ASSOCIATION BETWEEN TYPE AND LEVEL OF DISABILITY WITH OVERWEIGHT OR OBESITY AMONG THE DISABLED IN KELANTAN

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ASSOCIATION BETWEEN TYPE AND LEVEL OF DISABILITY WITH OVERWEIGHT OR OBESITY AMONG THE DISABLED IN KELANTAN

by

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and the highest blessed to both my parent who continuously courage, support, and prayer; and to the one above all of us, Allah, for answering my prayers and giving me the strength and courage to accomplish the task.

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ABSTRAK

HUBUNGKAIT ANTARA JENIS DAN TAHAP KECACATAN DENGAN BERLEBIHAN BERAT BADAN ATAU OBESITI DI KALANGAN ORANG KURANG UPAYA DI KELANTAN

Latar belakang: Kekurangan upaya merupakan satu keadaan yang mudah untuk seseorang mendapat penyakit atau masalah kesihatan yang berkaitan kecacatannya terutamanya penyakit tidak berjangkit. Mereka mempunyai masalah dalam psikososial dan fizikal yang menyebabkan mereka terbatas dalam melakukan aktiviti fizikal, sekali gus membawa kepada peningkatan risiko untuk berat badan berlebihan atau obes. Keadaan ini akan menggandakan beban kepada diri mereka sendiri, keluarga dan penjagaan kesihatan. Pengetahuan kami, masih belum ada kajian analitikal yang dilakukan di antara jenis dan tahap kecacatan dengan obesiti atau berat badan berlebihan di Malaysia.

Objektif: kajian ini bertujuan untuk menggambarkan prevalens obesiti dan berat badan berlebihan di kalangan orang Kurang Upaya di Kelantan dan menentukan Persatuan antara jenis dan tahap kecacatan dengan obesiti atau berat badan secara berlebihan di Kelantan.

Metodologi: Kajian rentas lintang dijalankan dari Mac 2020 hingga Mei 2020 yang melibatkan sepuluh daerah di Kelantan. Kajian ini menggunakan data sekunder yang diperolehi daripada borang *Borang Penrmohonan Pendaftaran Orang Kurang upaya BPPOKU (Pindaan 1/2012)* sebagai sumber data. Semua pemboleh ubah yang dipilih

seperti yang tercatat dalam borang telah dikumpulkan. Analisa logistik mudah dan analisis regresi berganda digunakan untuk menganalisa hubungkait antara jenis dan tahap kecacatan dengan obesiti atau berat badan berlebihan.

Keputusan: Sejumlah 164 subjek yang memenuhi kriteria penyertaan telah dikaji. Kajian ini mendapati bahawa 33.6% daripada subjek ini adalah obesiti atau berlebihan berat badan. Analisis selanjutnya menunjukkan bahawa Kurang Upaya Pembelajaran adalah berkait rapat dengan obesiti/berat badan berlebihan (Adj. atau 0.132, 95% CI; 0.05, 0.35; p = < 0.001). Bagi penyebab Bersama, umur sahaja ditemui mempunyai kaitan rapat dengan obesiti/berat badan berlebihan (Adj. atau 1.047, 95% CI; 1.01, 1.09; p = 0.019).

Kesimpulan: Kami mendapati bahawa mereka yang mempunyai Kurang Upaya Pembelajaran mempunyai kaitan rapat dengan berat badan berlebihan/gemuk berbanding dengan lain-lain jenis kecacatan. Walau bagaimanapun, peningkatan umur akan meningkatkan risiko untuk mendapat obesiti atau berat badan berlebihan. Dengan mengenal pasti kumpulan berisiko untuk menjadi obesiti/berlebihan berat badan pasti akan membantu kami mengoptimumkan program kawalan dan pencegahan bagi mengurangkan bebanan penyakit sekunder khususnya obesiti di kalangan orang kurang upaya di Malaysia terutamanya di Kelantan.

KATA KUNCI: obesiti, berat badan berlebihan, orang kurang upaya Kurang Upaya Pembelajaran, Kelantan

ABSTRACT

ASSOCIATION BETWEEN TYPE AND LEVEL OF DISABILITY WITH OVERWEIGHT OR OBESITY AMONG THE DISABLED IN KELANTAN

Background: People with disabilities are vulnerable to a disability-related health condition, especially non-communicable diseases. They had an issue in psychosocial and physical, which caused limitation in participating in physical activity, leading to increased risk for overweight or obese. This condition will double the burden to themselves, family, and healthcare. To our knowledge, there is yet no analytical study done looking at the association between type and level of disability with obesity or overweight in Malaysia.

