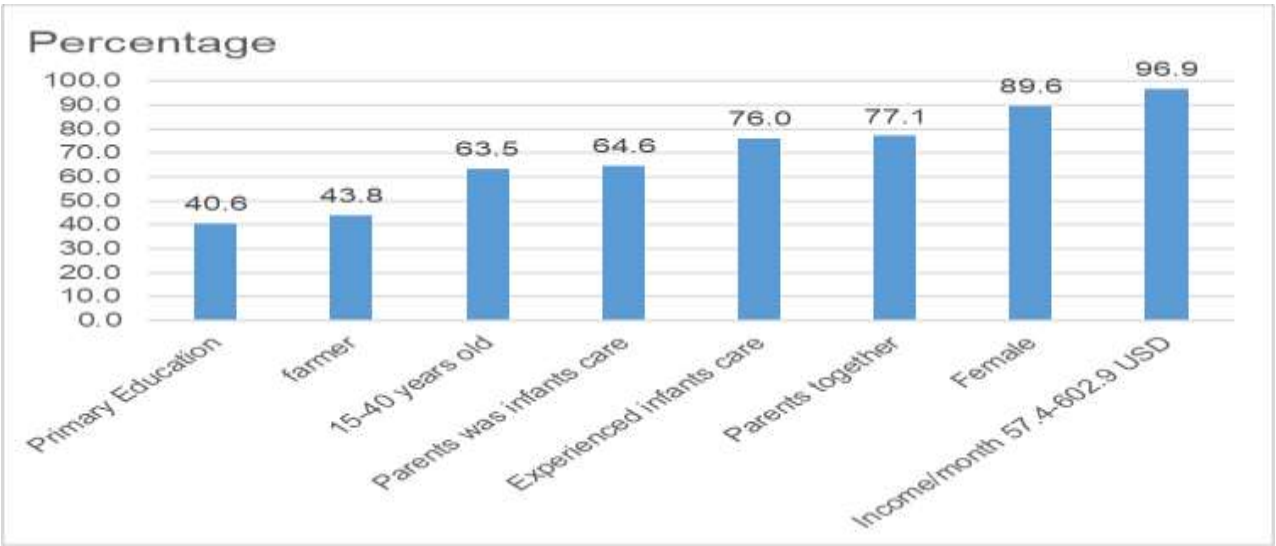

Figure 3. Personal data for infant Caregivers (n=96)

3.2. General information for infants 6-12 months

The majority of infants 6-12 months were male of 62.5%, 12 months old of 22.9% (Mean=9.24, SD.=2.161), gestational age of 38 weeks 40.6% (Mean=38.04, SD.=1.075), birth weight ≥ 2500 grams of 88.5%, normal labour 82.2%, Hb<11 g/dl 27.1% (Mean=11.436± SD.=0.9961), as shown in Figure 4.

