THE NUTRITIONAL STATUS OF *ORANG ASLI* CHILDREN AFTER PARTICIPATING IN THE COMMUNITY FEEDING PROGRAM (CFP) IN GUA MUSANG AND JELI, KELANTAN.

By

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LIST OF ABBREVIATIONS

AOR	Adjusted Odd Ratio
CFC	Community Feeding Centres
CFP	Community Feeding Program
FBP	Food Basket Program
JHEOA	Jabatan Hal Ehwal Orang Asli
GNR	Global Nutrition Report
MDG	Millennium Development Goal
MREC	Medical Research Ethics Committee
OA	Orang Asli
OR	Odds Ratio
RUTF	Ready to Use Therapeutic Food
SD	Standard Deviation
SDG	Sustainable Development Goal
SPSS	Statistical Package for Social Science
USM	Universiti Sains Malaysia
WHO	World Health Organization

LIST OF SYMBOLS

>	More than
<	Less than
=	Equal to
≥	More than and equal to
≤	Less than and equal to
A	Alpha
B	Beta
%	Percentage
Δ	Precision/ Delta

ABSTRAK

STATUS PEMAKANAN DALAM KALANGAN KANAK-KANAK *ORANG ASLI* SETELAH MENYERTAI PROGRAM SUAPAN KOMUNITI DI PUSAT SUAPAN GUA MUSANG DAN JELI, KELANTAN

Latar Belakang: Malpemakanan merupakan penyebab utama kematian kepada kanak-kanak di seluruh dunia. Malpemakanan memberikan impak yang serius dan berpanjangan terhadap ekonomi, sosial, dan kesihatan. Ia juga mempengaruhi pembesaran dan perkembangan kanak-kanak, dan menyumbang kepada penyakit kronik pada masa dewasa. Dalam mengatasi masalah malpemakanan, pelbagai program pemakanan telah dijalankan untuk menambahbaik status pemakanan kepada semua kanak-kanak di Malaysia. Perlaksanaan Program Suapan Komuniti secara khusus dijalankan terhadap kanak kanak komuniti *Orang Asli* berikutan dengan kadar malpemakanan yang semakin meningkat.

Objektif: Kajian ini bertujuan untuk menentukan kadar peratusan serta mengkaji faktor-faktor yang mempengaruhi keberjayaan terhadap status pemakanan dalam kalangan kanak-kanak *Orang Asli* yang menyertai program suapan komunti di Gua Musang dan Jeli, Kelantan.

Kaedah: Ini adalah kajian secara hirisan lintang data melibatkan seramai 175 orang peserta yang berumur di antara enam bulan sehingga enam tahun yang terlibat di dalam program suapan komuniti di Gua Musang dan Jeli, Kelantan. Data kesemua peserta daripada Buku Kanak-Kanak Kekurangan Zat Makanan (BKKKZM) telah direkod

menggunakan borang proforma. Program ini merupakan kombinasi tiga elemen intervensi iaitu pembekalan “Ready to Used Therapeutic Food (RUTF)”, suapan makanan, dan program pemerkasaan kesihatan komuniti.

Keputusan: Hasil kajian menunjukkan perubahan yang signifikan terhadap status pemakanan seperti tinggi, berat badan, kebantutan, dan kurang berat badan. Kadar peratusan keberjayaan status pemakanan adalah sebanyak 64.0 % terhadap masalah kurang berat badan dan 65.1% terhadap masalah kebantutan. Faktor-faktor yang mempengaruhi keberjayaan dalam peningkatan status pemakanan (kekurangan berat badan) adalah lokasi pusat suapan (AOR; 3.34, 95% CI:1.55, 7.18) dan peratusan kehadiran ke program tersebut (AOR; 1.058, 95% CI: 1.19, 6.74). Manakala, faktor-faktor yang mempengaruhi keberjayaan dalam peningkatan status pemakanan (kebantutan) adalah lokasi pusat suapan (AOR; 4.074, 95% CI:1.86, 8.90) dan taraf pendidikan bapa (AOR; 2.83, 95% CI: 1.03, 1.08).

Kesimpulan: Program suapan komuniti di Gua Musang dan Jeli menunjukkan keberkesanan dalam meningkatkan status pemakanan dalam kalangan kanak-kanak *Orang Asli*. Sehubungan itu, program ini seharusnya dikekalkan untuk meningkatkan peratusan keberjayaan status pemakanan terhadap program.

Kata Kunci: Malpemakanan, Program Suapan Komuniti, nutrisi intervensi, *Orang Asli*

ABSTRACT

THE NUTRITIONAL STATUS OF *ORANG ASLI* CHILDREN AFTER PARTICIPATING IN THE COMMUNITY FEEDING PROGRAM (CFP) IN GUA MUSANG AND JELI, KELANTAN.

Background: Malnutrition is one of the main causes of death and disease among children globally. The economic, social, and medical impacts of malnutrition are serious and long-lasting. It can affect the growth and development of children and had subsequently, chronic diseases in adults. To counteract malnutrition, nutrition programs have been put in place to improve the nutritional well-being of Malaysian children. The Community Feeding Program (CFP), focused specifically on the underprivileged community such as the *Orang Asli* due to the persistently high prevalence of malnutrition.

Objectives: This study aimed to investigate the proportion and factors associated with the successful outcome of the CFP among *Orang Asli* children in Gua Musang and Jeli, Kelantan.

Methodology: A cross-sectional study was conducted involving 175 recipients of *Orang A*sli children aged between six months to six years old who participated in the CFP in Gua Musang and Jeli, Kelantan. Data were collected from *Buku Kanak-Kanak Kekurangan Zat Makanan* (BKKKZM) using a proforma. This program involved a combination of three interventions; provision of Ready to Used Therapeutic Food (RUTF), Supplementary Feeding, and Community Health Empowerment Program.

