



UNIVERSITI PUTRA MALAYSIA

***FACTORS ASSOCIATED WITH STUNTING AMONG URBAN POOR
CHILDREN AGED 2 TO 5 YEARS LIVING IN LOW COST-FLATS AT
KUALA LUMPUR***

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ABSTRACT

FACTORS ASSOCIATED WITH STUNTING AMONG URBAN POOR CHILDREN AGED 2 TO 5 YEARS OLD LIVING IN LOW COST-FLATS AT KUALA LUMPUR

Nur Aida Aryani bt Mohd Razi

Stunting remains a public health concern. There are increasing concerns that low-income families in urban are particularly vulnerable to stunting. However, there is limited study examining stunting issue among urban poor children under five in Malaysia. Most of the local studies on stunting focused on school-aged children and Orang Asli children. Moreover, the UNICEF report in 2018 on childhood stunting among urban poor children in low-cost flats did not identify the associated factors of stunting. Therefore, this cross-sectional study aimed to determine the factors associated with stunting among urban poor children aged 2 to 5 years old living in low-cost flats at Kuala Lumpur. A total of 52 children (48.1% males and 51.9% females) and their mothers participated in this study through convenience sampling. Information on sociodemographic characteristics, breastfeeding practice, food insecurity, second-hand smoke exposure and anthropometry data were completed by the mothers using an online questionnaire. Findings showed that the prevalence of stunting in children aged 2 to 5 years old in this study was 28.8%, whereas 21.2% of the mothers and 13.5% of the fathers had short stature. However, these results in this study have to be interpreted cautiously as self-reported height and weight of the respondents was used in this study due to the application of lockdown in the country to contain COVID-19 pandemic. This study further found that majority of the mothers practiced exclusive breastfeeding (79.0%) and the prevalence of early initiation of breastfeeding within one hour of birth was 82.7%. The mean duration of breastfeeding was about 30 months. Besides, majority of the households in this study had the problem of food insecurity (67.3%). All mothers in this study were not smoking. However, 36.5% of the fathers smoked. Moreover, this study found the mean $\pm$ SD of the number of cigarettes that fathers smoked was 8.21 ± 3.31 per day, in which more than half smoked more than 10 cigarettes per day (52.6%). About one third (32.7%) of the children were exposed to second-hand smoke. Female children ($p=0.020$), mothers with short stature ($p=0.023$), fathers who smoked ($p=0.025$) and children who exposed to second-hand smoke ($p<0.001$) showed higher risk of becoming stunted. However, there were no significant associations between ethnicity, parental marital status, parental education level, monthly household income, father's height, birth weight, breastfeeding duration and food security with child stunting ($p>0.05$). Immediate and appropriate interventions targeted at urban poor children are needed, particularly in addressing second-hand smoke exposure. Family member who smoke is encouraged to quit smoking to maintain a smoke-free home environment that is beneficial to the nutritional and health status of children.

ABSTRAK

FAKTOR-FAKTOR YANG MEMPENGARUHI TUMBESARAN TERBANTUT DALAM KALANGAN KANAK-KANAK MISKIN BANDAR BERUMUR 2-5 TAHUN YANG TINGGAL DI PERUMAHAN KOS RENDAH DI KUALA LUMPUR

Nur Aida Aryani bt Mohd Razi

Tumbesaran terbantut kekal menjadi kebimbangan dalam kesihatan awam. Kebimbangan yang semakin meningkat di mana keluarga berpendapatan rendah yang tinggal di bandar sangat terdedah dengan tumbesaran terbantut. Walaubagaimanapun, kajian yang mengkaji isu tentang tumbesaran terbantut dalam kalangan kanak-kanak miskin bandar bawah umur lima tahun di Malaysia adalah terhad. Kebanyakan kajian tempatan tertumpu kepada kanak-kanak sekolah dan kanak-kanak Orang Asli. Tambahan pula, laporan dari UNICEF pada tahun 2018 mengenai tumbesaran terbantut dalam kalangan kanak-kanak miskin bandar yang tinggal di flat kos rendah tidak mengenal pasti faktor yang berkaitan dengan tumbesaran terbantut. Justeru itu, kajian keratan rentas ini bertujuan untuk mengenal pasti faktor-faktor yang mempengaruhi tumbesaran terbantut dalam kalangan kanak-kanak miskin bandar berusia 2 hingga 5 tahun yang tinggal di perumahan kos rendah di Kuala Lumpur. Seramai 52 orang kanak-kanak (48.1% lelaki dan 51.9% perempuan) dan ibu mereka mengambil bahagian dalam kajian ini melalui persampelan secara kebetulan. Maklumat mengenai latar belakang sosio-demografi, amalan penyusuan susu ibu, sekuriti makanan, pendedahan kepada asap rokok dan data antropometri dilengkapi oleh ibu dengan menggunakan soal selidik dalam talian. Hasil kajian ini menunjukkan bahawa 28.8% kanak-kanak berumur 2 hingga 5 tahun mengalami masalah tumbesaran terbantut, manakala 21.2% ibu dan 13.5% bapa mempunyai ketinggian yang rendah. Walaubagaimanapun, hasil kajian ini harus ditafsirkan dengan berhati-hati kerana ketinggian dan berat badan dilaporkan sendiri oleh responden disebabkan oleh penyekatan perjalanan dalam negara kerana pandemik COVID-19. Kajian ini mendapati bahawa majoriti ibu mengamalkan penyusuan susu ibu secara eksklusif dan 82.7% ibu menyusu anak dalam masa satu jam selepas kelahiran. Tempoh penyusuan adalah dalam jangka masa lebih kurang 30 bulan. Selain itu, kebanyakan isi rumah dalam kajian ini mengalami masalah sekuriti makanan (67.3%). Semua ibu dalam kajian ini tidak merokok. Walaubagaimanapun, 36.5% bapa merokok. Tambahan pula, kajian ini mendapati bahawa purata jumlah rokok yang dihisap oleh bapa adalah 8.21 ± 3.31 batang rokok sehari, di mana lebih daripada separuh bapa merokok lebih daripada 10 batang rokok sehari (52.6%). Kajian ini juga menunjukkan bahawa 32.7% kanak-kanak terdedah kepada asap rokok. Kanak-kanak perempuan ($p = 0.020$), ibu dengan ketinggian yang rendah ($p = 0.023$), bapa yang merokok ($p = 0.025$) dan kanak-kanak yang terdedah kepada asap rokok ($p < 0.001$) menunjukkan risiko yang lebih tinggi untuk mengalami masalah terbantut. Walau bagaimanapun, tidak terdapat hubungan yang ketara antara bangsa kanak-kanak, status perkahwinan ibu bapa, tahap pendidikan ibu bapa, pendapatan isi rumah bulanan, ketinggian bapa, berat lahir, tempoh penyusuan dan sekuriti makanan dengan tumbesaran terbantut ($p > 0.05$). Intervensi segera dan sesuai perlu disasarkan kepada kanak-kanak miskin bandar, terutama dalam menangani masalah pendedahan kepada asap rokok. Anggota keluarga yang merokok digalakkan untuk berhenti merokok untuk menjaga persekitaran rumah supaya bebas dari asap rokok dan dapat meningkatkan status pemakanan dan kesihatan anak-anak.

CHAPTER 1

INTRODUCTION

1.1 Background

Stunting refers to a child who is too short for his or her age (UNICEF, 2020). Children are described as stunted if their height-for-age z-score is more than two standard deviations below the WHO Child Growth Standards median (UNICEF/WHO/The World Bank Group, 2020). Globally, 21.3% or 144 million children under five years of age suffered from childhood stunting, in which 54% of all these stunted children lived in Asia in 2019 (UNICEF/WHO/The World Bank Group, 2020). In South-eastern Asia, the prevalence of childhood stunting among children under five was 24.7% (Global Nutrition Report, 2020). Today, stunting has been identified as a major public health priority, in which the World Health Assembly has set a new global nutrition target aims to reduce childhood stunting by 50% in 2030 (WHO, 2020). Greater efforts are required to achieve the global target of reducing the number of stunted children to 99 million by 2025 and to 82 million by 2030 (WHO, 2018).

In Malaysia, the National Health and Morbidity Survey (NHMS) showed that the prevalence of stunting in children under five years of age has increased from 13.4% in 2015 (IPH, 2015) to 20.7% in 2016 (IPH, 2016) and further to 21.8% in 2019 (IPH, 2020). According to a UNICEF report, 22% of urban poor children under five in low cost flats at Kuala Lumpur were stunted (UNICEF, 2018), in which it appears to be higher than the national average. Furthermore, the same report also showed that the prevalence of stunting in children increased with age, in which the prevalence in aged 4 years old (23%) was much higher than that of 2 years old (15%) (UNICEF, 2018).

Global urban population is growing every day by 220,000 inhabitants, or 80 million per year (UNICEF, 2018). The research, Advantage or Paradox: The dilemma for urban children and young people, showed that not all urban children benefit from the so-called 'urban

advantage' in which the idea that greater wages, improved facilities, and proximity to services give improved lives to urban dwellers (Mzumara, Bwembya, Halwiindi, Mugode, & Banda, 2018). The study also highlighted that intra-urban disparities can be due to inadequate access to essential resources and nutrition reflected in childhood outcomes (UNICEF, 2018). Inadequate nutrition in the child's life can contribute to poor development, which is irreversible (WHO, 2015). It is estimated that 4.3 million deprived urban children are more likely to die young before five years old compare to their peers in rural areas (UNICEF, 2018). Stunted children experience significant permanent physical and cognitive impairment, low adult income, loss of productivity and, when followed by excess weight gain later in childhood, increased risk of chronic diseases in adult life (UNICEF, 2013).

Generally, children from low-income households and poor socio-economic status are at high risk of poor nutritional status, leading to poor growth and development. Most of the previous studies on child stunting focused primarily on children aged <2 years old. However, recent studies suggest that the risk of stunting among preschool children increases with age, with older children (2 to 5 years old) were more likely to be stunted than younger children (Bogale et al., 2020; Hossain et al., 2020; Kang et al., 2018; Khan et al., 2019; Madiba et al., 2019; Mzumara et al., 2018) as well as increases with household income, with lower household income were more likely to have stunted children (IPH, 2016). Therefore, by studying factors associated with stunting in urban poor children aged 2 to 5 years old can help to address the needs and accelerate efforts to protect children, who are the most vulnerable members of the community (UNICEF, 2019). Further actions are necessary in reducing the number of childhood stunting.

1.2 Problem Statement

Stunting has long-term effects on individuals and populations, including decreased in cognitive and physical growth, productive ability and poor health, as well as increased the incidence of degenerative diseases such as diabetes (UNICEF, 2013). According to UNICEF (2019), Malaysia has recorded higher percentages of malnourished children, including stunting, among urban poor areas compared to the national average. Urban poverty among Malaysian children is approximately 11% (UNICEF, 2019). Unplanned and unregulated urbanization will lead to several problems such as physical, environmental, social and psychological problems (WHO, 2010). These environmental and social problems put the urban poor under a heavy burden of disease and inequity (WHO, 2010). Furthermore, these children do not receive basic human rights, such as nutritious food, housing, schooling, health care, and they are unfortunate enough to grow up and become adults (UNICEF, 2019). Thus, health and well-being of the urban poor children should be a priority, especially during this COVID-19 pandemic.

Current crisis of COVID-19 pandemic has detrimental impact on child nutrition and health status, in which malnutrition problem is expected to be worsen due to impacted of food systems by disrupting safe, new, and accessible food production, transportation, and sales, forcing millions of families to rely on foods that are poor in nutrient (Fore, Dongyu, Beasley, & Ghebreyesus, 2020). Social protection systems are overwhelmed in many low- and middle-income (LMICS) countries causing underprivileged urban poor families struggle to access the food and services they need (Fore et al., 2020). Child malnutrition is expected to increase due to sharp declines in household incomes, changes in the availability and affordability of nutritious foods, and disruptions to health, nutrition, and social protection services (Headey et al., 2020). Without effective action, the profound effect of the COVID-19 pandemic on early life nutrition may have intergenerational effects for child growth and development, life-long

impacts on learning process, risk of chronic diseases and overall human capital formation (Headey et al., 2020).

Numerous studies have been conducted in determining the associations between socio-demographic characteristics and childhood stunting, however, mixed findings were reported. For instance, some studies revealed that higher prevalence of stunting was found in boys compared to girls (Jiang et al., 2015; Kizilyildiz et al., 2016; Modjadji & Mashishi, 2020; Ponum et al., 2020), while others (Dekker et al., 2010) found the opposite. On the other hand, maternal parity is another risk factor of childhood stunting (Dekker et al., 2010; Dorsey et al., 2018; Taufiqoh et al., 2018). Stunting was four times more common among children born to women with five or more previous births than among school children of primiparous women (Dekker et al., 2010). However, limited studies have investigated the association of maternal parity and stunting in children aged 2 to 5 years old. Inconsistent findings were also found in the association of mother's working status and childhood stunting. Working mothers showed lower prevalence of stunted child compared to housewives or unemployed mothers (Laksono et al., 2019; Taufiqoh et al., 2018). However, Mzumara et al. (2018) reported that working mothers had higher prevalence of stunted children compared to non-working mothers. Therefore, further studies are needed to investigate the associations between sociodemographic factors and stunting among urban poor children.

Nutrition plays a major role in preventing child stunting, in particular, breastfeeding has an important role. Several studies have shown that children who received exclusive breastfeeding were least likely to become stunting compared to children who did not receive exclusive breastfeeding (Fanny, 2015; Kuchenbecker et al., 2015; Taufiqoh et al., 2018; Utami et al., 2019). However, it was reported that only 47.1% of Malaysian children practiced exclusive breastfeeding in the first 6 months of life (IPH, 2016b) and high prevalence of

stunting was shown among urban poor children (UNICEF, 2018). No study has been associated breastfeeding and stunting in urban poor children in Malaysia.