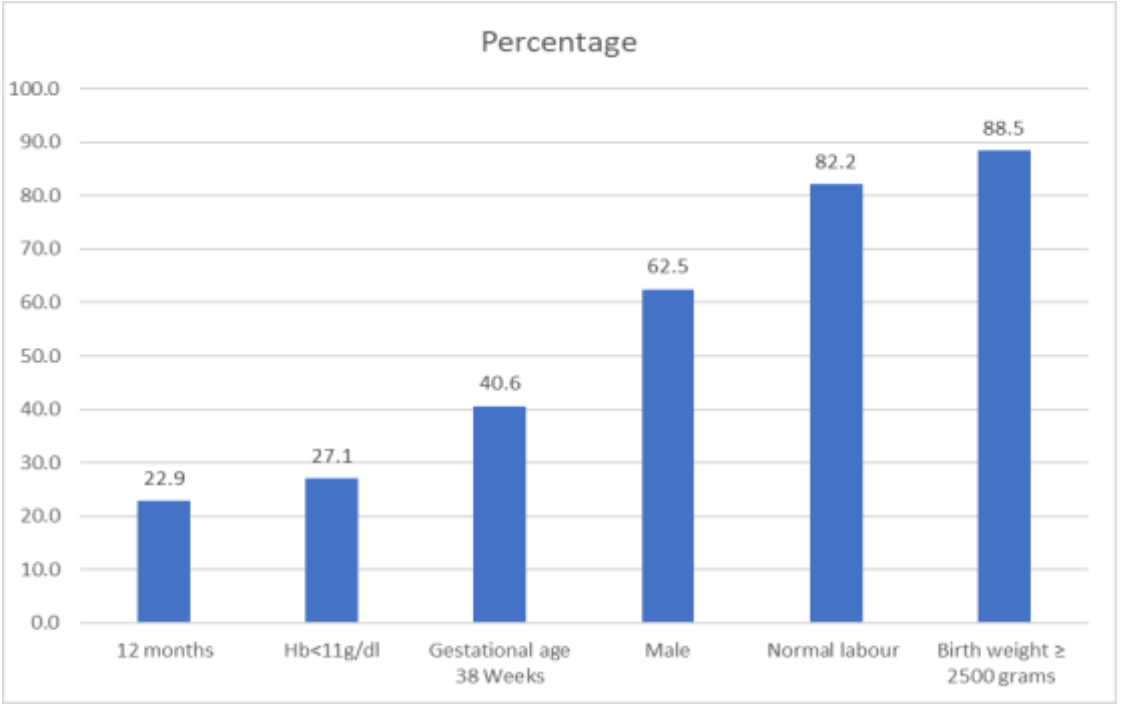

Figure 4. Personal data for infant 6-12 months (n=96)

The caregivers of infants 6-12 months had Health Belief patterns, Perceived Susceptibility, Perceived Severity of Anemia, Perceived Barriers, and Cues to Action were moderate level, and Perceived Benefits was high level, as shown in Table 1.

Table 1 The average of health belief patterns of caregivers (n = 96)

The health belief patterns	Mean ± S.D.	level
- Perceived Susceptibility	10.4792±2.30779	moderate
- Perceived Severity	10.8125±2.26326	moderate
- Perceived Benefits	12.4583±2.08714	high
- Perceived Barriers	11.5313±2.38395	moderate
- Cues to Action	7.9688±1.75591	moderate
- Health Belief patterns	53.2500±7.07999	moderate
Mean ± SD. = 53.2500 ± 7.07999, Min = 40, Max = 72		

The factors associated with Anemia (Hb<11 g/dl) of infants 6-12 months were caregiver age, parental status, birth weight of infant (p<0.05). Furthermore, caregiver relevance, health belief patterns, Perceived Susceptibility, Perceived Severity, and Cues to Action were associated with Anemia (Hb<11 g/dl) of infants 6-12 months (p<0.001), as shown in Table 2.

Table 2 The Factors associated with hemoglobin level of infants 6-12 months (n=96)

factors	Hb<11 g/dl	Hb ≥11 g/dl	x^2	p-value
	N (%)	N (%)		
Caregiver Age				
15 Years – 40 Years	22(22.90)	39(40.60)	6.836	0.009*
41 Years – 66 Years	4(4.20)	31(32.30)		
Total	26(27.10)	70(72.90)		
Caregiver Relevance				
Parents	24(25.00)	38(39.60)	11.982	<0.001**
No Parents	2(2.10)	32(33.30)		
Total	26(27.10)	70(72.90)		
Parental Status				
Stay together	24(25.00)	50(52.10)	4.679	0.031*
Divorce	2(2.10)	20(20.80)		
Total	26(27.10)	70(72.90)		
Birth weight of infants				
< 2,500 g.	7(7.30)	4(4.20)	8.405	0.004*
≥2,500 g.	19(19.80)	66(68.80)		
Total	26(27.10)	70(72.90)		
Perceived Susceptibility				
Low	24(25.00)	0(0.00)	86.344	<0.001**
Moderate	2(2.10)	41(42.70)		
High	0(0.00)	29(30.20)		
Total	26(27.10)	70(72.90)		
Perceived Severity				
Low	6(6.30)	1(1.00)	41.022	<0.001**
Moderate	20(20.80)	20(20.80)		
High	0(0.00)	49(51.00)		
Total	26(27.10)	70(72.90)		
Perceived Benefits				
Low	1(1.00)	1(1.00)	0.572	0.751
Moderate	14(14.60)	40(41.70)		
High	11(11.50)	29(30.20)		
Total	26(27.10)	70(72.90)		
Perceived Barriers				
Low	4(4.20)	10(10.40)	0.438	0.803
Moderate	17(17.70)	42(43.80)		
High	5(5.20)	18(18.80)		
Total	26(27.10)	70(72.90)		
Cues to Action				
Low	17(17.70)	0(0.00)	57.378	<0.001**
Moderate	9(9.40)	50(52.10)		
High	0(0.00)	20(20.80)		
Total	26(27.10)	70(72.90)		
Health belief patterns				
Low	26(27.10)	13(13.50)	52.114	<0.001**
Moderate	0(0.00)	57(59.40)		
High	0(0.00)	0(0.00)		
Total	26(27.10)	70(72.90)		
factors	**Hb<11 g/dl**	**Hb ≥11 g/dl**	x^2	**p-value**
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Note: * p <0.05.