Result: This study showed an improvement in the nutritional status indicators such as height, weight, height-for-age (stunting), and weight-for-age (underweight) after six months in the program. The proportion of successful outcome of nutritional status increased to 64.0% for underweight and 65.1% for stunting. Factors associated with the underweight successful outcome include location of feeding centres (AOR; 3.34, 95% CI:1.550, 7.180) and percentage of attendance (AOR; 1.058, 95% CI: 1.189, 6.738). While factors associated with the stunting successful outcome include location of feeding centres (AOR; 4.07, 95% CI:1.86, 8.90) and fathers education (AOR; 2.83, 95% CI: 1.03, 1.08).

Conclusion: The Community Feeding Program showed the improvement in the nutritional status of *Orang Asli* children, thus this program should be sustained to increase the success of the program.

Keyword: Malnutrition, Community Feeding Program, Nutritional Intervention, *Orang Asli*

CHAPTER 1

INTRODUCTION

1.1 Study background

1.1.1 Malnutrition in children

Malnutrition is a global major health problem that have affected children below five (World Health Organization, 2021). Malnutrition indicates three situations of nutritional status, which are undernutrition, micronutrient-related, and overnutrition. It is estimated that undernutrition is responsible for 45% of mortality among children under five (WHO, 2018). The facts stated in a recent report mentions that 149 million of the children were stunted, 49.5 million fell under the category of wasting, and 40.1 million were overweight (Global Nutrition Report, 2020). They were all children below the age of five years old (Csete and Nestle, 2015).

Child undernutrition is when the child lacks calories and insufficient food consumption to stay physically and mentally healthy. Undernutrition includes stunting, wasting, underweight, and micronutrient insufficiency (WHO, 2020). Wasting is an acute malnutrition state, defined as low weight-for-height characterized by a rapid decline of nutritional status over a short period and increased risk of death if left untreated (GNR, 2020). Stunting is defined as low height-for-age resulted from nutrient deficiency, which interferes with their ability to grow physically well according to their height scales and cognitive aspects. Stunting is known to affect approximately 21.9% or 149 million children globally. Three-quarters of these children live in Sub-Saharan and South Asia region. Global Nutrition Targets for 2025 highlights an important goal out of its six goals to reduce stunting cases and gradually

ending hunger and malnutrition among children (WHO, 2011). It is also a key indicator in the Sustainable Development Goal (SDG) of Zero Hunger (WHO, 2018). Meanwhile, underweight is defined as low weight-for-age, while micronutrient insufficiency is the inadequacy of micronutrients such as Vitamin A, iron, folate, zinc, and iodine. Subsequently, all these forms of undernutrition have a negative impact on child survivability, growth, and development (UNICEF and Children, 2015).

One important concept related to malnutrition is the first 1,000 days of life. The concept of the first 1,000 days is the period of a woman's early pregnancy until their children reach their second birthday. This is the time when their brain, body, and immune system grow and develop significantly. This is a critical period in which undernutrition could occur and is also a golden period of opportunity to prevent undernutrition and its consequences. Children are a vulnerable group because they depend entirely on others for their nutriment (Reinhardt and Fanzo, 2014a). Poor nutrition throughout the first 1,000 days of life can permanently harm a child's developing brain, affect their school performance and diminish their earning capacity in the future, which eventually contributes to poverty (Martorell, 2017).

Malnutrition can bring devastating consequences for children, and it has a negative impact on one's health, economic well-being, and educational achievement. The short-term consequences of malnutrition will increase the risk of mortality and morbidity. Globally, an estimated 50% of child mortality is linked to malnutrition (Baharudin *et al.*, 2019). In 2006, WHO re-evaluated the relationship between mortality risk and the weight-for-height status. The result showed that children with a weight-for-height below minus three standard deviation have a nine-time higher risk of death than children with normal nutrition status (WHO, 2018). Furthermore, chronic maternal malnutrition will increase poor pregnancy outcomes, early gestational age of

new-borns, higher maternal mortality, and inadequate weight gain throughout pregnancy. Infants with low birth weight have a higher risk of mortality in the first week of life and, in the long term more likely to suffer from cognitive impairment, development problems, and highly susceptible to disease (Vafa and Mahmoodianfard, 2016). Figure 1.1 below indicates the relationship between maternal and new-born outcomes from malnutrition; the vicious cycle will be repeated if no intervention was given. Malnutrition also impacts the economic sector and puts a burden on countries as their economic productivity and earnings are affected (WHO/UNICEF, 2009).