Current evidence has shown that second-hand smoke (SHS) exposure might be related to adverse growth outcomes in children, including stunting (Astuti et al., 2020; Muraro et al., 2014; Nadhiroh et al., 2020). Second-hand smoke exposure not only during pregnancy but also in early childhood showed a long-term detrimental effect on the height of children until adolescence (Muraro et al., 2014). On the other hand, evidence also shows mixed finding on the association of food insecurity and childhood stunting (Ali Naser et al., 2014; Betebo et al., 2017; Makoka & Masibo, 2015; Mkhize & Sibanda, 2020; Mulu & Mengistie, 2017; Shinsugi et al., 2015). There is no published study in Malaysia relating SHS exposure and food insecurity with stunting among urban poor children.

Overall, there is limited study examining stunting issue among urban poor children under five of age in Malaysia. Most of the local studies on stunting focused on school-aged children (Partap et al., 2019) and Orang Asli children (Siti Fatimah et al., 2018; Wong et al., 2015). Moreover, the UNICEF report on childhood stunting among urban poor children in low-cost flats (UNICEF, 2018) did not identify the associated factors with stunting. Little is known about specific factors associated to stunting among urban poor children under five in Malaysia. Hence, this study aimed to fill this research gap by determining the factors associated with stunting among urban poor children aged 2 to 5 years old living in low-cost flats at Kuala Lumpur. This study was conducted to answer the research question below:

1. What are the factors associated with stunting among urban poor children aged 2 to 5 years old living in low-cost flats at Kuala Lumpur?

1.3 Significance of the Study

This study will generate new knowledge especially to urban poor community as well as provide latest and updated information about the factors associated with stunting in urban poor children. Stunting in children will reduce school performance and affect work capability and work productivity in later life. Therefore, it is important to have an understanding of the factors associated with stunting among urban poor children. By understanding the major factors of stunting in children, it might help nutritionists and health promotion planners to establish effective intervention or health promotion strategies to improve the health status of urban poor children. Furthermore, it could contribute to policy makers in formulating policies to enhance nutritional status of urban poor children. Moreover, the results of this study may serve as a baseline data for future researchers.

1.4 Research Objectives

1.4.1 General Objective

To determine factors associated with stunting among urban poor children aged 2 to 5 years old living in low-cost flats at Kuala Lumpur.

1.4.2 Specific Objectives

1. To examine sociodemographic factors (age, sex, race, marital status, maternal parity, monthly household income, maternal education, and maternal employment status) of urban poor children living in low-cost flats.
2. To examine nutritional factors (birth weight, maternal and paternal height, and breastfeeding practices) of urban poor children living in low-cost flats.
3. To examine environmental factors (food insecurity and second-hand smoke exposure) of urban poor children living in low-cost flats.

4. To determine the prevalence of stunting in urban poor children living in low-cost flats.
5. To determine the associations of sociodemographic, nutritional, and environmental factors with stunting among urban poor children living in low-cost flats.

1.5 Research Hypotheses

1. There is association between sociodemographic factors and stunting in urban poor children living in low-cost flats.
2. There is association between nutritional factors and stunting in urban poor children living in low-cost flats.
3. There is association between environmental factors and stunting in urban poor children living in low-cost flats.

1.6 Research Framework

Figure 1.1 shows the research framework of this study. The dependent variable of this study is stunting among urban poor children living in low-cost flats which is measured using height-for-age z score (HAZ). Independent variables that are related to stunting include sociodemographic factors (age, sex, race, marital status, maternal parity, monthly household income, maternal education, and maternal employment status), nutritional factors (birth weight, maternal and paternal height, and breastfeeding practices), and environmental factors (food insecurity and second-hand smoke exposure).

A study done by Nshimyiryo et al. (2019) found that the income of households is a proxy for the buying power for food and other nutritious products required for the health of the children. It showed that children in low socio-economic families are less likely to be exposed to healthy nutrition, which can lead to stunting, compared to the richest families. Baharudin et al. (2019) found that sex, mother education and ethnicity were shown to have a major

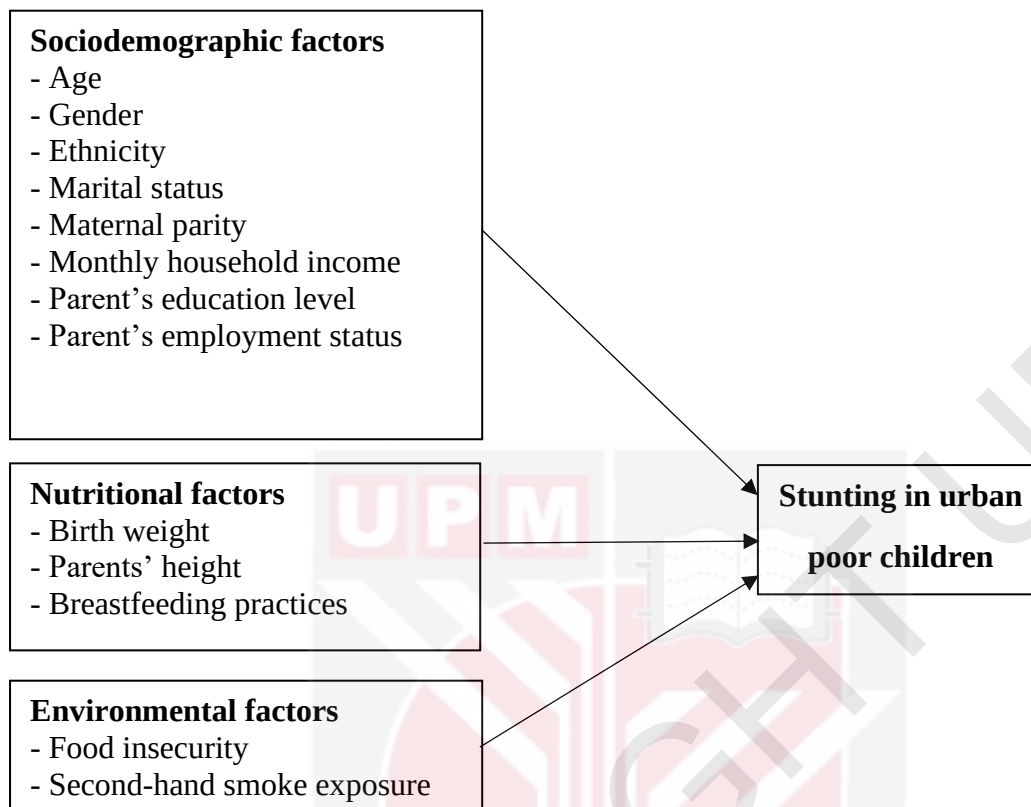


Figure 1.1: Research framework of this study

association with stunting problem. Male children were a major indicator of stunting because they were more likely to be stunted than female children. Mothers with only secondary education are more likely to have stunted children than mothers with higher education or even those with only primary education (Baharudin et al., 2019). Chinese and Indian ethnicity were less likely to become stunted compared to Malay ethnicity (Partap et al., 2019).

Nutritional factors, such as short maternal height, have been reported to be associated with stunting in children (Addo et al., 2013; Campos et al., 2020; Li et al., 2020; Utami et al., 2019; Wali et al., 2020; Zhang et al., 2015). Maternal height influences the linear growth of the offspring over the growing period (Addo et al., 2013). They stated that short mothers with less than 150 cm were 3.2 times more likely to have stunted child at 2 years old compared to taller mothers. Thus, there might be an intergenerational period of malnutrition in the future,

where a stunted child would be a stunted mother who would deliver a stunted child (Zhang et al., 2015).

Besides, Taufiqoh et al. (2018) found that children without exclusive breast-feeding had a 3.7 times higher risk of stunting than those who had received exclusive breast-feeding. They further reported that children who received exclusively breast-fed since infant had a higher growth rate of 51.8% compared to those who were not given exclusive breast-feeding.

Lack of access to food caused by household food insecurity can be a potential cause of stunting in left behind children (Yang et al., 2019). Besides, a recent study done by Astuti et al. (2020) stated that amount of exposure to tobacco smoke was significantly linked to stunting in children aged 25–59 months, in which exposure to tobacco smoke by more than 3 hours a day raised the rate of stunting by 10.316 times in children. Nadhiroh et al. (2020) explained that the height of children exposed to cigarette smoke was lower because the smoke contains cadmium, which disrupts the bioavailability of zinc, and further lead to short stature.

CHAPTER 2

LITERATURE REVIEW

2.1 Prevalence of stunting among children

The global stunting prevalence among children under 5 years old has decreased from 32.4% in 2000 to 21.3% in 2019 and the number of children affected has decreased from 199.5 million to 144.0 million (UNICEF, 2020). Although the prevalence was declined, overall progress is insufficient, and many children are still at risk. According to UNICEF/WHO/The World Bank Group (2017), the ongoing global reduction of stunting were considered low, which were 60 out of 134 countries or 45% countries having stunting rate below 20%. It was reported that 20% of children in India (UNICEF, 2018), 41% in Afghanistan (UNICEF, 2017) and 38% in Pakistan (UNICEF, 2019) are already stunted at birth. In Asia, 21.8% of stunting cases were reported, and Southern Asia had recorded the highest number of stunting cases which was 31.7% (WHO, 2020).

A recent study carried out by Li et al. (2020) among 299 353 children aged 12 to 59 months from 35 low- and middle-income countries found that the prevalence of stunting was 38.8%, from 18.8% in Peru to 61.1% in Burundi. Another recent study by Wali et al. (2020) utilising the data of the Demographic and Health Surveys (2014–2018) in five South Asia countries including Bangladesh, India, Maldives, Nepal, and Pakistan reported that the prevalence of stunting among children aged 24 to 59 months was 38%, with Pakistan reporting the highest prevalence at 44%, followed by 42% in Bangladesh and India, 41% in Nepal and 12% in Maldives.

A study done by Akombi et al. (2017) among children under five living in Nigeria found that 36.7% were identified as stunting while 27% were identified as severe stunting. Another study done by Rakotomanana et al. (2017) among children under 5 years old in Madagascar

found that the prevalence of stunting was high, which was 48.5%. On the other hand, a recent community-based cross-sectional study in Southern Ethiopia found that 47.9% of children aged 6-59 months were stunted (Bogale et al., 2020).

In China, a study done by Jiang et al. (2015) among children under five showed that 27% of children were identified as stunting while 21% were identified as severe stunting. According to the 2015 National Nutrition Survey in Bhutan, 21.2% of children aged 0–59 months were stunted (Kang et al., 2018). Besides that, a cross-sectional study done by Rahman et al. (2019) among children aged 6-59 months in Bangladesh showed that more than two-fifth of the children (41.4%) were stunted.

A recent study done by Astuti et al. (2020) among 123 children aged 25–59 months in Indonesia found that 26.83% of the children were stunted. A wide range of the prevalence of stunting among children under five was reported, such as 23.3% in Vietnam, 32.3% in the Philippines, 35.1% in Myanmar, 44.2% in Ethiopia and 59.3% in Afghanistan (de Onis et al., 2013). The SEANUTS study among children aged 6-17 years old in Cambodia found that stunting was more prevalent in rural children (36.4%) compared to urban counterparts (20.4%) (Horiuchi, Kusama, Kanha, & Yoshiike, 2018). Sandjaja et al. (2013) found that in urban and rural areas in Indonesia, the overall prevalence of stunting was 25.2% and 39.2%, respectively. The higher prevalence of stunting among rural children could be due to the reduced consumption of food from animals (Darapheak, Takano, Kizuki, Nakamura, & Seino, 2013).

In Malaysia, the prevalence of stunting increased from 16.6% in 2011 (IPH, 2011), 17.7% in 2015 (IPH, 2015) to 20.7% in 2016 (IPH, 2016b). According to Kok (2019), Malaysia's stunting prevalence (20.7%) is much worsen than West Bank and Gaza (7.4%) and comparable to Iraq's stunting rate (22.6%) at the end of the U.S invasion in 2011. According to the latest NHMS results in Malaysia, the prevalence of stunting among children under five has further increased to 21.8% (IPH, 2020). This prevalence rate is considered high (the

prevalence threshold of 20% to <30%) by international standards, in which it indicates a trigger-level as a basis of public health decisions (de Onis et al., 2019) as shown in Table 2.1.

Table 2.1: Prevalence thresholds and corresponding labels of stunting in children under 5 years using the ‘novel approach’

Prevalence of thresholds (%)	Labels	No. of countries
<2.5	Very low	4
2.5 - <10	Low	26
10 - <20	Medium	30
20 - <30	High	30
≥30	Very high	44

Source: De Onis et al. (2019)

Several small-scale studies have been done in Malaysia on the prevalence of childhood stunting (Aziz & Devi, 2012; Baharudin et al., 2016; Lee et al., 2020; Mohd Nasir et al., 2012; Poh et al., 2012; Poh et al., 2019; Shariff et al., 2015; Wong et al., 2014). For instance, Lee et al. (2020) found the prevalence of stunting among preschool children aged 3-6 years old in Seremban was 6.9%. Besides, Shariff et al. (2015) reported that the prevalence of stunting among children aged 1-10 years old in Wilayah Persekutuan and Selangor was 18.7%. Poh et al. (2019) found the proportion of stunted children among 2406 Malaysian children aged 5 to 12 years, who had participated in the Southeast Asian Nutrition Surveys (SEANUTS) was 8.4%. Apart from that, Baharudin et al. (2019) found that the prevalence of stunting among children in Malaysia that aged 6 months and below were 13.9% while 12-23 months were 17%.

Consequences of stunting can be observed during childhood until adult life (Prendergast & Humphrey, 2014) as shown in Figure 2.1. During 2 years of age, stunted children were exposed to increase in morbidity and mortality from infection, delayed motor skills and delayed in executive function. Throughout the school aged, stunted children are prone to have poor performance in school and fewer years of schooling. During the adulthood, stunted children will experience stunted growth, low physical stamina and lower in IQ level

that will lead to lower in lifetime earnings and have fewer assets later in life. Stunting is a cyclical mechanism for women who are stunted which tend to have stunted children, create a cycle of intergenerational poverty, and decrease human capital that is hard to penetrate (Martorell & Zongrone, 2012).