** p <0.001.

4. DISCUSSION

One of the most important criteria in connection to hemoglobin readings in neonates 6 to 12 months of age is the absence of maternal and paternal genetic conditions. In addition, taking good care of the infant, understanding the significance of feeding babies well, etc. Therefore, during antenatal care, a body of knowledge about nutrition, basic hygiene, and the support of family and community should be created for women. These were the main things

that were learned from the study. Therefore, postpartum necessitates the participation care of all the body's health, necessitating the systemic application of nutrition.(30)

The research result revealed that the majority of caregivers were female of 89.6% age range 15 to 40 of 63.5 %. farmer of 43.8 %, primary education of 40.6 %, income/month 57.4-602.9 USD. of 96.9 %. The majority of infants 6-12 months were male of 62.5%, 12 months old of 22.9%. Because of this, parents might not be able to use their resources as effectively as they could to enhance their hemoglobin of infants. Which it was related to experienced infants care of caregivers.(31)

According to the findings of this study, The majority of infants 6-12 months were male of 62.5%, 12 months old of 22.9%, gestational age of 38 weeks 40.6%, birth weight ≥ 2500 grams of 88.5%, normal labour 82.2%, Hb<11 g/dl 27.1%. As a result, the main objectives of pregnancy and infant health were guarantee that the mother nutrition very important. Then, a husband and wife need to make serious preparations before having children.(32)

The findings of a screening for Anemia in infants aged 6 to 12 months showed that their Hb values ranged less than 11 g/dl 27.1%. Therefore, government have to protect women and children on nutrition with high iron. In addition, it shall check Anemia on infants, and mothers. Because it is important for health of infants, and mothers include Intelligence Quotient (IQ) of children.(33)

The age of caregiver, parental status, and birth weight of infants were factors which related to Anemia among infants aged 6 to 12 months. The causes of this may be that the majority of parents are also working while caring for infants, which prevents them from giving the child their full attention. They have to prepare food and many things for infants by themself takes with more time, more care, more well-being and other elements. This is consistent with the findings, which examined the incidence of iron deficiency Anemia and risk factors in 6-month-old newborns at health promotion hospitals. According to studies, the mother's age is one of the factors that is most strongly linked to baby Anemia, family wealth, the mother's labour history, and lack of iron.(34)

The factors associated with Anemia (Hb<11 g/dl) of infants 6-12 months were caregiver age, parental status, birth weight of infant ($p<0.05$). Furthermore, caregiver relevance, health belief patterns, Perceived Susceptibility, Perceived Severity, and Cues to Action were associated with Anemia (Hb<11 g/dl) of infants 6-12 months ($p<0.001$). Therefore, These factors can be used to improve maternal and child health work for benefit later.(35) The results of the study inform the situation, including the Anemia of children. According to planning to prevent COVID-19 or new emerging diseases or disasters.(36) So, it is important to determine standard and measure of health service unit as well as organizations and community, which regard to health, well-being, and economic condition.(37,38)

5. CONCLUSION

The health of infants between the ages of 6 and 12 months might be influenced by the Caregivers' experiences, notably in the area of nutrition and Anemia. The appropriate nutritional advantages are affected by the assessment of the Anemia. In addition, caregiver age, parental status, caregiver relevance, birth weight of infant, and health belief patterns of caregiver related with hemoglobin levels. These elements can solve health problem, especially mother and child health.

6. ACKNOWLEDGEMENT

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