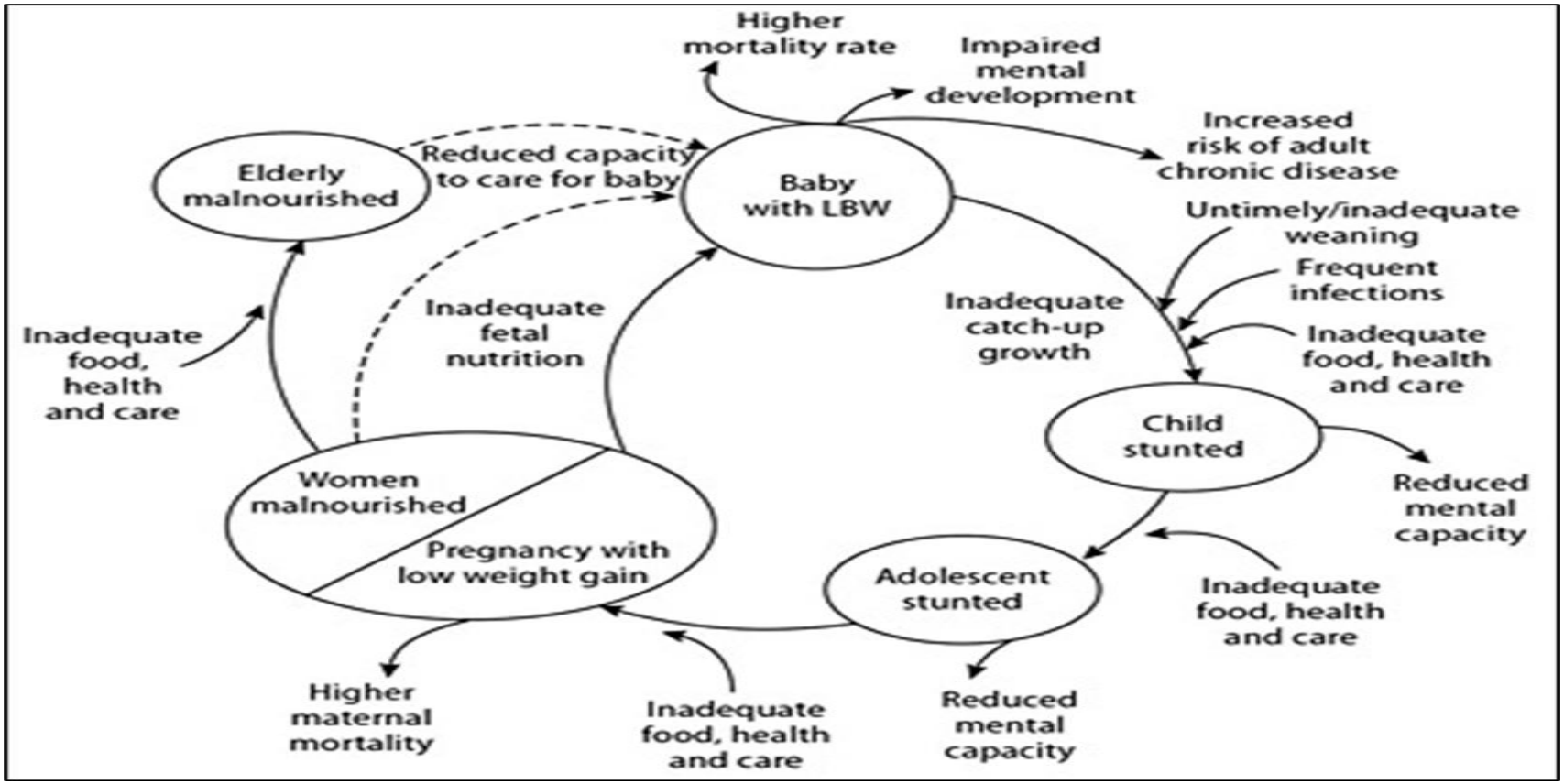

Figure 1.1: Relationship between maternal and newborn outcomes from malnutrition (WHO/UNICEF, 2009)

The UNICEF Nutrition Strategy developed a conceptual framework on the causes of malnutrition as shown in Figure 1.2. They are divided into three categories: direct (individual), underlying (household or family level), and basic (societal level). The three categories are interrelated. The household insecurity, poor feeding practices, an unhealthy environment, and insufficient health services have all been recognized as contributing factors for malnutrition. For example, the prevalence of malnutrition in Vietnam among mountainous and rural communities is much higher compared to other communities. Most households live below the poverty line, and low education contributes to food insecurity in households (Boulom *et al.*, 2020).

Parts of the SDG goals include ending all forms of malnutrition and zero hunger by 2030 to ensure that everyone, especially children, has enough and nutritious food throughout the year (UNDP, 2021). It entails encouraging sustainable agriculture, aiding small-scale farmers, and ensuring equal access to land, technology, and markets for all people. At least 12 of the 17 goals in SDG2 contain indicators that are connected to nutrition (WHO, 2018). To support the goals, stakeholders had been advocating and promoting wholesome diets with necessary nutrition intakes to pregnant mothers, infants, and young children by implementing effective nutrition intervention, healthy diets from sustainable and resilient food systems, and an intersectoral approach (UNICEF, 2019).