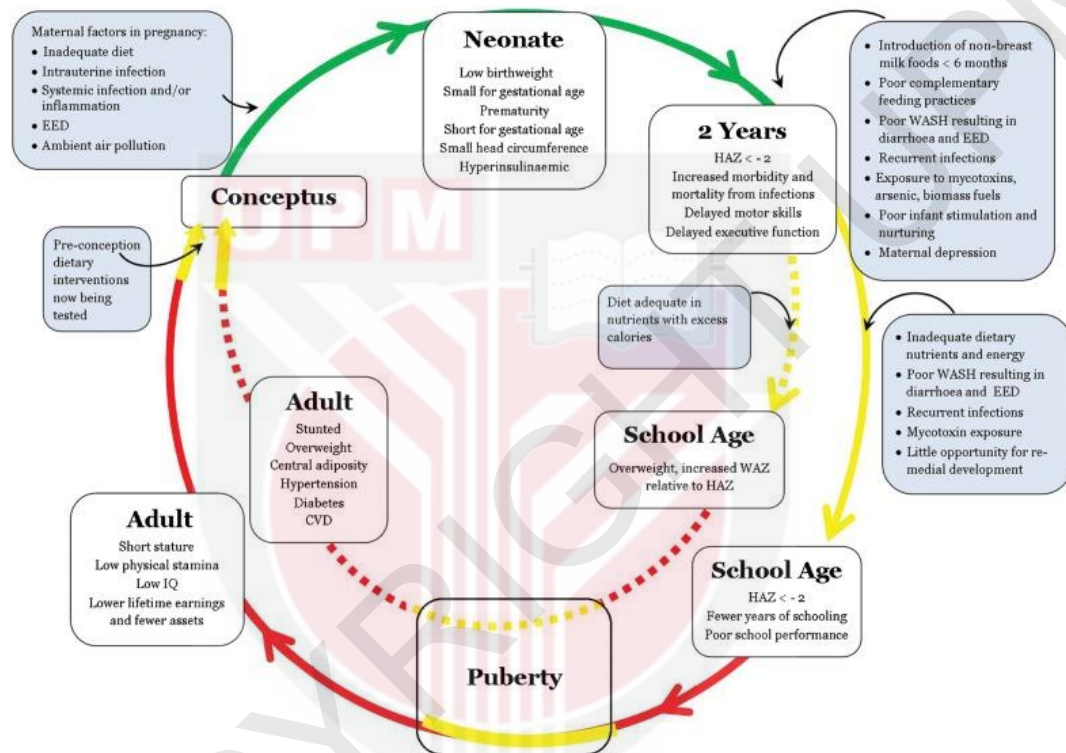


Figure 2.1: The stunting syndrome

Source: Prendergast and Humphrey (2014)

The global COVID-19 pandemic that we are currently facing has increased the risk of malnutrition in children under 5 years old, including stunting (Zemrani et al., 2021). Stunting becomes serious in low-income families who were unable to afford nutritious food. During COVID-19 pandemic, certain types of food might not be available and affordable for some families. The stunting prevalence could be increased as a result of decline in family income, change in food availability and disruption to health and social services (Yanti & Fauziah, 2021). It is estimated that 2.6 million additional children under 5 years of age will be stunted

in 2022 compared to 2019 due to interruptions in nutrition services and declines in household poverty status as a result of COVID-19 pandemic (Osendarp et al., 2021). Furthermore, it is estimated that almost 1.2 million would be in Sub-Saharan Africa and 790,000 in South Asia (Osendarp et al., 2021). Further actions are necessary in reducing the number of childhood stunting.

2.2 Factors associated with stunting among children

2.2.1 Association of sociodemographic factors and stunting

Previous studies stated that stunting has been significantly associated with several sociodemographic factors such as age, gender, race, marital status, maternal parity, monthly household income, maternal education, and maternal employment status.

Studies have shown that risk of stunting increased by age (Bogale et al., 2020; Darteh et al., 2014; Gebru et al., 2019; Kang et al., 2018; Madiba et al., 2019; Mzumara et al., 2018). For instance, Kang et al. (2018) found that children aged 24 to 59 months in Bhutan were 5 times more likely to be stunted than children aged <6 months (OR = 5.07, 95% CI = 1.16-22.2). Consistent findings were reported in the study of Madiba et al. (2019) in which they reported that older children (>24 months) were more likely to be stunted (60.7%) than younger children (12-24 months; 40.6%). A case control study conducted by Mzumara et al. (2018) among children aged 0-59 months in Republic of Zambia also showed a greater proportion of stunting was seen in those children over the age of 24 months. A study conducted by Darteh et al. (2014) among 2,912 children under five years old in Ghana revealed that children aged 36–47 months were 10.4 times more likely to be stunted than children aged less than six months ($p = 0.001$). Similar findings were found in a local study by NHMS among children below 5 years old in Malaysia (IPH, 2016b). Their findings showed that the highest prevalence of stunting was

among those aged 24-35 months (23.5%) and the lowest prevalence was among children aged 6-11 months (15.5%).

In terms of sex difference, Modjadji and Mashishi (2020) found that more boys (51.7%) than girls (38.8%) under age of 5 were stunted in South Africa, in which further findings showed that boys had increased odds of stunting (AOR = 2.07, 95% CI = 1.26-3.41, $p = 0.004$) as compared to girls. Similarly, Gebru et al. (2019) revealed that the prevalence of stunting was higher in males (37.93%) compared to females (34.81%; $p = 0.002$). Mzumara et al. (2018) found that 42.4% of the stunting cases were in boys and 37.6% were in girls below aged of five in Zambia. Abuya et al. (2012) also found that boys had 57% higher probability of being stunted compared to girls. Similarly, Baharudin et al. (2019) showed that male children were significant predictor for stunting as they were more likely to be stunted (AOR = 1.76, 95% CI = 1.56, 1.98) compared to female children. Consistently, the NHMS 2016 report also found that male children (22.2%) had higher prevalence of stunting compared to female children (19.2%) (IPH, 2016b). Males are biologically more vulnerable to adverse health outcomes compared to females and if they have to grow up in harsher environments, they are more likely to be stunted (Knaap, 2018).

In contrast, inconsistent findings were found in the latest NHMS 2019, in which findings reported that female children less than 5 years old showed higher prevalence of stunting (23.5%) than males (20.2%) (IPH, 2020). These findings were supported by a cross-sectional study done by Shinsugi et al. (2015) among 516 children less than 5 years old in a rural community of South-eastern Kenya, in which results showed that stunting was more prevalent in female children (24.8%) than male children (21.5%). However, Madiba et al. (2019) found that there was no association between sex of the child and stunting (OR = 1.22, 95% CI 0.94–1.58, $p = 0.12$).

There was little evidence about ethnicity related with stunting. A cross-sectional study done by Partap et al. (2019) found that Indian and Chinese ethnicity had an approximately 30% decreased risk of stunting compared with those of Malay ethnicity (RR for Indian ethnicity: 0.66, 95% CI 0.52–0.83, $p < 0.001$; for Chinese ethnicity: 0.68, 95% CI 0.55–0.83, $p < 0.001$). On the other hand, results from the NHMS 2016 among children below 5 years old showed that other ethnicities showed the highest prevalence of stunting (29.5%), followed by Other Bumiputera (24.9%) (IPH, 2016b). However, in NHMS 2019, it was found that the highest prevalence of stunting among children under 5 years old were in Bumiputera Sarawak ethnicity with 41.5% (IPH, 2020).

A cross-sectional study done by Akombi et al. (2017) among 24,259 children under-5 years in Nigeria found that currently married mothers were more likely to have severely stunted children than formerly married mothers. In contrast, a study by Laksono et al. (2019) in Indonesia on 149,571 children aged 0-59 months found that children with married mothers had a lower risk of stunting (OR = 0.862, 95% CI = 0.768-0.967) and severely stunting (OR = 0.771, 95% CI = 0.672-0.883) compared to children with separated mothers. The study showed that children living with married mothers were better protected from stunting. Researchers explained that divorce causes sources of income to be chaotic and disrupts regular availability and quality of food, which lead to poor nutritional status of children (Laksono et al., 2019).

Other than that, a study conducted by Abuya et al. (2012) showed that the prevalence of childhood stunting in mothers currently in union (currently married or living together) was 37.8%, 48.3% in mothers ever in union (separated, divorced, and widowed) and 44.8% in never married mothers. This result indicates that the risks of stunting for children born to mothers who have never been married are 56% higher than those already in marriage ($p < 0.05$).

Maternal parity is another factor related to childhood stunting. Taufiqoh et al. (2018) found a significant correlation between maternal parity and childhood stunting, in which under-

five children from multiparous mothers had 4 times stunting risk compared with children from primiparous mothers. Similar finding was also reported by Darteh et al. (2014) who found a significant relationship between number of children and stunting among children. They found that children whose mothers had 5–8 children were more likely to be stunted compared to those whose mothers had 1–4 children ($OR = 1.3, p < 0.05$) (Darteh et al., 2014).

Monthly household income was also found to be significantly associated with stunting. Yanti and Fauziah (2021) reported a significant relationship between family income and the prevalence of stunting in preschool children at Puspa Bangsa Kindergarten, Bogor City during the COVID-19 pandemic. Their results showed that most stunting cases were found in low income families. Bogale et al. (2020) found that wealth status was significantly associated with stunting among children aged 6–59 months in Southern Ethiopia, in which they reported that the likelihood of stunting was more than 2 times higher among children who lived in the households with medium ($AOR = 2.20, 95\% CI: 1.44–3.38$) and poor ($AOR = 2.87, 95\% CI: 1.72–4.81$) wealth status compared to children from rich households.

Utami et al. (2019) also revealed that children whose families earned income below the regional minimum wage were 6.625 times more likely to experience stunting than other children ($p=0.012$). Another study done by Darteh et al. (2014) also found that there was a significant relationship between household wealthiness and stunting among children, in which children in wealthier households were 0.43 times less likely to experience stunting compared to the poorest. This relationship may be explained by the fact that rich people are able to afford good living conditions that can enhance children's health, including nutrition. However, households with low income would purchase foods that are cheap, thus with poor quality and nutritional value (Ntila, Siwela, Kolanisi, Abdelgadir, & Ndhlala, 2017). As a result, nutritional status of these children is negatively affected.

Furthermore, previous studies found that lack of maternal education was associated with stunting in children (Akombi et al., 2017; Kang et al., 2018; Li et al., 2020; Modjadji & Mashishi, 2020; Partap et al., 2019; Taufiqoh et al., 2018; Wali et al., 2020). For instance, a recent study conducted by Modjadji and Mashishi (2020) among 404 children under five attending childcare services in South Africa found that children whose mothers pursued secondary (AOR = 0.39, 95% CI: 0.16–0.97, $p = 0.044$) and grade 12 or post-grade 12 education (AOR = 0.32, 95% CI: 0.12–0.83, $p = 0.020$) were less likely to be stunted compared to children of mothers who only had primary education. A study done by Akombi et al. (2017) among children under five in Nigeria showed that mothers with no education were more likely to have severely stunted children than mothers with primary education ($p = 0.014$) and secondary education ($p = 0.004$). Similar finding was found by Partap et al. (2019) which stated that the prevalence of stunting was highest among mothers who only had primary educational level in Malaysia. Another study by Taufiqoh et al. (2018) also found that low maternal education was associated with higher risk of stunting in children (OR=3.878, 95% CI=1.413-10.646, $p=0.012$) in Indonesia. These findings suggest that maternal education is an important factor that can impact a child's nutritional status because levels of higher education in mothers can help to build a healthy diet within the family and to enhance health-seeking behaviours of mothers (Wali et al., 2020). Besides, there were evidence showed paternal education were significantly correlated with stunting in children. A study by Sarma et al. (2017) among 7173 children under 5 years in Bangladesh showed that majority of stunted children (48.4%) came from fathers who had no education ($p<0.001$). Similar finding was found by Hossain and Khan (2018) that showed children with fathers had higher education were less likely to be stunted (OR = 0.63, 95% CI: 0.50-0.81; $p<0.001$) than those whose fathers had primary education.

Taufiqoh et al. (2018) found that the correlation between maternal employment and stunting was significant (OR=2.836, 95% CI=1.304-6.168, $p=0.013$), in which housewives or

unemployed mothers had 3 times higher risk of having stunted under five children compared to working mothers. However, the findings of the study are not in line with the findings of other studies that have shown that working mothers appeared to have little time to look after their children. For instance, Fikadu et al. (2014) found that children whose mothers worked as merchants (AOR = 4.03, 95% CI = 1.60-10.17) were more likely to be stunted than children whose mothers were housewives. This might be explained by working mothers had reduced interaction time with their children, which might bring short periods of exclusive breastfeeding, early breastfeeding cessation, increased exposure to bottle feeding, and inappropriate complementary foods, that could have a major adverse impact on the children's development. In contrast, García Cruz et al. (2017) found that housewives and working mothers had the same risk of stunting in children ($p=0.304$).

2.2.2 Association of nutritional factors and stunting

2.2.2.1 Birth weight

There is very little available evidence about birth weight of children especially among children between 2 to 5 years old. Only a few studies are available but there are mostly focused on infants aged 0 to 23 months (Aryastami et al., 2017; Sinha et al., 2018; Utami et al., 2018). For instance, a longitudinal study conducted by Utami et al. (2018) among infants aged 0-23 months in Bogor, Indonesia showed that infants with birth weight less than 3000 grams had 1.8 times higher risk to be stunted compared to infants with birth weight equal or more than 3000 grams. A case control study done by García Cruz et al. (2017) found that birth weight was significantly associated with stunting (AOR = 19.99, 95% CI = 5.8–68.85, $p < 0.001$) among children aged below 5 years in Tete Province, Mozambique. Similar findings were also found by Nshimyiryo et al. (2019), in which their findings showed that low birth weight at birth

was associated with the stunting among under five years old children (OR = 2.12, 95% CI = 1.39–3.23, $p < 0.01$).