Objective: This study aims to describe the prevalence of obesity and overweight among the disabled in Kelantan and determine the association between type and level of disability with obesity or overweight among the disabled in Kelantan.

Methodology: A cross-sectional study was conducted from March 2020 till May 2020 involving ten districts in Kelantan. The study used secondary data derived from *Borang Permohonan Pendaftaran Orang Kurang Upaya BPPOKU (Pindaan 1/2012)* form as the source of data. All the selected variables, as documented in the form, were collected. Simple logistic and multiple logistic regression analyses were

used to analyse the association between type and level disability with obesity or overweight.

Result: A total of 164 subjects who fulfill the inclusion and exclusion criteria were studied. This study revealed that 33.6% of the residents were obese or overweight. Further analysis showed that learning disability was significantly associated with obesity/overweight (Adj. OR 0.132, 95% CI; 0.05,0.35; p=<0.001). Only age was found significantly associated with obesity/overweight (Adj. OR 1.047, 95% CI; 1.01, 1.09; p= 0.019) for the cofounder.

Conclusion: We found that those with a learning disability had less probability of being overweight/obese as compared to other types of disability. However, increasing age will increase the risk to get obesity or overweight. Being able to recognize groups at risk to become obese/overweight will undoubtedly help us optimize the control and prevention programme to reduce secondary health disease burden among the disabled, specifically obesity them, in Malaysia, especially in Kelantan.

KEYWORDS: Obesity, overweight, disabled, learning disability, Kelantan

CHAPTER 1

INTRODUCTION

Background

The WHO estimates the prevalence of the disabled in the world was 10% (WHO, 2011). This figure is a bit lower if we compare it with prevalence obtained from the World Health Survey in 2004, which was 15.6% (WHO, 2011).

Globally, the prevalence of obesity or overweight among the disabled was varied. An estimation done by James (2004), almost 315 million peoples were obese worldwide. In Turkey, the prevalence of obesity was 13.2%, and overweight was 37.6% among the disabled (Bozkir *et al.*, 2016). The prevalence of obesity among the disabled in Australia was 36% (Zhou *et al.*, 2019).

Other countries, such as the UK, already implemented a national community based healthy lifestyle programmes for children or youth and family such as the "Mind, Exercise, Nutrition… Do it!" (MEND) 's programme, but then they modified it to suit children and youth with intellectual disability and autism. Furthermore, they targeted children and youth with intellectual disabilities because of the increasing overweight and obesity trends and associated health comorbidities (Hinckson *et al.*, 2013).

In Malaysia, the disabled registered with the Department of Social Welfare in 2017 was 453,528, and 513,519 in 2018. It was about 1.58% of the total Malaysian

population, but the number was under-reporting due to more of the disabled was not registered. From the *Sinar Harian,* 13th April 2019, stated that approximately 4.86 million Malaysian were the disabled. The number was almost equal with the National Health and Morbidity Survey in 2015, which found that 11.8% were reported as disabled. However, not much study was found regarding obesity or overweight among the disabled in Malaysia.

The disabled are vulnerable to a disability-related health condition (Wilber *et al.*, 2002). In Malaysia, higher prevalence of Non-communicable diseases; Diabetes Mellitus, hypertension, and hypercholesterolemia among the disabled compared with the normal population (Ahmad *et al.*, 2017). People with disabilities have limitations in balance, strength, coordination, power, and aerobic fitness. They also had an issue in psychosocial, which causes a restriction in participating in physical activity (Papas *et al.*, 2016).

Considering the disabled were prone to get obesity or overweight, Malaysia had developed a few special programs for the disabled. Community-Based Rehabilitation was a rehabilitation programme that focused on the disabled of all ages by giving basic training in mobility, speech, special education, or skills in daily life activities. The CBR programme in Malaysia is *Pemulihan Dalam Komuniti (PDK)* under the Department of Social Welfare, and they cooperated with MOH to develop the *PDK Ku Sihat* programme. The *PDK Ku Sihat* programme focuses on health screening or NCD detection, prevention, and healthy lifestyle as general and monitoring the disabled health status (MOH, 2012). They include people with vision, hearing, physical, and having problems in learning and intelligent smart. Yet, the effectiveness of this programme is still under monitoring. Perhaps, this

study becomes preliminary research and be one of the steps to improve our strategies towards better health of the community, especially for the disabled.