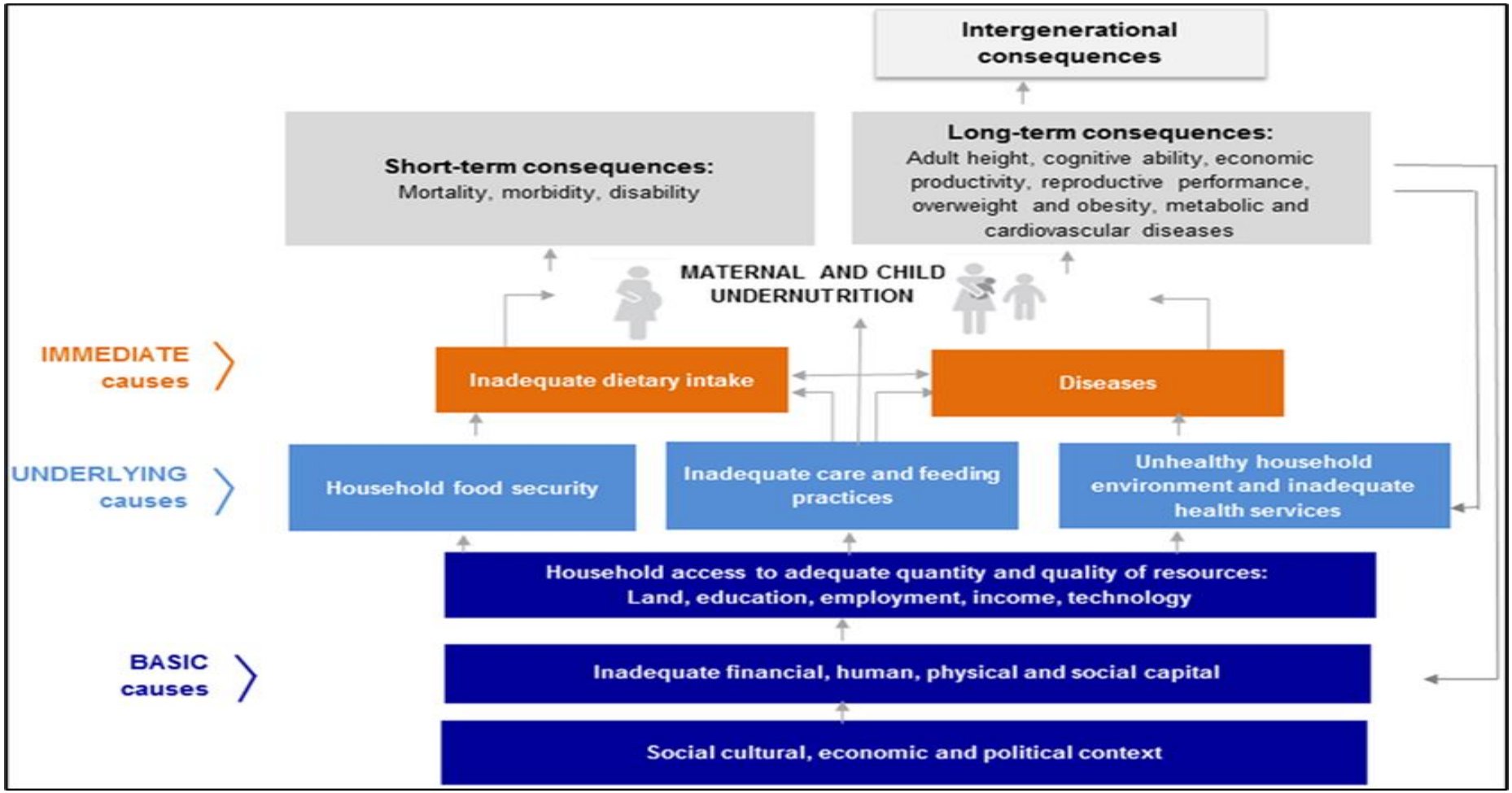

Figure 1.2: UNICEF conceptual framework on causes of malnutrition (Reinhardt and Fanzo, 2014b).

1.1.2 Global prevalence of malnutritiom

In 2017, 22.9% of cases of stunting, 7.7% wasting, and 6.0% overweight were reported by UNICEF. (2017). According to the report, the prevalence of undernutrition was reducing while the prevalence of overweight increasing in comparison with the year 2013. Although the majority of undernutrition is declining globally, it still remains as an issue in Africa and Asia region. In a report for the Asia region by the WHO. (2018), the prevalence of stunting and wasting affected 87 million and 36 million children respectively in 2017. Although the prevalence of undernutrition in low and middle-class economic background countries have declined, nutritional challenges still persist in a remote area as they are from low socioeconomic and minority groups with limited access to food and healthcare facilities, consequently leading to malnutrition (Boulom *et al.*, 2020).

According to the National Health Morbidity Survey (NHMS) 2019, 14.1% of children under five were underweight, 21.8 % stunted, and 9.4 % were wasting. The prevalence of stunting and wasting have increase from 17.7% to 21.8 %, and 8.1 % to 9.4 % respectively. In terms of geographical distribution, children in remote areas are believed to suffer more nutrient deficiency occurrences than those coming from urban areas (Khambalia *et al.*, 2012). As highlighted in NHMS findings in 2015, three states Kelantan, Pahang, and Terengganu, have a higher prevalence of stunting (IPH, 2015).

1.1.3 Nutrition intervention program

Undernutrition remains a significant problem for most low- and middle-income countries. As malnutrition are manifested in multiple ways, the pathway of prevention should focus at different levels; on maternal nutrition such as adequate nutrition before and post-pregnancy, optimal breastfeeding in the first two years of life, optimal child nutrition, and a healthy environment. These key ingredients can free children from any form of malnutrition (Black *et al.,* 2013; WHO 2018). Numerous nutrition interventions have been implemented, particularly in these countries, and various indicators are used to measure the impact (R. Rana *et al.*, 2020).

There have been many strategies employed by stakeholders to overcome children's nutrient deficiency; one effective approach was nutrient interventions (De Pee and Bloem, 2009). A study conducted by Rana *et al*. (2020) showed two interventions, which are complementary feeding and dietary supplementation, that have repeatedly reported a positive impact on reducing stunting. Also, Abate *et al*. (2020) had evaluated the effectiveness of outpatient therapeutic feeding in treating severe malnutrition for children aged below five years in Ethiopia. He found that the recovery rate was 65%. This demonstrates that the therapeutic feeding program effectively treats severe acute malnutrition even in poor environmental situations. Hence, boosting health institutions' capacity in addressing the problem of malnutrition can help improve the efficacy and impact of interventions (Liben *et al*., 2019).

1.1.4 Malnutrition among indigenous people worldwide

Globally, one of the most severe health problems that indigenous people face was health disparities caused by poor nutrition and food insecurity, with life expectancy lowered by up to 20 years (Browne *et al.*, 2020). This is due to multiple factors; extreme poverty, degradation, and pollution of their previously resided environments (Siwar, 2017). Poverty increases the risk of and consequences of malnutrition. People who are poor are more susceptible to various forms of malnutrition. Malnutrition also raises health-care expenses, lowers productivity, and hinders economic growth, thus perpetuating a cycle of poverty and illness (WHO, 2020). The consequence is a double burden malnutrition (DBM) because over 50% of indigenous adults manifesting malnutrition are also suffering with type 2 diabetes, and these numbers are predicted to rise. Diabetes has reached pandemic proportions in some indigenous communities, putting indigenous societies in jeopardy (Crowshoe *et al.*, 2018).

Morris *et al.* (2018) demonstrated that hospitalized indigenous participants were more prone to be malnourished compared to hospitalized non-indigenous participants. Participants with malnutrition were at higher risk of mortality and utilized more healthcare services, resulting in the need of increased dietitian resources and urgent community and hospital-based nutrition programs (Morris *et al.*, 2018). In addition, a study conducted among indigenous people in India found that the prevalence of severe wasting was the highest among children from low basic amenities in the household. However, improvements in water, sanitation, and hygiene (WASH) showed a sign of reduced stunting among children (K. D. Singh *et al.*, 2015). Moreover, Wise. (2013) suggested that targeted approaches and universal policy actions are practical for indigenous people to improve nutrition-related health outcomes.