Besides, a case control study done by Dewi et al. (2019) among 200 children aged 2-5 years old in Tulungagung, Indonesia showed that stunting was affected by birth weight and birth length. The findings for birth weight and birth length showed a direct relationship score with a coefficient of 3.64 and 4.10 respectively at $p < 0.001$. The findings indicated that children with a low-birth-weight background were more likely to experience stunting compared to normal birth weight children. Similarly, a recent cross-sectional study carried out by Campos et al. (2020) also found that low birth weight was a significant risk factor for child stunting.

Another study conducted by Lestari et al. (2018) among 60 children aged 24-59 months found that low birth weight (adjusted OR=10.510, 95% CI=1.180 to 93.572) were associated with childhood stunting in Indonesia. Their findings revealed that low birth weight history increased the risk of stunting more than 12 times compared to normal birth weight history. This is because children with a history of low birth weight have shown to experience uterine growth retardation, both acutely and chronically.

2.2.2.2 Maternal and paternal height

A recent study carried out by Li et al. (2020) among 299 353 children aged 12 to 59 months from 35 low- and middle-income countries found that short maternal height (<145 cm) was the strongest factor associated with child stunting (OR = 4.7, 95% CI = 4.5-5.0, $p < 0.001$).

Javid and Pu (2020) conducted a cross-sectional study among 3883 children under five years old in urban and rural areas in Pakistan to analyse whether maternal stature was associated with stunting. Mothers were defined as short stature if their height were <150 cm. Results revealed that short mothers had a higher prevalence of stunted children compared to taller mothers

(OR=2.02, 95% CI=1.67-2.45, $p<0.01$). These results were also in agreement with other recent studies carried out by Campos et al. (2020), Khan et al. (2019) and Wali et al. (2020).

Dorsey et al. (2018) showed that children of short mothers (<145 cm) were more likely to be stunted compared to tall mothers (OR=3.08 95% CI: 2.43, 3.92, $p<0.01$). Besides, a case control study done by Dewi et al. (2019) in children aged 2-5 years old in Indonesia showed that there was an effect on maternal height during pregnancy and incidence of stunting in children. Another study conducted by Geberselassie et al. (2018) found that stunting was significantly correlated with maternal height. They concluded that mother's height was related to the physical growth of the child. They also stated that genes from parent including mother can be inherited to their children (Geberselassie et al., 2018).

Maternal height provides a useful indicator for assessing intergenerational linkages in child's health (Khatun, Rasheed, Alam, Huda, & Dibley, 2019; Wali et al., 2020). This could be due to genetic factors and environmental factors such as diet, nutrition, poverty and culture that impact the mothers during early childhood and then the growth of their child (Khatun et al., 2019; Li et al., 2020). Biomechanical (i.e., maternal organ size) and biological mechanisms (maternal nutrition stock, and fetal programming) can explain the intergenerational linkages between maternal short stature and the development of the offspring faltering in utero (Khatun et al., 2019).

A recent study done by Sindhughosa and Arimbawa (2020) on the association between parent body height with stunting among children aged 1-5 years old in Indonesia found that, paternal height was not significantly associated with child stunting. The researchers explained that the finding was likely due to mistakes in filling out the questionnaires related to recall bias. The second possibility is, in the study, the measured variable was done once, and no further monitoring was carried out, meanwhile, to assess the association between father's body height to stunting required continuous monitoring.

In contrast, a study conducted by Nasikhah and Margawati (2012) showed that father's body height was significantly increased the risk of child stunting (OR=7.4, $p=0.013$) among children aged 24 to 36 months in Semarang Timur, Indonesia.

2.2.2.3 Breastfeeding practices

According to WHO, exclusive breastfeeding is a practice by mothers who only giving breastmilk to their children in the first 6 months of life. Toko et al. (2016) found that the odds of stunting were higher among children who were not exclusively breast fed for the first 6 months (AOR = 1.55, 95% CI: 1.07–2.24) than those of exclusively breast-fed children from rural Western Kenya. Another study done by Taufiqoh et al. (2018) among children aged 12-59 months also showed significant association of history of exclusive breastfeeding and stunting. Their findings showed that children who did not receive exclusive breastfeeding during the first 6 months of life were 30% at risk of stunting.

A case control study done by Fikadu et al. (2014) among children (121 cases and 121 controls) of age 24 to 59 months in South Ethiopia showed that children who were breastfed for <2 years (AOR = 5.61, 95% CI = 1.49-11.08) were more likely to be stunted than those who were breastfed for ≥ 2 years. Furthermore, findings also revealed that children who were exclusively breastfed for <6 months (AOR = 3.27, 95% CI = 1.21-8.82) were more likely to be stunted than children who were exclusively breastfed for the first 6 months.

Similar finding was also found by García Cruz et al. (2017), in which results showed that the period of breastfeeding (17.4 ± 5.4 and 11.4 ± 6.1 months) was higher in the normal children compared to the malnourished children ($p<0.001$). Breast milk is important as it contains growth factors for the development of intestinal mucosa in children (Taufiqoh et al., 2018).

Besides, a study done by Mattheus et al. (2017) among infants two years of age in Malawi indicated that infants under 6 months of age who were exclusively breastfed by their mothers were longer, heavier and less likely to be stunted than non-exclusively breastfed children. Results of the study showed significant impact of breastfeeding practices on LAZ, in which breastfed infants had a higher mean LAZ than non-breastfed infants.

Another study was conducted by Campos et al. (2020) among 2089 children aged 6-35 months in Mexico reported that never breastfed children showed higher prevalence of stunting compared to breastfed children. Their study also found that receiving breastfeeding <6 month was a protective factor of stunting in children (OR = 0.33, CI 95% = 0.13-0.81). This correlation has been primarily explained by the immune-protective factors of breastmilk at the individual level, which enhance the immature immune system of children, reduce diarrheal experiences and other infectious diseases, that have been identified as major risk factors for child stunting.

2.2.3 Association of environmental factors and stunting

2.2.3.1 Food Insecurity

Food insecurity is a condition that occurs where people lack secure access to enough, safe and nutritious food for normal growth and development and for an active and healthy life (FAO, 2011). According to the World Food Program (WFP), about 272 million people were trapped in acute food insecurity in 2020, with 97 million people suffering from chronic food insecurity due to the COVID-19 pandemic's rising impact (World Food Program, 2020). Food insecurity and hunger can have a variety of negative effects on health, including the risk of malnutrition, numerous diseases, chronic illnesses, poor health and wellbeing, cognitive impairment, mental health problems, social and cultural conflicts, increased social and economic inequalities, and the ability to hinder the overall developmental activities among

children and young people (Ke & Ford-Jones, 2015). Other recent study found that food insecurity during the COVID-19 pandemic was linked to intrapersonal, interpersonal, organisational, community, and public policy elements at multiple levels especially among low-income families (Singh et al., 2021).

Several previous studies reported that food insecurity was a significant risk factor for child stunting (Agho et al., 2019; Berra, 2020; Betebo et al., 2017; Campos et al., 2020; Mahmudiono, Nindya, Andrias, Megatsari, & Rosenkranz, 2018; Moradi et al., 2019). A systematic review and meta-analysis done by Moradi et al. (2019) showed that food insecurity increased the risk of stunting among children under 5 years of age (OR = 1.14, 95% CI = 1.05-1.23). A recent study conducted by Berra (2020) in West Oromia, Ethiopia found that children living in food-insecure households were 2.09 times more likely to be stunted (OR = 2.09, 95% CI = 1.02-4.28) as compared to those children in food-secure households.

Another study done by Agho et al. (2019) among 2,222 children aged 6 to 59 months from the Gicumbi district in Rwanda found that moderate and severe household food security associated significantly with stunting and severe stunting. Children from households with moderate food insecurity were 2.47 times more likely to be severely stunted (AOR = 2.47, 95% CI = 1.77-3.46), and those from households with severe food insecurity were 1.82 times more likely to be severely stunted (AOR = 1.82, 95% CI = 1.34-2.48), compared with those from food secured households (Agho et al., 2019).

Betebo et al. (2017) conducted a cross-sectional study among mothers and 6-59-month-old children to assess household food insecurity and its association with the nutritional status of children in East Badawacho District, South Ethiopia. The results showed that the mean HAZ was lower for children from food insecure households (-1.88 ± 2.34) than for children from food secure households (-0.78 ± 1.93 , $p < 0.05$). Similarly, the prevalence of stunting was higher among children from food insecure households (54.5%) than among children from food secure

households (17.5%). Furthermore, the risk of being stunted for the children living in food insecure household was 6.7 times higher than those children living in food secure households (AOR = 6.7, 95% CI = 3.7-12.1) (Betebo et al., 2017).

Another cross-sectional study conducted by Mahmudiono et al. (2018) found that increased likelihood of child stunting was observed in households with mild food insecurity (OR = 1.740, 95% CI = 1.043–2.903) and severe food insecurity (OR = 2.182, 95% CI = 1.280–3.717) among children in Surabaya, Indonesia. Stunting in children is due to insufficient availability and intake of growth-promoting and nutrient-dense foods in food insecure household (Mahmudiono et al., 2018). Trade-offs of food insecurity used by households, such as consuming less food and monotonous diets, may also impact the nutritional status of children.

Ali Naser et al. (2014) conducted a study on the association between household food insecurity and nutritional outcomes among children aged 2 to 12 years in North-eastern of Peninsular Malaysia. Findings showed that the prevalence of stunting in food insecure households were 62.5%, which was much higher than food secure households (41.6%). As stunting indicates past nutritional status, findings of the study suggested that children who had inadequate diets and live in poverty were the major factors that lead to stunting in children (Ali Naser et al., 2014). Similar finding was reported in a study done by Singh et al. (2014) among 2335 children below five years old in Nepal. Findings showed that 51% of children in severe food-insecure households were stunted compared to only 33% of children in food-secure households ($p < 0.05$).

In contrast, there were studies reported the opposite findings. For instance, a cross-sectional study was conducted in Sekela District, Western Ethiopia among 576 households having children less than 5 years old (Mulu & Mengistie, 2017). Findings showed that food insecurity was associated with underweight but not stunting in children. Their findings

indicated that food security is an essential but not a sufficient condition to achieve good nutritional status. Another cross-sectional study done by Shinsugi et al. (2015) among 438 children under five years old in South-eastern Kenya showed that no significant difference was reported between stunting and food insecurity household level. Out of the 263 households, 165 (62.7%) were classified as having severe food insecurity. The number of moderately and mildly insecure and secure households was 29 (11.0%), 22 (8.4%) and 47 (17.9%), respectively. The association with stunting was not significantly difference between the categories of food insecurity ($p>0.05$).

2.2.3.2 Second-hand Smoke Exposure

Exposure to cigarette smoke in a long period of time will disturb the growth of children, especially in the early 1000 days of a child's life (golden period of growth). A study done by Pem (2015) showed that exposure to cigarette smoke in the first 1000 days of life increased the risk of childhood stunting by 2.04 times. Many families have been spending more time at home during the lockdown of COVID-19 pandemic. In homes where someone smokes, this indicates more exposure to second-hand smoke, in which this can be especially harmful to a child's health.

A cross-sectional study done by Astuti et al. (2020) in Surabaya City, Indonesia showed that the duration of cigarette smoke exposure had a significant relationship with stunting (OR = 10.316, 95% CI=3.509–30.323; $p<0.001$) among children aged 25 to 59 months old. Besides, they also stated that length of exposure to cigarette smoking of more than 3 hours a day increased the risk of stunting by more than 10 times. The majority of cigarette smoke exposure originated from paternal (father) as many as 63.6%, and the majority of father's smoking for more than three years was 97.5% (Astuti et al., 2020).

A recent systematic literature review done by Nadhiroh et al. (2020) among children below 8 years old found that second-hand smoke exposure was related with higher risk of stunting. Findings indicated that exposure of smoke by family members was significantly associated with increased risks of moderate stunting (OR=1.15, 95% CI=1.06–1.23) and severe stunting (OR=1.13, 95% CI=1.03–1.25) compared to non-smoker families ($p<0.05$).

Another systematic review and meta-analysis done by Quelhas et al. (2018) found that prenatal exposure to tobacco during early childhood and even later in life may potentially contribute to stunting and damaging brain growth in children. Nicotine in cigarette smoke can reduce 30–40% oxygen supply and interfere the absorption of nutrients such as minerals, calcium, and vitamin C that are important for the height growth of children (Ramadani et al., 2019).

CHAPTER 3

METHODOLOGY

3.1 Study Design

This was a cross-sectional study aimed to determine the associations of sociodemographic factors, nutritional factors, and environmental factors with stunting among urban poor children living in low-cost flats at Kuala Lumpur.

3.2 Study Location

More people live in urban areas than in rural areas, with 55% of the world's population living in urban areas in 2018 (United Nation, 2018). Urban population in Malaysia has risen from about 71% in 2010 to 77% in 2020 (Plecher, 2020). Malaysia is expected to undergo high rates of urbanisation, with majority of the population estimated to live within urban areas in the future.

This study was conducted at the People's Housing Program or commonly known as *Projek Perumahan Rakyat* (PPR) in Kuala Lumpur. Kuala Lumpur is the capital of Malaysia. PPRs have been developed by the National Housing Department (*Jabatan Perumahan Negara* or JPN) since the 1998 in an effort to provide affordable housing to low socioeconomic groups (Goh, Tee & Ahmad, 2011). According to the National Housing Department (JPN), a total 169 People's Housing Program (PPR) have been built in Malaysia in 2016. There are 56 PPR in Kuala Lumpur with a total of 61,713 households (Yeap, 2020).

3.3 Study Population

The study population of this study were children aged 2 to 5 years old and their mothers who were living in low-cost flats. They were selected based on the inclusion and exclusion criteria as stated in Table 3.1.