The impact of being obese or overweight is higher in the disabled such as an increase in health care expenditure and can be severely changing their function and quality of life (Anderson *et al.*, 2013; Wilber *et al.*, 2002).

Hence, obesity and overweight among the disabled should become a significant public health issue. Yet, more works to be done to investigate the factors associated with obesity or overweight among them so policymaker can use reliable data. Thus, a better strategy can be implemented to tackle this epidemic.

Statement of problem & Study rationale

To our knowledge, limited studies are looking at the association of type of disability and level of disability with obesity or overweight among the disabled in Malaysia. Even there are programs built for the disabled such as *PDK Ku Sihat* but the problem regarding obesity or overweight is still common among them, and studies regarding this issue are very limited in Malaysia. The established programs were built as general for all types of disabilities. There is no specific module for each type of disability, which possibly focuses on prevention or rehabilitation programs.

From this study, the prevalence of obesity and overweight among the disabled can be obtained, and the association between obesity/overweight with type and level of disability can be studied. The result of this study can be used to increase awareness for health care providers regarding obesity/overweight among this group; hence, a specific intervention can be done to prevent and reduce this problem.

Research question

1. What is the prevalence of obesity and overweight among the disabled in Kelantan?

2. Is the type and level of disability associated with obesity /overweight among the disabled in Kelantan?

Objectives

1.4.1 General Objective

To determine prevalence and association between type and level of disability with obesity/overweight among the disabled in Kelantan.

1.4.2 Specific objectives

1) To determine the prevalence of obesity and overweight among the disabled in Kelantan.

2) To determine the association between obesity/overweight with type and level of disability among the disabled in Kelantan.

Research hypotheses

There is a significant association between type and level disability with obesity/overweight among the disabled in Kelantan.

LITERATURE REVIEW

2.1 Prevalence of obesity and overweight among the disabled

Obesity is the excessive accumulation of adipose tissue to the extent that it harms both physical and psychosocial health and well-being (James, 2004). The prevalence of obesity in western countries has doubled over the past decade.

In Figure 2.1, many countries in Central and Latin America have revealed the prevalence of overweight above 30% of their population, for example, in Colombia, Chile, Peru, Brazil, Costa Rica, and Cuba. The graph also shows an increasing trend of overweight in Latin America and Africa. Obesity or overweight was not only common in Latin America or Africa, but it is also regularly found in Southeast Asia (Muda *et al.*, 2015).

A calculation of body mass index, or BMI, determines whether a person isn't eating enough or is tipping the scales. Many developing countries are facing both problems simultaneously.

Source: WHO, 1997.
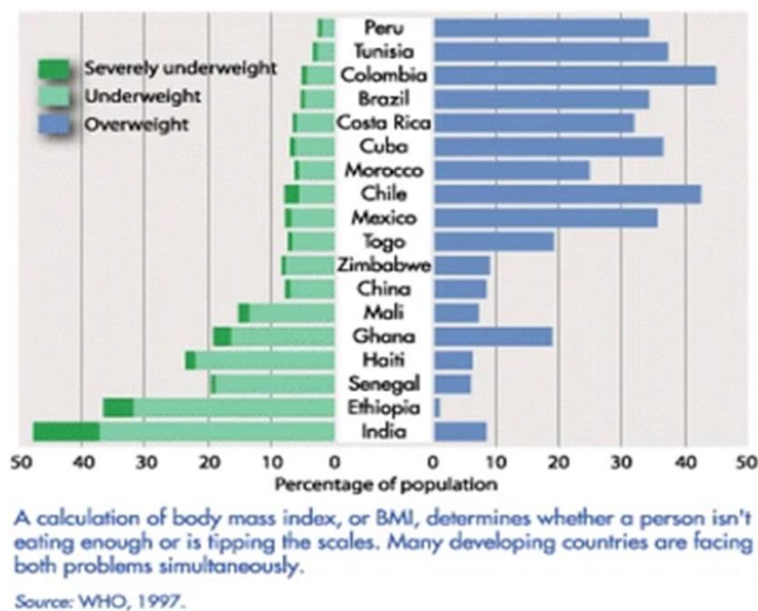
Figure 2.1 Underweight and overweight in selected developing countries.