1.1.5 Malnutrition among indigenous people in Malaysia

The indigenous people in Malaysia is estimated to be 13.8% of the country's total population in 2015 (IWGIA, 2020). They belong to several ethnolinguistic groups living in Peninsular Malaysia referred to as *Orang Asli*; in Sarawak, they were the Dayaks, and in Sabah, 39 ethnic groups were identified (Khor & Shariff, 2019). It is undeniable that the natives living in Sabah and Sarawak are in a better condition politically than the Peninsular *Orang Asli*. This statement is based on the source that stated the situation would probably because they are a part of the ruling government (Masron *et al.*, 2013). Living in a remote area makes *Orang Asli* prone to malnutrition. This is supported by a study done in 2012 by Khambalia *et al.* (2012) shown *Orang Asli* people in Malaysia were more likely to be underweight and less likely to be overweight than the general population. Data showed 69% stunting, 63.4 % underweight, followed by 40% wasting occurrences among children in remote areas compared to those living in the urban areas (Ab Manan *et al.*, 2015).

Continuity of the problem stated above, the Ministry of Health in Malaysia (MOH) has collaborated with other ministries to implement nutrition intervention in highlighting Malaysians nutritional conditions. One of the efforts by the implementation of the CFP. It was executed for the underprivileged *Orang Asli* community to enhance the nutritional status of children below six years old (MOH, 2016). Thus, the CFP attempts to complement existing programs by providing meals at feeding centres located in their settlement to improve food access and availability. Unfortunately, since the implementation of CFP, no further evaluation of the effectiveness of this program has been studied.

1.2 Problem statement

Globally, the prevalence of malnutrition has been shown to reduce (UNICEF, 2018). However, this has not occurred for vulnerable groups and minorities community such as *Orang Asli*. This may be due to their socioeconomic status. Children from low socioeconomic households are 2.5 times more vulnerable to malnutrition compared to children from medium or upper socioeconomic households (Ahmad *et al.*, 2020). In 1997, 80% of the *Orang Asli* community lived below the poverty line compared to the national poverty rate of 8.5%. This ratio was extremely high (Masron *et al.*, 2010). They are the most impoverished and most marginalized population among Malaysians, with over half of them classified as inferior and 33% of them living in extreme poverty compared to the national average of 0.7 % (Department of Statistics Malaysia, 2010). One of the consequences of poverty was malnutrition (Hartline Grafton and Dean, 2017).

In Malaysia, child undernutrition is documented as a persistent health problem among *Orang Asli* children compared to other rural or poor communities (Khambalia *et al.*, 2012; Wong *et al.*, 2015). Wong (2015) showed the prevalence of stunting, underweight, wasting, and thinness to be 64%, 49%, 14%, and 12%, respectively in *Orang Asli* children. In general, the *Orang Asli*, who are a minority and marginalized community of Peninsular Malaysia, are still poor. Being characterized as poor, their quality of life is far from that which is enjoyed by other Malaysian populations, even when compared to those living in mainstream rural villages. Their underdevelopment situations in health, education, livelihood, and well-being issues are threatened by poverty calamities (Hui, 2019). Although there have been many studies conducted among the low-income population in Malaysia on their health, access, and nutritional issues, few studies had neglected to report the health and nutrition issues of the

socioeconomically disadvantaged group of *Orang Asli* (Khor and Shariff, 2019; Shahar *et al.*, 2019).

Following the increase in the growth rate among *Orang Asli* population in Peninsular Malaysia, as stated in the study, there is a need for specific actions and improvements for this vulnerable group to avoid many problems that could arise in the future. Masron *et al.* (2013) described the state of Pahang recording the highest *Orang Asli* population followed by the state of Perak, Selangor and Kelantan. Based on the report by the Department of *Orang Asli* Affairs in 2006, the three states of Kelantan, Perak, and Pahang had the highest cases of malnourished children (Pah *et al.*, 2007). Due to the malnutrition problem, the National Plan of Action for Nutrition of Malaysia III, 2016-2025 (NPANM) and the National Coordinating Committee for Food and Nutrition (NCCFN) established various nutrition intervention programs in strengthening the efforts to reduce malnutrition among children. The nutrition programs and activities for children six years and below include Nutrition Surveillance, Rehabilitation Program for Malnourished Children, and Nutrition Activities at Childcare Centres (Ministry of Health, 2016).

Globally, many studies have shown that nutritional interventions had effectively reduced malnutrition problems among children (Warchivker and Hayter, 2001; De Pee and Bloem, 2009). For example, nutrition education intervention carried out by the Bangladesh Integrated Nutrition Project focusing on parents of children aged between six to nine months old had effectively prevented growth retardation and malnutrition among young children by 20 percent higher than before (Roy *et al.*, 2007; Manan *et al.*, 2019). Even though there is a lot of evidence of malnutrition in Malaysia and its associated factors among *Orang Asli* children, there is no evidence on the effectiveness of the feeding programs on the nutritional status of malnourished

children (Singh,2008). Therefore, this study is necessary to evaluate efficacy of the program, specifically in changing the statistics of malnutrition among the children of the *Orang Asli* community.

1.3 Rationale of study

In Malaysia, various programs have been implemented to combat malnutrition among children. Two studies on the prevalence of malnutrition among children in Gua Musang, Kelantan that were conducted at two different times between 1999 and 2017 showed the reducing trend of stunting from 40.4% to 32.5% since the implementation of nutritional intervention, namely the Food Basket Program in 2010 carried out by the Ministry of Health (Zulkifli *et al.*, 2000; Mas-Harithulfadhli-Agus *et al.*, 2018). This program aims to assist hardcore low-income families and improve their quality of life by providing basic food essentials (MOH, 2014).