Table 3.1: Inclusion and exclusion criteria for the selection of respondents

Inclusion criteria	Exclusion criteria
- Malaysian - Living in <i>Projek Perumahan Rakyat</i> (PPR) in Kuala Lumpur - Children aged 2-5 years old - Mothers who had accessed to internet	- Children with psychomotor retardation, hormonal disorder and acute severe illness such as heart attack and pneumonia - Mothers and children who were in quarantined period that had close contact with COVID-19 infectious person - Physical disability

3.4 Sample Size Determination

Sample size of this study was calculated using the 2-proportion formula by Lemeshow et al. (1990) as shown in Table 3.2.

$$n = \frac{\{z_{1-\frac{\alpha}{2}} \sqrt{2 P(1-P)} + z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)}\}^2}{(P_1 - P_2)^2}$$

Where;

$z_{1-\frac{\alpha}{2}} = 1.96$ at confidence interval 95%

$z_{1-\beta} = 0.84$ with power 80%

P_1 = estimated proportion in group 1

P_2 = estimated proportion in group 2

P = average proportion of group 1 and 2, $P = (P_1 + P_2)/2$

Table 2.2: Calculation of sample size

Independent variables	Proportion values	Sample size
Mother's education level (Li et al., 2020)	P ₁ = 47.9% (no education)	$n = \frac{\{1.96 \sqrt{2(0.338)(1 - 0.338)} + 0.84 \sqrt{0.479(1 - 0.479) + 0.197(1 - 0.197)}\}^2}{(0.479 - 0.197)^2}$ = 43
	P ₂ = 19.7% (tertiary education)	n = 43 × 2 = 86
Birth order (Khatun et al., 2019)	P ₁ = 31.4% (first)	$n = \frac{\{1.96 \sqrt{2(0.212)(1 - 0.212)} + 0.84 \sqrt{0.314(1 - 0.314) + 0.110(1 - 0.110)}\}^2}{(0.314 - 0.110)^2}$ = 62
	P ₂ = 11.0% (fourth)	n = 62 × 2 = 124
Birth weight (Campos et al., 2020)	P ₁ = 28.2% (<2.5 kg)	$n = \frac{\{1.96 \sqrt{2(0.196)(1 - 0.196)} + 0.84 \sqrt{0.282(1 - 0.282) + 0.110(1 - 0.110)}\}^2}{(0.282 - 0.110)^2}$ = 83
	P ₂ = 11.0% (≥2.5 kg)	n = 83 × 2 = 166
Mother's height (Nshimiyiryo et al., 2019)	P ₁ = 67% (<145 cm)	$n = \frac{\{1.96 \sqrt{2(0.52)(1 - 0.52)} + 0.84 \sqrt{0.67(1 - 0.67) + 0.37(1 - 0.37)}\}^2}{(0.67 - 0.37)^2}$ = 43
	P ₂ = 37% (≥145 cm)	n = 43 × 2 = 86
Duration of breastfeeding (Fikadu et al., 2014)	P ₁ = 80.0% (<24 months)	$n = \frac{\{1.96 \sqrt{2(0.637)(1 - 0.637)} + 0.84 \sqrt{0.800(1 - 0.800) + 0.473(1 - 0.473)}\}^2}{(0.800 - 0.473)^2}$ = 33
	P ₂ = 47.3% (≥24 months)	n = 33 × 2 = 66
Food insecurity (Betebo et al., 2017)	P ₁ = 54.5% (food insecure)	$n = \frac{\{1.96 \sqrt{2(0.360)(1 - 0.360)} + 0.84 \sqrt{0.545(1 - 0.545) + 0.175(1 - 0.175)}\}^2}{(0.545 - 0.175)^2}$ = 25
	P ₂ = 17.5% (food secure)	n = 25 × 2 = 50

The highest number of sample size was selected as the sample size of this study, which was 166 respondents based on Table 3.2. After consideration of the response rate of 80%, a total of **208 respondents** were required in this study.

3.5 Sampling Design

Convenience sampling was used in this study due to the implementation of movement control order (MCO) and conditional movement control order (CMCO) in response to the COVID-19 pandemic outbreak in the country. The link of google form was posted in the Facebook timeline of the PPR groups. Besides, the link was also posted in WhatsApp group of the PPR by their representatives.

3.6 Study Instruments

Mothers completed a Malay version self-administered online questionnaire on sociodemographic background, nutritional factors, and environmental factors using Google Form (<https://forms.gle/L3yn3pCHKVAKZuQD9>). Height and weight of mothers, fathers and their children were self-reported by the mothers. Details of the instruments used in this study are discussed below.

3.6.1 Mother-Administered Questionnaire

3.6.1.1 Sociodemographic factors

This section contained respondent's sociodemographic characteristics which were age, sex, race, marital status, monthly household income, parental education, and parental employment status which were self-reported by the mothers.

3.6.1.2 Breastfeeding practice

A set of questionnaire on breastfeeding practice from the NHMS 2016 (IPH, 2016) were used in this study. Mothers were required to recall information on breastfeeding status and practices. The first and second questions were asked whether the children still consume breast milk until now and whether the mothers give breast milk in the first hour after birth. Besides, mothers were asked how long they gave milk to children (breast milk and formula milk) and how long the mothers gave breast milk exclusively to children. Next questions mothers need to recall when they are introducing other liquids other than breast milk to children. After that, mothers were asked how old the children when start introducing complementary foods (except formula milk) to them. Besides, the mothers need to recall how old the children are when stops breastfeeding. The last question was asked whether the mother gave food supplements to children. If the answer in “yes”, the aged of children when giving the food supplement were being asked.

3.6.1.3 Food insecurity

The U.S. Household Food Security Survey Module: Six-Item Short Form Economic Research Service (USDA) by Blumberg et al. (1999) was used to assess household food insecurity. It provides a clear, simple, user-friendly approach and less respondent burden to access element of household food insecurity.

Affirmative responses such as ‘always’, ‘sometimes’, and ‘yes’, and non-affirmative responses such as ‘never’, ‘no’, and ‘don’t know’ were used in this scale. An affirmative response was given a score of 1 and a non-affirmative response was given a score of 0. The sum of affirmative responses to the six items was the household’s raw score on the scale. The possible total score ranged from 0 to 6, in which score of 2 and above were classified as food insecurity. The detail of the scoring of this scale is shown as below:

- Raw score 0-1 – High or marginal food security (raw score 1 may be considered marginal food security, but a large proportion of households that would be measured as having marginal food security using the household or adult scale will have raw score zero on the six-item scale)
- Raw score 2-4 – Low food security
- Raw score 5-6 – Very low food security

This 6-item questionnaire has been used in the Malaysian Adults Nutrition Survey (MANS) 2014 (Ahmad et al., 2018) to assess the food insecurity among Malaysian adults. It also showed good internal consistency reliability among urban adults in Selangor (Mesbah, Sulaiman, Mohd Shariff, & Ibrahim, 2020).

3.6.1.4 Second-hand Smoke Exposure

The combination of modified Environmental Questionnaire (EQ) by Braithwaite et al. (2015), and Environmental Tobacco Smoke (ETS) exposure by Mattheus et al. (2017) were used to assess second-hand smoke exposure in children in the current study.

The first and second questions were from the Environmental Questionnaire (EQ; Braithwaite et al., 2015) regarding question on if the child's mother (or female guardian) and child's father (or male guardian) smoke the cigarettes at home. If the answer was "yes", the number of cigarettes the child's mother (or female guardian) and father (or male guardian) smokes each day were being asked. The last two questions question was adapted from the study of Mattheus et al. (2017) from the Environmental Tobacco Smoke (ETS) questionnaire. The question would like to know whether the people who live with the children allowed to smoke in front of children. For the last question mothers were being asked regarding the number of

cigarettes smoked inside the house per day and the options provided were “never smoked inside the house” and “at least one cigarette smoked inside the house per day”.

3.6.2 Anthropometry Data

3.6.2.1 Birth Weight

Birth weight (grams) of the children were self-reported by mothers. The WHO (2016) defines birth weight based on the following categories: extremely low birth weight is < 999 g, low birth weight is < 2,500 g and high birth weight is > 4500 g.

3.6.2.2 Parent’s and Children’s Current Height and Weight

Parent’s and children’s current height and weight were self-reported by mothers. Mothers were defined as short stature if their height was <150 cm according to the World Health Organization (WHO, 2006). This cut-off point was also being used in other studies (Addo et al., 2013; Dewi et al., 2019; Javid & Pu, 2020; Utami et al., 2018). Besides, fathers were defined as short if their height was <165 cm. This cut-off point was also being used in a previous study (Sindhughosa & Arimbawa, 2020). On the other hand, body mass index (BMI) of the parents was calculated using the formula as below:

$$Body\ Mass\ Index\ (BMI) = \frac{body\ weight\ (kg)}{height\ (m^2)}$$

The classification of BMI is shown in the Table 3.4 based on the WHO classifications (WHO, 2000).

Table 3.3: Classifications of BMI (WHO, 2000)

Classification	BMI (kg/m²)
Underweight	< 18.5
Normal	18.5 – 24.9
Overweight	25.0 – 29.9
Obesity Class I	30.0 – 34.9
Obesity Class II	35.0 – 39.9
Obesity Class III	> 40.0

Height-for-age z score (HAZ) was used to measure the level of stunting in children. Children aged below 5 years with a HAZ < -2SD according to the WHO Child Growth Standard were considered as stunting (WHO, 2006). For weight-for-age z score (WAZ), children were considered underweight if their WAZ < -2 SD (WHO, 2006). Children were considered wasted, overweight and obese if their BMI-for-age z-score (BAZ) were < -2 SD, > +2 SD and > +3 SD respectively (WHO, 2006). The WHO AnthroPlus 1.0.4 version was used to enter data, and anthropometric indices were generated using WHO-recommended reference medians and categorised using standard deviation units (z-scores).

3.7 Study Approval

Ethical approval was sought from the Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia (see Appendix A; Reference Number: JKEUPM-2020-176) prior to data collection. After getting approval from JKEUPM, permission from Kuala Lumpur City Council (DBKL) (see Appendix B) was obtained.

3.8 Pre-test

Prior to the data collection, the questionnaire was pre-tested on children from one of the PPR in Kuala Lumpur that met the required study criteria in October 2020. The respondents for pre-testing had similar characteristics as the study sample. These children were excluded

from the actual data collection. Time taken to complete the questionnaire were about 15 minutes. The clarity of instructions and understanding of questions from the questionnaire were assessed. Besides, problems encountered by respondents of pre-testing in answering the questionnaire were identified and corrected based on their feedback after pre-testing.

3.9 Data Collection

Data collection was conducted from March to May 2021. Information sheet which contained a brief explanation on the aims of the study was given to the mothers (see Appendix C). Mothers answered an online questionnaire (see Appendix D) regarding information on sociodemographic factors, breastfeeding practice, food insecurity, second-hand smoke exposure and anthropometry data. The online questionnaire was given to the mothers through representative in each PPR. The researcher approaches the representative using Facebook messenger, Instagram direct message and WhatsApp application. The online questionnaire was sent through WhatsApp group of the PPRs. No incentive was given to the respondents.

3.10 Statistical Analysis

Statistical analysis was performed by using IBM SPSS Statistics 25 (IBM Corp., Armonk, NY). Descriptive data including categorical data were presented as frequencies and percentages where continuous data were presented as means and standard deviations if the data were normally distributed or as median and interquartile range (IQR) if the data were not normally distributed. The normality of the distribution of the score was first estimated by using skewness and kurtosis values. The values fall in the range of -2 and $+2$ indicated the scores were normally distributed (George & Mallery, 2003). The significant association between two categorical variables were tested using the chi-square test or Fisher's Exact test. Then, the independent-samples *t*-test was used to assess the mean difference in continuous variable

between stunted and non-stunted urban poor children. Statistical significance level was set at $p < 0.05$.



CHAPTER 4

RESULTS AND DISCUSSION

4.1 Sociodemographic Characteristics

Table 4.1 shows the sociodemographic characteristics of the respondents. A total of 52 respondents (48.1% boys and 51.9% girls) with a mean age of 3.38 ± 1.22 years participated in this study. Majority of the respondents are Malays (82.7%). Almost all of the parents were married (96.2%) and had completed tertiary education (90.4%). Half of the mothers have 2 children (50.0%). The mean $\pm$ SD monthly household income was RM 3650.54 $\pm$ 1833.67. Majority of the parents were employed (76.9% mothers and 94.2% fathers).

Table 4.1: Sociodemographic characteristics of the respondents (n= 52)

Characteristics	Mean $\pm$ SD	n (%)
Child's age (years)	3.38 $\pm$ 1.22	
2		18 (34.6)
3		10 (19.2)
4		10 (19.2)
5		14 (27.0)
Child's gender		
Male		25 (48.1)
Female		27 (51.9)
Child's race		
Malay		43 (82.7)
Chinese		4 (7.7)
Indian		5 (9.6)
Parental marital status		
Married		50 (96.2)
Not married		2 (3.8)
Maternal parity		
1		12 (23.1)
2		26 (50.0)
3		10 (19.2)
4		2 (3.8)
5		1 (1.9)
6		1 (1.9)
Monthly household income (RM)	3650.54 $\pm$ 1833.67	
Maternal education level		
Secondary		5 (9.6)
Tertiary		47 (90.4)

Table 4.1: Sociodemographic characteristics of the respondents (n= 52) (cont.)