In Malaysia, the overall national prevalence of obesity among Malaysians aged 15 years old and above was 11.7% (Rampal *et al.*, 2007). It was lowered if compared with NHMS 2015, which reported that the prevalence of overweight was 33.4%, while the prevalence of obesity was 30.6% ((IPH), 2015).

Obesity was not only a prominent health issue among healthy people but also to those with disabilities (Neter *et al.*, 2011b). The prevalence of obesity among the disabled varied from 13.2% to 38.2% and the prevalence of overweight ranged from 30% to 37.6% (Anderson *et al.*, 2013; Bozkir *et al.*, 2016; Havercamp and Scott, 2015; Papas *et al.*, 2016; Zhou *et al.*, 2019). However, the study population are varying since (Anderson *et al.*, 2013; Bozkir *et al.*, 2016; Havercamp and Scott, 2015) study are among the disabled adult while Papas *et al.* (2016) among the adolescent disabled. A systemic review by Maiano (2011), stated that the prevalence of obesity overweight ranges from 7% to 36% in people with intellectual disabilities, and the age range also varies.

A higher prevalence was noticed in the study by Rimmer and Wang (2005), with 84% of the disabled were overweight or obese. Actually, this study was conducted using secondary data from a more extensive clinical trial study that examined the effect of a health promotion program for people with physical and cognitive disabilities. They were also recruited from a small cluster of a minority community in Chicago, and possible that was the reason why this study finding was very high if we compare with other studies. A study by Bozkir *et al.* (2016) investigated prevalence and risk factors among the physically disabled adult in Turkey. The physically disabled was consist of orthopedically disabled, visually impaired, hearing impaired and speech impaired. This study was more significant because

random sampling method was used and face to face interview was conducted using a verified questionnaire.

The study topic was broad in range in terms of definition, disability type, group selection, data collection method, and age that had been investigated (Ahmad *et al.*, 2017). Yet, numerous studies focus on intellectual disability (Hsieh *et al.*, 2014; Maiano, 2011; Melville *et al.*, 2007; Rimmer *et al.*, 2007). However, a study by Rimmer and Wang (2005) was focused on people with an intellectual and physical disability, while Bozkir *et al.* (2016) study was among the physical disability, same with Reinehr *et al.* (2010).

The term disability was also a bit different in some studies. In Ahmad *et al.* (2017), the description of disability was based on the International Classification of Functioning, Disability and Health (ICF), which states that disability as an umbrella term; impairment, limitation in activity and restricted in movement. The variety of disability definitions was the reason the differences in measuring disability itself vary across countries. It also influences the results of the study.

In Malaysia, a national survey by Ahmad *et al.* (2017) was conducted, which was part of the NHMS in 2015 to examine the prevalence of disability and its determinants among adults in Malaysia as internationally comparable data on disability in Malaysia. Further analysis was showed that the population at risk in Malaysia were older people, physically inactive, low level of education, single, obesity, and having mental health problems. This survey focused on the prevalence of disability and its determinant, and it was significant that obesity was the factor for disability but unable to show vice versa.

2.2 Type disability and overweight/obesity

The factors such as type and level disabilities were reviewed in a lot of studies. Most of the study was direct their attention towards overweight or obesity among people with intellectual disabilities (Collins and Staples, 2017; Emerson *et al.*, 2016; Hinckson *et al.*, 2013; Savage and Emerson, 2016). All these studies showed a significant association between intellectual disability and obesity or overweight.

The association between type of disabilities; physical, visual, hearing, and speech disabilities with obesity and overweight were studied in Turkey (Bozkir *et al.*, 2016). The prevalence of obesity was highest in visual disability (21.3%), followed by speech disability (17.9%), 17.8% in hearing disability, and 6.5% in physical disability (Bozkir *et al.*, 2016). The prevalence of overweight/obesity among functionally restricted mobility was 30% (Reinehr *et al.*, 2010) but compared with the healthy group (16% was overweight).