However, a report by Mas-Harithulfadhli-Agus *et al.* (2018) for children from hardcore families showed that *Orang Asli* children were five times less likely to succeed in the FBP than other races. The finding from this study highlights that ethnicity contributes to malnutrition among children below five years of age, specifically in Gua Musang which is considered a remote area based on its rurality. Due to the findings, the CFP was specially designed for low-income households of *Orang Asli*, which started in 2012 to combat malnutrition. The selection of areas was based on the most cases of malnutrition among *Orang Asli* children. Until 2020, there were 41 Community Feeding Centres (CFC) in Malaysia which were located in Perak, Pahang, and Kelantan. However, there have been no further evaluation carried out to analyse the effectiveness of the CFP. Hence, this study will attempt to evaluate the outcome of CFP on the nutritional status among *Orang Asli* children after six months of enrolling in this program. This is in line with the objective of the program, which is

to rehabilitate more than 25% of malnourished children. In addition, by understanding the factors related to the outcome of nutritional status of *Orang Asli* children, improvement can be made to the program. Information on the trend of the growth status of indigenous children is useful for developing intervention strategies. However, the data on the effectiveness of nutrition education intervention combined with feeding trials are limited in Malaysia. According to Holley and Mason. (2019), the intervention implemented should be based on the grounded theory of change and considered a system-based approach to implementing and evaluating these nutrition interventions to promote effective intervention to facilitate the nutritional status of the *Orang Asli* children.

1.4 Research questions

1. Is there any improvement in *Orang Asli* children's nutritional status who received the CFP in Gua Musang and Jeli, Kelantan?
2. What is the proportion of successful nutritional status outcomes among *Orang Asli* children who participated in the CFP in Gua Musang and Jeli, Kelantan?
3. What factors are associated with the successful outcome of nutritional status among *Orang Asli* children who participated in the CFP in Gua Musang and Jeli, Kelantan?

1.5 Objectives

1.5.1 General objectives

To evaluate the effectiveness of the CFP on the nutritional status of *Orang Asli* children in Gua Musang and Jeli, Kelantan.

1.5.2 Specific objectives

1. To evaluate the change in nutritional status of *Orang Asli* children participating in the CFP in Gua Musang and Jeli, Kelantan.
2. To determine the proportion of successful outcomes on nutritional status among *Orang Asli* children who participated in the CFP in Gua Musang and Jeli, Kelantan.
3. To determine the factors associated with a successful outcome of nutritional status of *Orang Asli* children after participating in the CFP in Gua Musang and Jeli, Kelantan.

1.6 Research hypothesis

1.6.1 Null hypotheses

There is no significant difference of the nutritional status among *Orang Asli* children after six months of participation in the CFP in Gua Musang and Jeli, Kelantan.

1.6.2 Alternative hypotheses

1. The nutritional status of *Orang Asli* children improved after six months of participation in the CFP in Gua Musang and Jeli, Kelantan.

2. There is a significant association between sociodemographic characteristics, parental and child factors, and the successful outcome among *Orang Asli* children in CFP in Gua Musang and Jeli, Kelantan.

CHAPTER 2

LITERATURE REVIEW

2.1 Malnutrition

There is no universally agreed definition of the term "malnutrition." Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients, or impaired nutrient utilization comprising a few components. There are two components of being malnourished; undernutrition and overnutrition (Saunders and Smith, 2010). Undernutrition is divided into two: deficiency of macronutrient and micronutrient. It was manifested in four broad sub-forms; wasting, stunting, underweight, and deficiencies in minerals and vitamins (WHO/UNICEF, 2009). Furthermore, it is noticeable that children may experience multiple forms of malnutrition, to be specific. According to WHO, all forms of malnutrition imposed significant negative impacts on child survivability, growth, and development (WHO and UNICEF, 2015).

Globally, undernutrition is thought to be responsible for 45 percent of mortality among children under five (Rwanda, 2014). In 2017, the global prevalence of stunting, wasting, and overweight among children less than five years old was 21.9% (149 million), 7.3% (49 million), and 5.9% (40 million) respectively (UNICEF, 2018; WHO, 2018). Three-quarters of the affected child worldwide were from Sub-Saharan Africa and South Asia region with low- and middle-income countries the most affected (WHO, 2018). Data collected by WHO in 2019 shows a marked reduction of stunting prevalence between the years 1990 and 2019, where the prevalence had reduced from 39.3% to 21.3%. This prevalence translates from 253 million to 144 million in total

numbers. However, the prevalence of stunting and wasting are still significant problems in South Asia regions, which is 33.4% or nearly one out of three children are stunted, and 5.2% or more than half of all wasted children live in South Asia (WHO & UNICEF, 2015).

At the same time, rates of overweight and obesity cases among children in these particular countries are alarming. This phenomenon concerns two conditions of malnutrition known as double burden malnutrition (Akombi *et al.*, 2019). The double burdens of malnutrition consist of nutrient deficiency and excessive nutrient intakes in the same individual, community, population, nation, or region (Romieu *et al.*, 2017). The double burdens of malnutrition are very toilsome because it decreases the frequency of nutrient deficiency and obesity at the same time among ASEAN countries (Rachmi *et al.*, 2016). Studies reported by Wong *et al.* (2015) revealed about 26 % of overweight and obese adults are coexisting with high proportions of underweight (49 %) and stunted (64 %) children in *Orang Asli* villages. The presence of double burden malnutrition among the *Orang Asli* community warrants special attention. This is due to the long-term consequences of stunted growth in early life that increases the risk of overweight later in life, which contributes to a high risk of metabolic syndromes and non-communicable diseases, particularly hypertension and cardiovascular disease (UNICEF, 2012).