Characteristics	Mean ± SD	n (%)
Paternal education level		
Primary		1 (1.9)
Secondary		16 (30.8)
Tertiary		35 (67.3)
Maternal employment status		
Employed		40 (76.9)
Unemployed		12 (23.1)
Paternal employment status		
Employed		49 (94.2)
Unemployed		3 (5.8)

4.2 Nutritional Factors

4.2.1 Anthropometric measurements

The mean values for anthropometric measurement of the respondents are shown in Table 4.2. The mean $\pm$ SD of children's birth weight was 3.08 ± 0.43 kg, with majority of them (96.2%) had normal birth weight. Based on height-for-age z-score, stunting prevalence in children aged 2 to 5 years old in this study was 28.8%. This result was higher when compared to the results of the National Health and Morbidity Survey (NHMS) 2019, which showed that 21.8% of Malaysian children were stunted (IPH, 2020). Besides that, this prevalence was also higher compared to the finding of UNICEF (2018), in which their results found that 22% of urban poor children under 5 in low-cost flats at Kuala Lumpur were stunted. The finding found in the present study is similar to other studies conducted around the world that have also documented higher prevalence of stunting among children <5 years old. For instance, in Bangladesh, Guatemala, Haiti, India, Nepal, Pakistan, Senegal, Tanzania, and Uganda, stunting was highest in urban poor clusters with the highest found in Pakistan (56%), Guatemala (55%), Bangladesh (48%), and Burundi (45%) (Assaf & Juan, 2020). Globally, there is a growing trend toward urbanisation. There are less food access issues in urban than rural areas, but this

“urban advantage” does not benefit the poorest who face disproportionate barriers to accessing healthy food and have an increased the risk of malnutrition (Vilar-Compte et al., 2021).

Table 4.2: Anthropometric measurements of the respondents (n= 52)

Characteristics	Mean ± SD	n (%)
Birth weight (kg)	3.08 ± 0.43	
Low birth weight		2 (3.8)
Normal		50 (96.2)
Height-for-age z score (HAZ)	-0.59 ± 1.53	
Stunted		15 (28.8)
Normal		37 (71.2)
Weight-for-age z score (WAZ)	-0.06 ± 1.34	
Underweight		4 (7.7)
Normal		48 (92.3)
BMI-for-age z score (BAZ)	0.17 ± 1.59	
Wasted		4 (7.7)
Normal		30 (57.7)
Obese		18 (34.6)
Mother's height (cm)	157.37 ± 7.43	
< 150		11 (21.2)
≥ 150		41 (78.8)
Mother's weight (kg)	64.08 ± 21.08	
Mother's BMI (kg/m²)	25.91 ± 8.72	
Underweight		4 (7.7)
Normal		25 (48.1)
Overweight		16 (30.8)
Obesity		7 (13.5)
Father's height (cm)	171.21 ± 8.68	
< 165		7 (13.5)
≥ 165		45 (86.5)
Father's weight (kg)	77.45 ± 11.60	
Father's BMI (kg/m²)	26.69 ± 5.70	
Underweight		0 (0.0)
Normal		24 (46.2)
Overweight		19 (36.5)
Obesity		9 (17.3)

Furthermore, this study found that 7.7% of the urban poor children aged 2 to 5 years old were underweight. This result is similar with a previous study done by Koetaan et al. (2018), whereby they found that the prevalence of underweight in children aged 5 years old and younger were 7.7%. However, it was lower than the findings from a national study in

Malaysia (13.7%) among children < 5 years old (IPH, 2016b). Regarding BMI-for-age, the result of this study showed that the prevalence of wasting was 7.7%. This prevalence was lower compared to the national prevalence of 11.2% (IPH, 2016). The prevalence of obesity was higher (34.6%) compared to the national prevalence of 11.8% (IPH, 2016). According to Poh et al. (2013), Malaysia is one of the top three countries with a high percentage of obese children (aged six months to twelve years), with 11.5%. However, the anthropometry results in this study have to be interpreted cautiously as self-reported height and weight of the children was used in this study due to the application of lockdown in the country to contain COVID-19 pandemic.

For parental nutritional status, the mean $\pm$ SD for mother's height was 157.37 ± 7.43 cm while 171.21 ± 8.68 cm for father's height. Most of the mothers and fathers reported normal height which were 78.8% and 86.5%, respectively. However, 21.2% of the mothers and 13.5% of the fathers had short stature. The mean $\pm$ SD for mother's BMI was 25.91 ± 8.72 kg/m² with 30.8% of the mothers were overweight and 13.5% were obese. For the father's BMI, the mean $\pm$ SD was 26.69 ± 5.70 kg/m², with 36.5% and 17.3% of the fathers were overweight and obese, respectively. According to a recent study by Sethi et al. (2020) among urban poor women in India, 13.7% of them were overweight and 21.1% were obese. In Malaysia, a trend has been observed that the prevalence of obesity increases with an decrease in income among the low-income (B40) group (Andoy-Galvan et al., 2020). A cross-sectional study conducted among adults residing in a PPR at Kuala Lumpur found that 25.5% were overweight and 39.6% were obese (Andoy-Galvan et al., 2020). The urban poor are more likely to consume unhealthy and energy-dense diets, which is linked to a higher prevalence of overweight and obesity (Hao et al., 2012). Tara Templin et al. (2019) explained that as countries develop economically, overweight prevalence increased significantly among the poorest and remained mostly

unchanged among the wealthiest. Therefore, nutritional status of urban poor should be monitored frequently.

4.2.2 Breastfeeding practices

Table 4.3 shows the breastfeeding practices of the respondents in this study. Majority of the mothers in this study practiced exclusive breastfeeding (79.0%). The result of this study was higher compared to national study by National Health and Morbidity Survey 2016 (NHMS) which found 47.1% of mothers practiced exclusive breastfeeding (IPH, 2016b). In contrast, this prevalence was lower compared to a study by Manggala et al. (2018), which found that 95.2% of the Indonesian mothers practiced exclusively breastfeeding among 166 children aged 24-59 months in Bali, Indonesia. Fikadu et al. (2014) also found that 96.7% of the children were breastfed for more than 6 months of age in South Ethiopia. Besides, this study found that the prevalence of early initiation of breastfeeding within one hour of birth was 82.7%. This result was higher compared to national study which found 65.3% of mothers were initiated breastfeeding within one hour of birth (IPH, 2016b). The finding found in the present study was also higher than study conducted by Muldiasman et al. (2018) that showed 45.9% of children in Indonesia got the opportunity to be breastfed early by their mothers. The mean duration of breastfeeding was about 30 months in this study. This result was higher compared to national study which showed median duration of breastfeeding among children aged 0-35 months old was 24 months (IPH, 2016b).

Table 4.3: Breastfeeding practices of the respondents (n= 52)

Characteristics	Mean $\pm$ SD	n (%)
Current breastfeeding status		
Yes		9 (17.3)
No		43 (82.7)
Exclusive breastfeeding		
Yes		41 (78.7)
No		11 (21.3)
Early initiation of breastfeeding		
Yes		43 (82.7)
No		9 (17.3)
Breastfeeding duration	29.69 $\pm$ 11.34	
< 6 months		7 (13.5)
$\geq$ 6 months		45 (86.5)
Length of milk feeding (Breastfeeding + Bottle feeding)	36.56 $\pm$ 13.80	
$\leq$ 24 months		20 (38.5)
25 – 48 months		15 (28.8)
> 48 months		17 (32.7)
Age introducing to other liquid	8.12 $\pm$ 5.74	
< 6 months		7 (13.5)
6 -12 months		37 (71.2)
> 12 months		8 (15.4)
Age to start complementary feeding	8.46 $\pm$ 6.80	
< 6 months		2 (3.8)
6- 12 months		44 (84.6)
> 12 months		6 (11.5)
Supplement		
Yes		19 (36.5)
No		33 (63.5)
Age given supplement (n=19)	24.95 $\pm$ 13.73	
< 12 months		2 (10.5)
12 – 24 months		1 (5.3)
> 24 months		16 (84.2)
Types of supplements (n=19)		
Appeton multivitamin		3 (15.8)
Calcium		1 (5.3)
Scott Emulsion		5 (26.3)
Vitamin C		10 (52.6)

4.3 Environmental Factors

4.3.1 Food security

Table 4.4 shows food security status in this study. Food security of the children in this study was assessed by using The U.S. Household Food Security Survey Module: Six-Item Short Form Economic Research Service (USDA) by Blumberg et al. (1999). The means $\pm$ SD for food security was 2.58 ± 1.79 , with majority of the households in this study had the problem of food insecurity (67.3%). According to UNICEF (2018), 1 in 2 urban poor household did not have enough money to buy food in recent months and 15% of household experiences this frequently. The Malaysian Adult Nutrition Survey (MANS) in 2014 found that about 4 million children (23.7%) were experiencing food insecurity in terms of reliance on a limited number of cheap foods, 20.8% (3.5 million) of households reported an inability to feed children with a variety of foods due to financial constraint (IPH, 2014).

Urban poor households are becoming increasingly food insecure, and in Nairobi, levels of food insecurity are estimated to be as high as 85.0% (Faye et al., 2011). In a disadvantaged district of Ho Chi Minh City, Vietnam, 34.4% of the households were food insecure (Vuong et al., 2015). Despite rapid urbanization, food insecurity remains a major public health concern in urban areas, implying that strategies to address food insecurity should be implemented in urban settings, and not just focusing in rural areas (Vuong et al., 2015). Food insecurity is caused by a combination of low and irregular incomes and high food costs (Boonyabancha et al., 2019). Access to adequate diets is a major challenge for low-income communities in Asia, and that hunger is widespread (Boonyabancha et al., 2019). The COVID-19 pandemic has also brought economic insecurity contributes to the increasing in food insecurity (Bublitz et al., 2020).

Table 4.4: Food security status of the respondents (n=52)

No.	In the last 12 months,	n (%)			
		Often true	Some-times true	Never true	Don't know / Refused
1.	The food that we bought just didn't last, and we didn't have money to get more.	19 (36.5)	12 (23.1)	20 (38.5)	1 (1.9)
2.	We couldn't afford to eat balanced meals.	15 (28.8)	11 (21.2)	26 (50)	-
		Yes	No	Don't know	
3.	Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?	30 (57.7)	22 (42.3)	-	
		Almost every month	Some months but not every month	Only 1 or 2 months	Don't know
4.	If yes, how often did this happen?	7 (23.3)	14 (46.7)	9 (30.0)	-
5.	Did you ever eat less than you felt you should because there wasn't enough money to buy food?	27 (51.9)	25 (48.1)	-	
6.	Were you ever hungry but didn't eat because you couldn't afford enough food?	32 (61.5)	20 (38.5)	-	
	Food security total score	2.58 ± 1.79			
	High food security	17 (32.7)			
	Low food security	25 (48.1)			
	Very low food security	10 (19.2)			

4.3.2 Second-hand smoke exposure

As shown in Table 4.5, all mothers in this study were not smoking. However, 36.5% of the fathers smoked. The means ± SD of the number of cigarettes that fathers smoked was 8.21 ± 3.31 per day, in which more than half smoked more than 10 cigarettes per day (52.6%) in this study. This finding reported 32.7% of children were exposed to second-hand smoke. According to the study by Lim et al. (2020), 23.3% reported exposure to second-hand smoke at least once in the car of their parents/guardians during one week before the survey. About

two-third (64.8%) of the fathers smoked at home exposing their children to second-hand smoke hazards (Vitória et al., 2017). Lee et al. (2020) showed that half of the pre-schoolers aged 3 to 6 years old in Seremban (51.4%) were exposed to second-hand smoke daily. Another local study found that the prevalence of second-hand smoke exposure was 56.4% among children in Peninsular Malaysia (Ghazali et al., 2019). Abidin et al. (2011) found that self-reported second-hand smoke exposure was 66.9% among 695 primary school students below aged 12 years in Kuala Lumpur and Negeri Sembilan. The finding of this study was also comparable with a study conducted in Bangladesh, that found 39.6% of the children exposed to second-hand smoke daily (Zafar Ullah et al., 2013).

Table 4.5: Second-hand smoke exposure of the respondents (n=52)

No.	Statement	n (%)
1.	Do you (or a female caregiver) smoke in the house?	
	Yes	0
	No	52 (100.0)
2.	Does your husband (or male caregiver) smoke in the house?	
	Yes	19 (36.5)
	No	33 (63.5)
3.	If yes, how many cigarettes does your husband (or male caregiver) smoke each day?	
	< 5 cigarettes	1 (5.3)
	5-10 cigarettes	8 (42.1)
	>10 cigarettes	10 (52.6)
	Mean $\pm$ SD	8.21 $\pm$ 3.31
4.	Are the people living with you allowed to smoke? (Anywhere in your house / in several rooms in your house / only in one room in your house / only outside)	
	Yes	8 (15.4)
	No	44 (84.6)
5.	The number of cigarettes you/your husband/your family members smoke in the house each day	
	At least one cigarette smoked inside the house per day	17 (32.7)
	Never smoked inside the house	35 (67.3)

4.4 Factors associated with stunting

4.4.1 Association between sociodemographic factors and stunting

The association between sociodemographic factors and stunting is presented in Table 4.6. No significant association was found between sociodemographic factors and stunting in children, except for child's gender.