Other studies indicate that children and youth with mobility limitations such as crawl, walk, run, or play, *e*xperience higher rates of obesity (28.5%) than children without these limitations. While, the children with intellectual or developmental disabilities have much higher rates of obesity (26.7%) than children without these disabilities (14.4%), though intellectual and learning disabilities are not clearly identified in their survey. Children with vision limitations were identified had a higher risk of obesity, but a significant association was not present. Hearing limitations were not significantly associated with obesity (Bandini *et al.*, 2015). The association between overweight and the type of disability was tested in De *et al.* (2008), and the result was insignificant. Apart from that, youths with cognitive

disabilities were found a significantly higher rate of obesity compared with youths with physical disabilities (Rimmer *et al.*, 2011).

A study by Fox *et al.* (1985) stated that overweight was a characteristic of children with Trisomy 21 and that knowledge was used until now. Yet, there is a limited study to show the association of each type of disability with overweight or obesity.

As far as we know, the prevalence of overweight or obesity was higher among the disabled compared with non-disabled. However, either the type of disability was a precedent to become obese or not is still weak. Furthermore, the most common type of disability that has a higher prevalence also needs to investigate.

Being obese or overweight plus having a physical or cognitive disability could affect greater demands on the person and the caregiver; in performing ADL activity and increased health care costs associated with the multiple health effects of having both (Rimmer *et al.*, 2011).

2.3 Level of disability and overweight/obesity

Another area of interest in this study was the association of the level of disability with obesity or overweight. Mobility limitation was studied by Hsieh *et al.* (2014), and the finding was 4.7% of people with intellectual disability had loads. However, no further statistical analysis was conducted for this variable. The level of disability was reported as adults with severe or profound ID had significantly lower rates of obesity compared with other levels of ID. (Bégarie *et al.*, 2013; Hsieh *et al.*, 2014).

There were studies to find the association between the severity of the disability with obesity or overweight, but none of it was significant (Bégarie *et al.*, 2013; De *et al.*, 2008; Emerson, 2009; Fox *et al.*, 1985). Yet, the definition of severity was categorized to moderate or severity of the disability. In our study, the level of disability was defined as a limitation in ADL.

Bandini *et al.* (2005) found that a higher rate of overweight (28%) among youth with mobility limitations compared with those with no limitation of movement (15%).

2.4 Other factors associated with overweight/obesity

Other variables such as age, gender, race, income, and type of institution showed affect the BMI status of the disabled (Chang *et al.*, 2017; Hsieh *et al.*, 2014; Papas *et al.*, 2016). Other related factors are dietary habits, physical activities, and comorbidities, also associated with obesity or overweight (Papas *et al.*, 2016; Zhou *et al.*, 2019).

2.4.1 Medication

The medication was confirmed is associated with weight gain. Medication stated is the medication for depression, hypertension, anxiety, epilepsy, diabetes, or sleep disorder (Hsieh *et al.*, 2014), and it was significantly associated with obesity. Side effects of medications prescribed for primary disabilities can increase appetite, decrease satiety, or alter metabolism (Tardieu *et al.*, 2003).

2.4.2 Gender

A study by James (2004) estimated the different prevalence rates of overweight and obesity in middle-aged men and women (age 45–59 years) throughout the world. Bégarie *et al.* (2013) also found a higher prevalence of obesity among women than men and demonstrated a significant association between obesity and gender statistically. It is also supported by a finding in a study by Papas *et al.* (2016), which found that obesity more prevalent in the girl than boys (14% vs. 9%). In contra, a study by Bozkir *et al.* (2016) revealed that 59.8% of male participants were having a higher risk of obesity/overweight than females, that 29.7% of them were at a high risk of having obesity/overweight.

2.4.3 Age

The prevalence of obesity increased with age (Rampal *et al.*, 2007). (Bégarie *et al.*, 2013; Chang *et al.*, 2017) also had similar findings, which was a positive relationship between age and obesity.

2.4.4 Income

(James, 2004; Savage and Emerson, 2016) had stated that the prevalence of obesity or overweight was higher in the poorer family.

2.4.5 Institution

The institution becomes other factors that may contribute to the prevalence of obesity or overweight. Services provided or programmed that implemented, including adaptations, may not be suited to the unique needs with a disability, and not be adequately integrated into physical education classes or alternative activities, such as adapted sports (Rimmer and Rowland, 2008).