2.2 Malnutrition among Indigenous People

More than 370 million indigenous people were estimated to be spread across 70 countries worldwide, who still uphold their distinctive traditional practices and languages. These indigenous people have retained their social, cultural, economic, and political characteristics that differed from the domineering communities they lived in. (Chakrabarti, 2006). A study by Manjong *et al.* (2020) demonstrated the indigenous peoples share a wide range of interconnected maternal, child, socioeconomic, and environmental factors that lead to child malnutrition. Low maternal educational status, poverty, and insufficient water, sanitation, and poor hygiene practice are the most significant predictors. The basic necessities such as drinking water, bathroom facilities, shelter, and cooking fuel are among the household risk factors that affected child health, particularly malnutrition (Dinachandra Singh *et al.*, 2015).

In America, the indigenous peoples are frequently one of the most disadvantaged communities, with an estimated 22 million preschoolers and 9 million children under the age of five suffered chronic malnutrition. The severe nutritional status for these people mostly related to industrialization, where oil exploitation took place at their settlements (Anticona and San Sebastian, 2014). While in Ecuador, the study manifested the association between economic inequality with child malnutrition. Stunting has affected almost 26% of children under five, with the prevalence was higher in the rural Highlands and among indigenous peoples (Larrea and Kawachi, 2005).

In Malaysia, the majority of the *Orang Asli* community relies on the forests for growing crops, firewood gathering, and hunting. They are also accustomed to lead a fundamental and moderate living style. The government unit in charge of overseeing and managing the *Orang Asli* community affairs is The Department of *Orang Asli*

Development (JHEOA). According to JHEOA, 99% of *Orang Asli* living in Peninsular Malaysia fall below the government's classification of poor income, contributing to a high poverty rate (Masron *et al.*, 2010). The *Orang Asli* have lived in unfavourable environments with poor sanitation, extreme poverty, were not well informed of personal hygiene practice, and were significantly at risk of infectious diseases (Nisha and Davamani, 2020).

The prevalence of childhood undernutrition among the *Orang Asli* population has been reported to be higher compared to other poor communities in Malaysia. The high prevalence of undernutrition and preventable infectious diseases like measles and malaria among *Orang Asli* highlights the significant gaps in social and public health policies and programs for them (Khor and Shariff, 2019). Some significant studies and researches have shown prominent findings regarding the underweight and stunting *Orang Asli* children involving almost three-quarters of the population groups (Zalilah and Tham, 2002; Al-Mekhlafi *et al.*, 2005; Khor and Shariff, 2019).

The Department of *Orang Asli* (JHEOA) in 2006 also reported that three states in Malaysia, referring to Kelantan, Perak, and Pahang, that were identified to have the highest cases of nutrient deficiency among the children (MOH, 2013). The affected children were higher in hard-core low-income families. Malnourished *Orang Asli* children were also at a higher risk of dying before reaching five years of age (A. Singh, 2008). There were many factors associated with the high prevalence of malnutrition among *Orang Asli* children, as mentioned by the Department of *Orang Asli* Development (Masron *et al.*, 2010), and 80% of *Orang Asli* living in Peninsular Malaysia were classified as being below the level of poor income classification set by the government. This rate was extremely high compared to the national poverty rate of 8.5% at that time (Asri and Noor, 2012).

2.3 Causes of malnutrition

Poverty caused by multiple factors as mentioned in UNICEF's conceptual framework is related to basic, intermediate, and underlying causes (UNICEF, 2015). The underlying causes consisted of three components associated with household food insecurity, poor care and feeding practices, and an unsupported environment. Impairment in the availability and accessibility of food, instability of supply and access, and unhealthy food utilization have contributed to food insecurity (Napoli *et al.*, 2011). Parts of the SDG goals were to eliminate severe poverty faced by society by 2030. It is to enable all men and women, especially the underprivileged, to have the same human rights (UNDP, 2005).

Globally, over 820 million people in developing countries consumed fewer calories than their requirement, which contributed to malnutrition mainly in South Asia and Sub-Saharan Africa (Bain *et al.*, 2013). Calorie-deficiency is often correlated with micronutrient malnutrition. For example, insufficient Vitamin A has caused consequences for both women and children; 20 million pregnant women were at an increased risk of mortality and mother-to-child HIV transmissions, while increasing infections and causing blindness in children (Papathakis and Rollins, 2005).

Over several decades, food insecurity among *Orang Asli* households was still a significant problem attributed mainly to the *Orang Asli* people's poor quality of health and nutritional status, particularly for their women and children (Khor and Shariff, 2019). The *Orang Asli* in Peninsular Malaysia households were burdened with food insecurity resulting from the ineffectiveness of traditional food-seeking activities, the failures in agriculture due to threats from wild animals, and unexpected weather as Malaysia experiences two monsoon seasons (L. Law *et al.*, 2018). A study conducted

in Hulu Langat, Selangor showed 82% of the *Orang Asli* households there faced food insecurity (Zalilah and Tham, 2002).

2.4 Nutrition intervention program worldwide

It is known that undernutrition remains a significant problem for most low- and middle-income countries. Numerous nutrition interventions had been implemented, particularly in these countries and various indicators had been used to measure the impacts (M. M. Rana *et al.*, 2018). The nutrition intervention includes community feeding, educational nutrition intervention, food supplementation, and food assistance program. As multiple approaches were developed to tackle child malnutrition, many studies have illustrated that these interventions effectively reduced malnutrition problems among children (Heflin *et al.*, 2019).

In China, the implementation of two interventions concerning complementary feeding to children aged six months to two years old and dietary counselling to caretakers repeatedly reported positive impacts on reducing stunting and anaemia. This intervention was conducted in the poor and remote areas found significant improvement in the feeding practices (Wang *et al.*, 2017). Similar findings in Indonesia, the government food supplementation program in the form of a biscuit found higher weight gain in the children who participated in the program, thus improving the underweight and stunting status (Purwestri *et al.*, 2012).

In addition, the nutrition intervention program also conducted through the enhancement of community participation with collaboration between research institutions, community members, and local authorities. This program showed substantial improvement in the growth of children age below three and reduced the rate of hospitalization (Warchivker and Hayter, 2001). Similar nutrition intervention

in Vietnam; community-based infant and young child feeding (IYCF) support group program among ethnic minorities found a significant impact on the feeding knowledge thus, improved on nutrition practice (M. M. Rana *et al.*, 2018).