Table 4.6: Association between sociodemographic factors and stunting (n= 52)

Factors	n (%) / Mean $\pm$ SD		χ^2/t	p-value
	Stunted (n=15)	Not stunted (n=37)		
Age (years)	3.20 $\pm$ 1.32	3.46 $\pm$ 1.19	0.689	0.494
Gender				
Male	4 (26.7)	23 (62.2)	4.059	0.020
Female	11 (73.3)	14 (37.8)		
Ethnicity				
Malay	11 (73.3)	32 (86.5)		0.419 ^a
Non-Malay	4 (26.7)	5 (13.5)		
Marital status				
Married	14 (93.3)	36 (97.3)		0.498 ^a
Not married	1 (6.7)	1 (2.7)		
Maternal parity	2.33 $\pm$ 1.18	2.11 $\pm$ 0.97	-0.715	0.798
Monthly household income	3660.00 $\pm$ 1718.72	4143.24 $\pm$ 1454.41	1.030	0.308
< RM 2000	4 (26.7)	5 (13.5)	1.469	0.480
RM 2000-3999	6 (40.0)	15 (40.5)		
> RM 4000	5 (33.3)	17 (45.9)		
Maternal education level				
Primary and secondary	7 (46.7)	19 (51.4)	0.094	0.760
Tertiary	8 (53.3)	18 (48.6)		
Paternal education level				
Primary and secondary	9 (60.0)	23 (62.2)	0.021	0.885
Tertiary	6 (40.0)	14 (37.8)		
Maternal employment status				
Employed	14 (93.3)	26 (70.3)		0.143 ^a
Unemployed	1 (6.7)	11 (29.7)		
Paternal employment status				
Employed	15 (100.0)	34 (91.9)		0.548 ^a
Unemployed	0 (0.0)	3 (8.1)		

^a Fisher exact test was performed

This study showed that there was a significant association between child's gender and stunting ($\chi^2 = 4.059$, $p = 0.020$), which females showed higher prevalence of stunting (73.3%) compared to males (26.7%). The finding was similar to a national study by IPH (2015), whereby it was reported that female children (14.1%) had higher prevalence of stunting compared to male children (12.7%). Similar finding was found in other previous studies (Karim & Mohd Noor, 2018; Shinsugi et al., 2015). In contrast, some previous studies found the opposite, in which more males were stunted than females (Mohd Nasir et al., 2012; Partap et al., 2019; Ponum et al., 2020). Biologically, female subjects have an advantage for better health and longer survival because of the role of sex hormones in modulating lipid levels and increasing immune response (Assefa et al., 2015), but in this study, findings found more females were stunted than males. This may be due to the different setting and unbalanced proportion of male and female children in this study.

There was no significant association between ethnicity and stunting ($p = 0.419$). This finding was contradicted with a local study done by Partap et al. (2019), which reported that Malay have higher prevalence of stunting (73.6%) compared to non-Malay (Chinese, Indian, Orang Asli) among Malaysian children and adolescents ($p < 0.001$). The implications of the increased risk of stunting observed among Malay children and adolescents are unclear (Partap et al., 2019).

No significant association between parental marital status and stunting ($p = 0.498$) was found in this study. Similar finding was found in other studies (Akombi et al., 2017; Assefa et al., 2015). In contrast, this result was contradicted with the study conducted by Abuya et al. (2012), which showed that the prevalence of stunting for children born with never married were 56% higher relative compared to those who were married ($p < 0.05$).

This study showed no significant difference between maternal parity and stunting ($p = 0.798$). The result of this study was consistent with other studies (Manggala et al., 2018;

Mzumara et al., 2018; Suryanegara & Reviani, 2020). However, there were studies showed opposite findings (Darteh et al., 2014; Faye et al., 2011), which found that household with more than 4 children showed higher prevalence of stunting compared to lower number of children. Women with higher parity are likely to have many young children, who might compete for the available care resources, which can have a negative effect on good care practices and consequently their children growth outcomes (Amugsi et al., 2019).

This study found no significant association between monthly household income and stunting ($p = 0.480$). Result was inconsistent with previous studies (Li et al., 2020; Ninna & Ruli, 2017; Utami et al., 2019; Yanti & Fauziah, 2021), which showed significant association. Households with low income would purchase foods that are cheap, thus with poor quality and nutritional value lead to nutritional status negatively being affected (Ntila et al., 2017). Almost all families had to change their lifestyles due to the impact of COVID-19 pandemic. Many families had to rearrange their shopping priorities, in which they will buy their essential needs only and may choose for lower quality items. This condition will also affect the decision of families in selecting the nutritious food for their children's growth and development, where this will affect the nutritional status of their children (Yanti & Fauziah, 2021). However, insignificant finding was shown in the current study, in which this might be due to the small sample size in the study.

No significant association was found between parental education level and stunting in this study. Similar finding was found in the previous studies (Hoque et al., 2016; Taufiqoh et al., 2018). In contrast, Assefa et al. (2015) showed that those who received even a minimal education were generally more aware than those who had no education of how to utilize available resources for the improvement of their own nutritional status and that of their families. Furthermore, no significant association between parental employment status and stunting was found in the current study. This finding was similar to other previous studies

(Amaha & Woldeamanuel, 2021; Chávez-Zárate et al., 2019; Eshete et al., 2017; García Cruz et al., 2017; Ninna & Ruli, 2017) whereby no significant association was found between employment status and child stunting. Stay-at-home mothers (unemployed mothers) are more likely to breastfeed and look after their children than working mothers (Amaha & Woldeamanuel, 2021).

4.4.2 Association between nutritional factors and stunting

The association between nutritional factors and stunting is presented in Table 4.7. No significant association was found between nutritional factors and stunting in children, except for mother's height.

Table 4.7: Association between nutritional factors and stunting in children

Nutritional Factors	n (%) / Mean $\pm$ SD		χ^2/t	p-value
	Stunted (n=15)	Not stunted (n=37)		
Birth weight (kg)	2.71 $\pm$ 0.37	3.23 $\pm$ 0.36	4.671	0.21
Low birth weight	3 (20.0)	0 (0.0)		
Normal	12 (80.0)	37 (100.0)		
Mother height (cm)	153.73 $\pm$ 8.98	161.84 $\pm$ 7.26	2.341	0.023
< 150 cm	8 (53.3)	3 (8.1)		0.031 ^a
> 150 cm	7 (46.7)	34 (91.9)		
Father height (cm)	167.73 $\pm$ 12.81	162.62 $\pm$ 5.98	1.886	0.065
< 165 cm	4 (26.7)	3 (8.1)		0.078 ^a
> 165 cm	11 (73.3)	34 (91.9)		
Exclusively breastfeeding				1.000 ^a
Yes	12 (80.0)	29 (78.4)		
No	3 (20.0)	8 (21.6)		
Breastfeeding duration	19.60 $\pm$ 10.85	19.73 $\pm$ 11.69	0.037	0.971
< 6 months	1 (6.7)	6 (16.2)		0.658 ^a
> 6 months	14 (93.3)	31 (83.8)		

^a Fisher exact test was performed

There was no significant association between birth weight and stunting ($p = 0.210$) in this study. However, the finding of this study was contradicted with other previous studies

(Avana et al., 2014; Dewi et al., 2019; Nurmalasari et al., 2019). Children with low birth weight had higher likelihood to become stunted. Low birth weight children are more susceptible to various infections, diseases, loss of appetite, and poor nutrition as compared to normal birth weight children (Rahman et al., 2019). The contradicted result might be due to recall bias and small sample size in this study.

This study showed that there was a significant association between mother's height and stunting ($\chi^2 = 2.341$, $p = 0.023$). Mothers in this study with a height of lower than 150 cm showed higher prevalence of stunting in children (53.3%) compared to mothers with more than 150 cm (46.7%). Consistent with previous study by Addo et al. (2013), their results showed that children with mothers with <150 cm were more likely to become stunted compared to mothers higher than 150 cm. Similarly, a recent study by Nuraisya and Erdi (2021) found that mothers who had short stature had a chance to experience high incidence of stunting compared to mothers who had normal height. Another recent study by Amaha and Woldeamanuel (2021) found that short mothers (< 150 cm) were 2.5 times more likely to have stunted children when compared with mothers above 160 cm. This study appears to support the theory that stunting is passed down through the generations, with shorter women producing stunted children who grow up to be short mothers with stunted children (Amaha & Woldeamanuel, 2021). Short parents, either one or both, are more likely to pass on the short characteristic to their offspring since the genes on their chromosomes carry the short trait (Nuraisya & Erdi, 2021). The protective influence of maternal height against offspring stunting agrees with prior observations that tall mothers have increased reproductive success (fertility, child survival) in stressed environments (Addo et al., 2013).

There was no significant association between father's height and stunting ($p = 0.065$). This finding was consistent with a recent study conducted by Sindhughosa and Arimbawa (2020). In contrast, Ninna and Ruli (2017) showed significant association between father's

height and child stunting. The result of this study maybe mistaken due to the self-reported anthropometry data. The second possibility is, in this study the measured variable was done once, and no further monitoring was carried out, meanwhile, to assess the association between father's body height to stunting required continuous monitoring (Sindhughosa & Arimbawa, 2020).

This study shows no significant association between exclusive breastfeeding and stunting ($p = 1.000$). This study was consistent with Muldiasman et al. (2018). In contrast, this finding was contradicted with the other studies that showed significant association (García Cruz et al., 2017; Kuchenbecker et al., 2015; Ninna & Ruli, 2017; Nurmallasari et al., 2019).

This result of this study shows no significant association between breastfeeding duration and stunting ($p = 0.658$). Only one mother with stunted child in this study reported that she breastfed her child for less than 6 months. Due to the small sample size, it is not enough to detect significant association. This result was inconsistent with other studies (Campos et al., 2020; Fikadu et al., 2014; Tiwari et al., 2014), which showed significant association. Prolonged duration of breastfeeding in children up to three years of age had significant association with stunting (Syeda et al., 2021).

4.4.3 Association between environmental factors and stunting

The association between environmental factors and stunting is presented in Table 4.8. The finding of this study showed that there was no significant association between food security and stunting ($p = 0.747$). This study was consistent with a previous study done by Shinsugi et al. (2015). However, other previous studies found significant association (Agho et al., 2019; Berra, 2020; Betebo et al., 2017; Campos et al., 2020; Mahmudiono et al., 2018; Moradi et al., 2019). Osei et al. (2010) suggested that household food security is important for

improved dietary intake of children; however, this alone may not have been enough to influence the nutritional status of the children.

Table 4.8: Association between environmental factors and stunting in children

Environmental factors	n (%) / Mean $\pm$ SD		χ^2/t	p-value
	Stunted (n=15)	Not stunted (n=37)		
Food security				0.747 ^a
High food security	4 (26.7)	13 (35.1)		
Low food security	11 (73.3)	24 (64.9)		
Maternal smoking				-
No	15 (100.0)	37 (100.0)		
Paternal smoking			5.004	0.025
Yes	9 (60.0)	10 (27.0)		
No	6 (40.0)	27 (73.0)		
Second-hand smoke exposure				<0.001 ^a
Yes	11 (73.3)	6 (16.2)		
No	4 (26.7)	31 (83.8)		

^a Fisher exact test was performed

This study showed significant association between parental smoking and stunting ($p = 0.025$). Higher proportion of stunted children (60.0%) had fathers who smoked compared to non-stunted children (27.0%). This finding was consistent with Astuti et al. (2020) that found smoking father has higher child stunting prevalence (63.6%) compared to non-smoking father (36.4%). Besides, their findings found that the group whose fathers did not smoke, 17.5% had severely stunted growth, compared to 20.4% in the smoking group (Astuti et al., 2020). The nutritional status of children whose fathers smoked is poor (Wijaya-Erhardt, 2019). Children whose fathers smoked were likely to have a lower reported proportion of food expenditure in the households lead to low in nutritional status in children (Wijaya-Erhardt, 2019). Money spent in smoking is potentially the money not spent on food and deprives the family of much needed income from their basic needs (Chowdhury et al., 2011), in which this might affect nutritional status of the children.

On the other hand, this study shows significant association between second-hand smoke exposure and child stunting ($p < 0.001$). More stunted children (73.3%) were exposed to second-hand smoke as compared to non-stunted children (16.2%). This finding was consistent with some recent studies (Astuti et al., 2020; Nadhiroh et al., 2020). Chowdhury et al. (2011) explained that indoor air pollution can cause respiratory infection, which can contribute to malnutrition in children. Nicotine can reduce 30–40% oxygen supply and disturb the absorption of nutrients such as calcium, minerals, and vitamin C that are important for the height growth of children (Ramadani et al., 2019). Therefore, it is crucial that active smokers, specifically those who live together with children, are made aware of the potential effects of second-hand smoke exposure on non-smokers (Nadhiroh et al., 2020).

CHAPTER 5

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1 Conclusion

This study found that stunting prevalence in urban poor children aged 2 to 5 years old were 28.8%. Prevalence of underweight and wasting were same which was 7.7% and for overweight the prevalence was quite high (34.6%). However, the results in this study have to be interpreted cautiously as self-reported height and weight of the children was used in this study due to the application of lockdown in the country to contain COVID-19 pandemic. This finding also found that the prevalence of overweight and obesity were high among low-income adults. Most of the mothers in this study practiced exclusive breastfeeding and majority of the households had the problem of food insecurity.

There were associations observed between children's gender, mother's height, paternal smoking and second-hand smoke exposure with stunting among urban poor children aged 2 to 5 years old in this study. In other words, female, short mother's stature, fathers who smoked and children who exposed to second-hand smoke showed higher risk of becoming stunted. The COVID-19 crisis has public health implications in children that could have life-long consequences. Effective and targeted measures mainly for these vulnerable children and households are needed to guarantee children's basic rights for optimal nutrition, health and development. Nutrition and lifestyle should be a key component of a response plan to such a pandemic, specifically for the vulnerable populations (Zemrani et al., 2021).

5.2 Limitations of the study

There are several limitations of the study that should be taken into consideration. Firstly, the minimum sample size of this study was not achieved due to COVID-19 pandemic and MCO and CMCO implementation by the government caused restriction of face-to-face data collection. Online survey was conducted where low response rate was received from the urban poor community. Nevertheless, online survey is safe to be conducted in such specific conditions. In addition, anthropometry data were self-reported by mothers, this can lead to misreporting and affect the results of this study. Besides, convenience sampling used in this study may bias the findings and they cannot be generalized to all urban poor children in Malaysia. Moreover, cross-sectional study design was used in this study, where it does not provide a causal relationship between independent and dependent variables.

5.3 Recommendations

Longitudinal study should be conducted in the future among urban poor children to see the changes of HAZ over time. Besides, future studies should include larger sample size and include all urban poor population in Malaysia. Anthropometry data should be measured by researcher to prevent bias of the results. Health professional such as nutritionists should provide education to the urban poor community about the relationship between cigarette smoke exposure and the risk of stunting in children. It is crucial that active smokers, especially those who live with children, are made aware of the potential negative impacts of second-hand smoke exposure on children. Household member who is smoker should be encouraged to stop smoking in order to maintain a smoke-free home environment. Further studies are needed to determine the impact of second-hand smoke exposure with different measures of child nutritional status. Interventions implemented through community-based platform programs such as exclusive breastfeeding as well as antenatal, perinatal and postnatal care should be

delivered by healthcare personnel or trained community workers and nutritionists and implemented locally in urban poor communities to reduce the prevalence of stunting among urban poor children.