2.5 Conceptual framework

Figure 2.2 shows the conceptual framework of identified factors that influenced obesity or overweight among the disabled. Factors associated with obesity/overweight among the disabled were type and level of disability, socio-demographic, medication and comorbidities. Level of disability and type of disability were the variables of the interest in this study, and others without mark * acted as cofounders. Those marks with * are variables that do not include in this study. They were education, physical activity, and dietary habit. Other factors which not included in this study was due to the unavailability of data. This study aimed to describe the prevalence of obesity and overweight among the disabled registered with PDK in Kelantan in 2019. Secondly, it is to determine the association between type and level of disability with obesity or overweight.
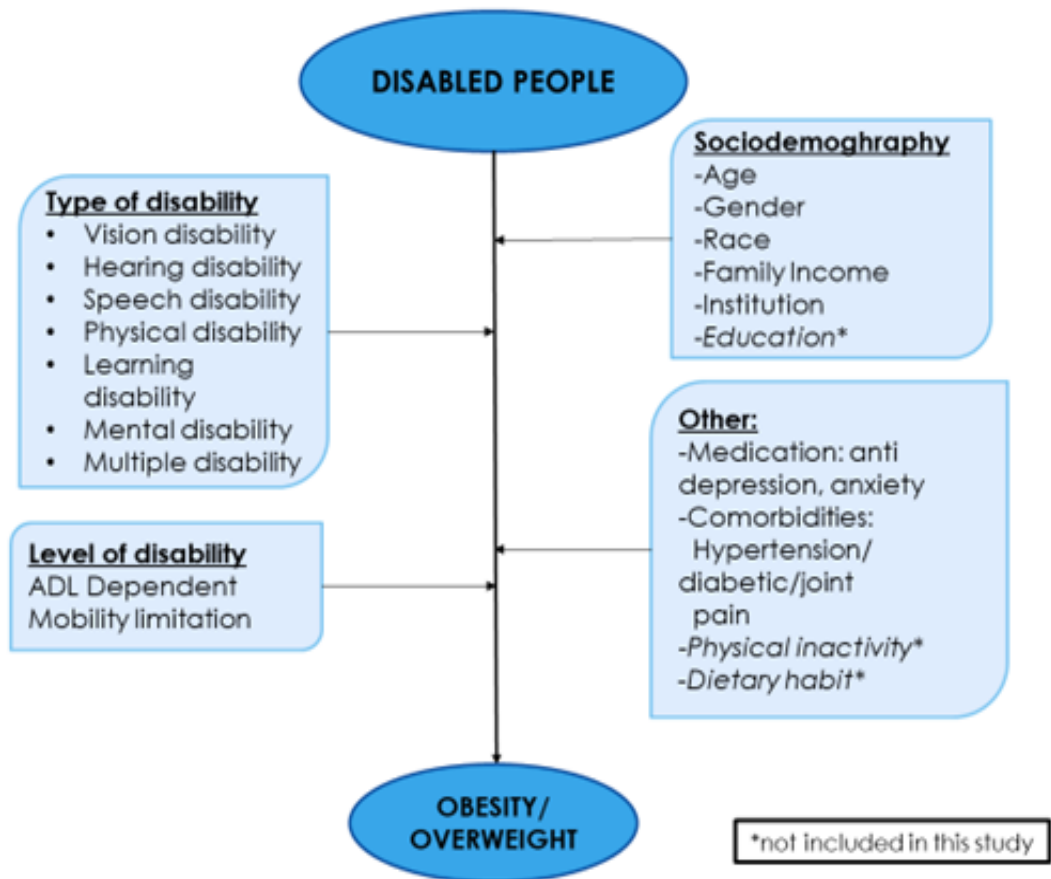
Figure 2.2 Conceptual framework of the study

CHAPTER 3

METHODOLOGY

3.1 Study area

This cross-sectional study was conducted in Community based Rehabilitation Centre (CBR) or PDK in Kelantan by examining records from the database *Enrolment Pelatih PDK 2019* at *JKNK*. There were 45 PDK centers in Kelantan in 2019, with 1429 trainers based on the system. One thousand four hundred and twenty of the trainers were Malays, and five were Chinese, and four were from other ethnicities. In the PDK, the disabled registered here was called as a trainer. Most of them were diagnosed as a learning disability (965), and other disabilities were 464.