Other examples of nutrition intervention were the inpatient therapeutic feeding program (ITP) and the outpatient therapeutic feeding program (OTP) in developing countries such as the African region. A standard treatment protocol in OTP for managing uncomplicated severe acute malnutrition by providing Vitamin A, supplementation of antibiotic, and location of the OTP centre in the affected residence. Liben *et al*. (2019) showed a significant outcome that almost 80% of malnourished children who participated in OTP had recovered from severe acute malnutrition. Meanwhile, a finding by Tekeste *et al.* (2012) in Ethiopia showed the cure rate among children in the ITP was 95.3%, and the death rate was 0% in comparison with community feeding.

Moreover, a study by Wise. (2013) in Australia suggested that targeted approaches and universal policy action were effective for Indigenous People to improve nutrition-related health outcomes. Early Childhood Development (ECD) was one of the approaches that aimed to enhance human potentials and researches proved that investing in ECD developed human capital, stimulated economic growth and eliminated social inequity (Wise, 2013). While in India, the integrated childhood program is called Integrated Child Development Service (ICDS) implemented in 1975, focusing on children aged below six and expectant and nursing mothers (Sachdev and Dasgupta, 2001). Some elements in the program offer complementary nutrition, nutrition education, and supplementation of Vitamin A and multivitamins. The studies by Jain. (2012) shown the program has performed well by improving ICDS children's nutritional status and vaccination coverage better than non-ICDS children.

In addition, the Supplemental Nutrition Assistance Program (SNAP) is one of the largest nutrition interventions in the United States intended to give benefits to a low-income household (USDA, 2013). The element of SNAP includes providing electronic debit cards, which used to purchase groceries at authorized retailers, thus increase access to nutritious food. Items such as alcohol, tobacco, and household products are not allowed. Since the implementation of SNAP, almost 4.6 million Americans have stepped out of the poverty line.

Besides that, the intervention in reducing malnutrition also involves improvement in sanitation and hygiene promotion. In India, studies conducted among indigenous people showed children with a lack of basic facilities in their household were highly prone to severe wasting. However, improvements in water, sanitation, and hygiene (WASH) showed a positive outcome in decreasing stunting among children (K. D. Singh *et al.*, 2015). Another study also demonstrated that improvements in WASH could reduce stunting in children and have been found to boost children's height far more than other dietary treatments (Dinachandra Singh *et al.*, 2015).

However, in some countries, the nutritional intervention failed to achieve the program's objectives due to inadequate implementation despite good policies and program strategies (Bourne *et al.*, 2007). The nutrition intervention was found to have different effects on the nutritional status. There were few reasons for the different outcomes include differences in intervention’s strategy and intensity, the difference in age of the children at enrolment, and pre-existing children’s growth and nutritional status (Majamanda *et al.*, 2014).

2.5 Nutrition intervention program in Malaysia

Despite the endless efforts by the government to reach all walks of life in Malaysia, the minority groups of the *Orang Asli* community were bound to face challenges. It could be due to their cultural beliefs, geographic location, low level of education, fear, and poverty (Nisha and Davamani, 2020).

In Malaysia, the MOH has executed many interventions of the nutritional program to address child malnutrition issues. The school feeding program has shown improvement in the nutritional status, dietary intake, and school attendance rates (Kandiah and Siong, 1990). Other interventions include the hospital-based refeeding program successfully rehabilitate malnourished *Orang Asli* children. However, a relapse of malnutrition occurred after discharged from the hospital, and the contributing factor was food scarcity (Rasid *et al.*, 2019). The community feeding or nutrition supplemental program was one of the initiatives to improve nutritional status and directly improve food insecurity among *Orang Asli* children (Collins and Klerman, 2017).

Therefore, community-based nutrition programs have been the main focus since 1960. Programs include full cream milk powder distributions for children below seven, FBP for malnourished children from a low-income family, School Supplementary Feeding program for primary school student, and cooked meals for children in public preschools (MOH, 2011). The FBP was launched in 1989, which focused on malnourished children in Malaysia from hardcore low-income families targeting children aged between six months old to six years old. The program was incorporated into the current policy through the community's establishment as outlined in the latest guideline developed in 2014 (MOH, 2014). However, the reported prevalence of malnutrition among *Orang Asli* children remained high compared to the

general population despite the many implementations of the nutritional intervention. Later, the implementation of the CFP by the MOH began in 2013, focusing mainly on the *Orang Asli* population as the prevalence of underweight, stunting, and thinness among indigenous people was higher than the general population and supported food basket initiatives and avoided sharing of food baskets among family members (MOH, 2016).

2.6 Factors associated with the effectiveness of the nutrition intervention program

Many factors influence the effectiveness of a nutritional intervention, particularly sociodemographic characteristics, compliance factors, parental factors, and child factors. Immunization status was a factor recognized as being prominently related to the outcome in the treatment of malnutrition. Vaccinated children had seven times faster recovery chances than those unvaccinated. The most logical rationale for this would be that immunization can build a shield against any possibilities of diseases (Abate *et al.*, 2020). Another study also demonstrated that children who were given colostrum at birth and who were vaccinated against measles are also less likely to develop wasting than other children, and these differences are statistically significant (Dinachandra Singh *et al.*, 2015).

Ethnicity is also associated with the outcome in the treatment of a nutrition intervention. According to Mas-Harithulfadhli-Agus *et al.* (2018) *Orang Asli* children in Malaysia were five times less likely to succeed in the FBP compared to Malay children, with the prevalence rates of 34.2% underweight, 16.4% thinness, 32.5% stunting, and 3.0% overweight. Nomadic lifestyle in certain ethnic of *Orang Asli* also influenced the prevalence of recovery rate. The Bateq *Orang Asli* are indigenous people who reside in the jungles of Peninsular Malaysia. Because they are nomadic