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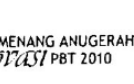
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Appendix B: Permission from Kuala Lumpur City Council (DBKL)



JABATAN PEMBANGUNAN KOMUNITI DAN KESEJAHTERAAN BANDAR DEWAN BANDARAYA KUALA LUMPUR

TEL.: 03-26176000 FAKS.: 03-26983722



Ruj Tuan : UPM/FPSK/JPD/600-4/14/1
Rujukan Kami : (72) DBKL/JPKKB/SPZ/29-3 Jil 8
Tarikh : 21 Ogos 2020
2 Muharram 1442H

Ketua Projek
Jabatan Pemakanan dan Dietetik
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
(u.p : Prof. Madya Dr. Gan Wan Ying)

Tuan,

SURAT KEBENARAN UNTUK MENJALANKAN KAJIAN PENYELIDIKAN DI KAWASAN PROGRAM PERUMAHAN RAKYAT (PPR), KUALA LUMPUR

Dengan hormatnya adalah saya diarah merujuk kepada perkara di atas.

2. Sukacita dimaklumkan bahawa surat kebenaran untuk menjalankan kajian penyelidikan di kawasan PA/PPR Dewan Bandaraya Kuala Lumpur telah diterima oleh Jabatan Pembangunan Komuniti dan Kesejahteraan Bandar.
3. Sehubungan dengan itu, jabatan ini telah bersetuju memberi kebenaran bagi melaksanakan kajian penyelidikan dengan mematuhi segala syarat-syarat yang telah ditetapkan oleh pihak jabatan. Oleh yang demikian, pihak jabatan mencadangkan kawasan PA/PPR seperti yang dimohon oleh pihak tuan sebagai rujukan (seperti dilampiran).
4. Sehubungan dengan itu, sebarang pertanyaan mengenai perkara di atas boleh hubungi Pelawat Perumahan mengikut PA/PPR yang telah disenaraikan. (Rujuk Lampiran)

Sekian, terima kasih.

.../2



MARLIAH/KAJIAN PENYELIDIKAN/MyDoc

Appendix C: Information sheet and consent form

1. STUDY TITLE:

Factors Associated with Stunting among Urban Poor Children Aged 2 to 5 years living in Low Cost-Flats at Kuala Lumpur

2. INTRODUCTION

Stunting is when a child has a low height for their age. Stunting is a condition in which children's growth and development are impaired as a result of poor nutrition, repeated infections, and insufficient psychosocial stimulation. Children are defined as stunted if their height-for-age z-score is more than two standard deviations below the WHO Child Growth Standards median. Childhood stunting is linked to a variety of short-and long-term health and social issues. A child with stunted linear growth can have a difficult time preventing illnesses. Previous study on stunting focusing on school age children rather than under five children. Therefore, this study aims to determine factors associated with stunting among urban poor children aged 2 to 5 years living in low cost-flats at Kuala Lumpur.

3. WHAT WILL YOU HAVE TO DO?

Respondent are required to fill all the important detail and answered the questionnaire carefully. Please read and understand the instruction given. Things that respondent need to do are as follows:

- a) Respondents will need to fill in the google form of the structured questionnaire regarding sociodemographic characteristic, breastfeeding practice, food insecurity, second-hand smoke exposure and anthropometry data.

There is no right and wrong answers. Respondents can answer all the questions without feeling pressure. Participating in this study is in form of voluntary and respondents may have the right to withdraw from this study at any time without giving any reasons and no penalty will be applied upon the withdrawal. There will be no payment gift nor incentive for those who participating in this study.

4. WHO SHOULD NOT PARTICIPATE IN THIS STUDY?

Children below or above the aged of 2 to 5 years old, non-Malaysian, children with psychomotor retardation, hormonal disorder and acute severe illness such as heart attack and pneumonia, mothers and children who were in quarantined period that had close contact with COVID-19 infectious person, physical disability and did not have access to Internet.

5. WHAT WILL BE BENEFIT OF THE STUDY

- a) TO YOU AS THE SUBJECT?

You will be provided with a summary of your stunting status and body weight status (body weight, height and body mass index). Summary of the finding will be given upon request.

- b) TO THE INVESTIGATOR?

Finding of this study will provide information on factors associated with stunting among urban poor children at Kuala Lumpur. Findings of this study will help

nutritionists and health promotion planners to establish effective intervention or health promotion strategies to improve the nutritional and health status of urban poor children.

6. WHAT ARE THE POSSIBLE RISK?

The respondents will not face any risks by taking part in this study.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All the information which is collected about you during the course of the research will kept strictly confidential and anonymised so that only the researcher carrying out the research will have access to such information.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTION DURING THE COURSE OF THE RESEARCH?

If you have any enquiries, you can contact as follow:

Researcher:

Nur Aida Aryani binti Mohd Razi

014-8338852 / 192111@student.upm.edu.my

Department of Nutrition,
Faculty Medicine and Health Sciences,
Universiti Putra Malaysia,
43400, UPM Serdang,
Selangor Darul Ehsan.

Supervisor:

Associate Professor Dr. Gan Wan Ying

03-97692469 / wanying@upm.edu.my

Department of Nutrition,
Faculty Medicine and Health Sciences,
Universiti Putra Malaysia,
43400, UPM Serdang,

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to
take part in the research stated above *(clinical /drug trial/video recording/ focus
group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse
effects and complications (as written in the Respondent's Information Sheet). I understand that
I have the right to withdraw from this research at any time without giving any reason
whatsoever. I also understand that this study is confidential, and all information provided with
regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be
used in any form of publication or presentation (if applicable)

* Delete where necessary

Signature Signature
(Respondent) (Witness)

Date:..... Name:.....

I/C No.:.....

I confirm that I have explained to the respondent the nature and purpose of the above-
mentioned research.

Date:..... Signature
(Researcher)

Appendix D: Questionnaire



No. Rujukan

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FAKULTI PERUBATAN DAN SAINS KESIHATAN

JABATAN PEMAKANAN

SOAL SELIDIK KAJIAN

FAKTOR YANG MEMPENGARUHI TUMBESARAN TERBANTUT DALAM KALANGAN KANAK-KANAK BERUMUR 2-5 TAHUN DI PROJEK PERUMAHAN RAKYAT (PPR) DI KUALA LUMPUR

Nama : Nur Aida Aryani bt Mohd Razi

Nombor matrik : 192111

Program : BSc. (Pemakanan dan Kesihatan Komuniti)

Penyelia : Assoc. Prof. Dr Gan Wan Ying

Panduan borang soal selidik:

1. Borang soal selidik ini mengandungi enam bahagian.
2. Segala maklumat yang diberikan akan dirahsiakan dan digunakan hanya untuk penyelidikan sahaja.
3. Kerjasama anda amatlah dihargai dan diakhiri dengan ucapan terima kasih.

BAHAGIAN A
MAKLUMAT PERIBADI

Arahan: Sila jawab semua soalan berikut.

1. Tarikh lahir anak: __/__/____ (hh/bb/tttt)

2. Umur anak: _____ tahun

3. Jantina anak:

☐	Lelaki
☐	Perempuan

4. Bangsa anak:

☐	Melayu
☐	Cina
☐	India
☐	Lain-lain (sila nyatakan): _____

5. Berat lahir anak: _____ kg

6. Anak ini merupakan anak ke berapa? _____

7. Bilangan anak: _____

8. Pariti ibu (Pariti didefinisikan sebagai berapa kali ibu melahirkan janin dengan usia kehamilan 24 minggu atau lebih, tidak kira sama ada anak itu dilahirkan hidup atau kelahiran mati)

☐	Primipara (mengandung buat pertama kalinya)
☐	Multipara (telah melahirkan lebih daripada seorang anak)

9. Status perkahwinan anda:

☐	Berkahwin
☐	Tidak berkahwin
☐	Ibu tunggal
☐	Berceraai

10. Taraf pendidikan anda

☐	Tiada pendidikan formal
☐	Sekolah Rendah
☐	Sekolah Menengah
☐	Diploma / Sijil
☐	Universiti

11. Status Pekerjaan anda

☐	Tidak bekerja
☐	Pelajar
☐	Bekerja

12. Taraf pendidikan suami

☐	Tiada pendidikan formal
☐	Sekolah Rendah
☐	Sekolah Menengah
☐	Diploma / Sijil
☐	Universiti

13. Pekerjaan suami

☐	Tidak bekerja
☐	Pelajar
☐	Bekerja

14. Pendapatan bulanan keluarga: RM_____

BAHAGIAN B
DATA ANTHROPOMETRI

1. Sila nyatakan ketinggian anak anda dalam cm: _____cm
2. Sila nyatakan berat badan anak anda dalam kg: _____kg
3. Sila nyatakan ketinggian anda dalam cm: _____cm
4. Sila nyatakan berat badan anda dalam kg: _____kg
5. Sila nyatakan ketinggian suami anda dalam cm (jika berkenaan): _____cm
6. Sila nyatakan berat badan suami anda dalam kg (jika berkenaan): _____kg

BAHAGIAN C

No	Perkara	Pilihan
1	Adakah anak anda masih disusukan dengan susu ibu (susu badan)?	() Ya () Tidak
	Adakah anda memberi susu ibu kepada anak ini dalam 1 jam yang pertama selepas kelahiran?	() Ya () Tidak
	Berapa lamakah tempoh anda menyusukan anak ini (termasuk susu ibu dan susu formula)?	_____bulan
	Berapa lamakah tempoh anda menyusukan anak ini secara eksklusif (hanya memberi susu ibu sahaja tanpa makanan atau minuman lain termasuk tidak memberi air kosong)?	_____bulan
2	Bilakah anda mula memperkenalkan cecair lain selain susu ibu?	_____bulan
	Berapakah umur anak ini apabila anda mula memperkenalkan makanan pelengkap kepadanya (kecuali susu formula)? <i>*Makanan pelengkap ditakrifkan sebagai makanan yang diberikan kepada bayi dalam bentuk pepejal atau separuh pepejal selain daripada susu ibu.</i>	_____bulan
3.	Berapa umur anak anda sekiranya anda telah berhenti menyusu susu ibu?	_____bulan
	a) Adakah anda memberi makanan suplemen kepada anak ini (dalam bentuk tablet/capsul/cecair)? Jika ada b) Berapakah umur anak ini semasa anda mula memberi produk suplemen tersebut? Apakah jenis suplemen yang diberikan?	() Ya () Tidak () bulan Sila nyatakan:

BAHAGIAN D

1. “Makanan yang (saya/kami) beli tidak akan bertahan lama, dan (saya/kami) tidak mempunyai wang untuk mendapatkan lebih banyak”.

Adakah kenyataan itu sering, kadang-kadang atau tidak benar untuk (anda/isi rumah anda) dalam tempoh 12 bulan yang lalu?

☐	Sering benar
☐	Kadang-kadang benar
☐	Tidak benar
☐	Tidak Tahu/Menolak

2. “(Saya/kami) tidak mampu untuk makan makanan seimbang.”

Adakah kenyataan itu sering, kadang-kadang atau tidak benar untuk (anda/isi rumah anda) dalam tempoh 12 bulan yang lalu?

☐	Sering benar
☐	Kadang-kadang benar
☐	Tidak benar
☐	Tidak Tahu/Menolak

3. Dalam tempoh 12 bulan yang lalu, sejak (nama bulan terkini), adakah (anda/atau orang dewasa lain dalam isi rumah anda) pernah mengurangkan saiz makanan atau melangkau waktu makan kerana tidak mempunyai wang yang cukup untuk makanan?

☐	Ya
☐	Tidak (Langkau soalan 4)
☐	Tidak tahu (Langkau soalan 4)

4. Jika ya, berapa kerapkah keadaan ini berlaku – hampir setiap bulan, beberapa bulan tetapi bukan setiap bulan, atau dalam hanya satu atau 2 bulan?

☐	Hampir setiap bulan
☐	beberapa bulan tetapi bukan setiap bulan
☐	Hanya 1 atau 2 bulan
☐	Tidak Tahu

5. Dalam tempoh 12 bulan yang lalu, adakah anda pernah makan kurang daripada yang anda rasa anda perlu kerana tidak mempunyai wang yang cukup untuk makanan?

☐	Ya
☐	Tidak
☐	Tidak tahu

6. Dalam tempoh 12 bulan yang lalu, adakah setiap kali anda lapar tetapi tidak makan kerana tidak mempunyai wang yang cukup untuk makanan?

☐	Ya
☐	Tidak
☐	Tidak tahu

BAHAGIAN E

No	Perkara	Pilihan
1.	Adakah anda (atau penjaga wanita) menghisap rokok di dalam rumah?	() Ya () Tidak
	Sekiranya ya, berapa banyak rokok yang dihisap oleh anda (atau penjaga wanita) setiap hari?	_____ batang rokok
2.	Adakah suami anda (atau penjaga lelaki) menghisap rokok di dalam rumah?	() Ya () Tidak
	Sekiranya ya, berapa banyak rokok yang dihisap oleh suami anda (atau penjaga lelaki) setiap hari?	_____ batang rokok
3.	Adakah orang yang tinggal bersama anda dibenarkan merokok? (Di mana sahaja di dalam rumah anda / di beberapa bilik di rumah anda / hanya di satu bilik di rumah anda / hanya di luar)	() Ya () Tidak
4.	Jumlah rokok yang dihisap anda/suami anda/ahli keluarga anda di dalam rumah setiap hari	() Tidak pernah merokok dalam rumah () Lebih daripada satu rokok dihisap di dalam rumah setiap hari

-SOAL SELIDIK TAMAT-