3.2 Study design

The study design is a cross-sectional study.

3.3 Study period

This study was conducted from March 2020 until May 2020

3.4 Reference population

The reference population in this study was disabled with obesity or overweight in Kelantan.

3.5 Source population

The source population for this study was disabled, who registered with PDK in Kelantan from the database *Enrolment Pelatih PDK* from Family Health Unit, Jabatan Kesihatan Negeri Kelantan (JKNK).

3.6 Study Criteria

3.6.1 Inclusion criteria

All the disabled registered with PDK Ku Sihat in Kelantan from Enrolment Pelatih PDK in 2019.

3.6.1   Exclusion criteria

Any missing data of Variable of Interest (BMI status & factor of interest).

3.7 Sample size calculation

For objective one (to determine prevalence and association between type and level of disability with obesity/overweight among the disabled in Kelantan), the sample size was calculated by using a single proportion formula:

A) Obesity

The estimated sample size will be calculated by using a single proportion formula:

$n=(Z/\Delta)^2 * p(1-p)$

where:

Z value based on 95% CI = 1.96 Δ = 0.05 (5%)

P = 0.106 (*p based on prevalence obesity in children with disabilities in Netherlands, 10.6%) (Neter *et al.*, 2011a)

So, $(1.96/0.05)^2 * (0.106)(1-0.106) = 145$

Estimated sample size calculated = n + 10% of possible missing data = 160

B) Overweight

Sample size determine by using single proportion formula:

$n=(Z/\Delta)^2 * p(1-p)$

Z value based on 95% CI = 1.96

Δ = 0.05 (5%)

P = 0.129

So, $(1.96/0.05)^2 * (0.129) (1-0.129) = 172$

Estimated sample size calculated = n + 10% of possible missing data = **189**

 (*p based on prevalence overweight in children with disabilities in Netherlands, 12.9%) (Neter *et al.*, 2011a)

For objective two (to determine the association between type and level of disability with obesity or overweight among the disabled in Kelantan), the sample size is calculated by using independent two proportion formula by PS software (dichotomous). The power of the study is set at 0.8 with α=0.05. The calculation will be applied to each variable with a 10% additional possibility of missing data.

Table 3.1 Sample size calculation for objective two

Factors of interest	Po	P1	m	n	n + (nx3) +10%
Vision disability	0.09*	0.39	3	18	87
Hearing disability	0.08*	0.34	3	22	106
Physical Disability	0.35*	0.65	3	28	135
Mental disability	0.08*	0.52	3	9	35
Learning disability	0.35*	0.67	3	24	116
Speech disability	0.01*	0.46	3	7	34

*reference of P0 for above factors from Department of Social Welfare, Malaysia in 2017.

Po = probability of factor in non-obese/general disabled population

P1 = estimated probability of factor in the disabled with obesity/overweight

m: ratio between cases group and control group

After calculation for both objectives, the calculated sample size for overweight was chosen because it was the largest sample size, which was 189.

3.8 Sampling method and subject recruitment

Simple random sampling was applied to the sampling frame using excel software.

3.9 Data Collection

This study used secondary data. All the information for the disabled, which had been randomly selected were obtained from *Borang Pendaftaran OKU (BPPOKU)* and patient record. All the information was transferred into proforma, enlisting the required variables. Then, it was moved into an excel format using MS Excel. The data information was collected, including socio-demographic variables. Prevention of data missing and error data entry was done by double-checking in every step of data collection.

3.10 Operational definition

3.10.1 The disabled:

In my study, the disabled are defined as people with a disability that had been diagnosed by a medical practitioner, as stated in *Borang Permohonan Pendaftaran Orang Kurang Upaya BPPOKU.*

3.10.2 Type of disability:

The type of disability is classified into seven categories: hearing, vision, physical, learning, speech, mental disability, and multiple disabilities, as stated in *Borang Permohonan Pendaftaran Orang Kurang Upaya BPPOKU.* (Akta OKU 2008).

3.10.3 Multiple disabilities:

Multiple disabilities are defined as people that have been diagnosed with having more than 1 type of disability.

3.10.4 Learning disability

I. Global Developmental Delay (GDD)

The situation in which there is a late development of at least two (2) standards deviation in at least two (2) domains whether gross motor/fine motor, speech/language, cognition, social/personal or activities of daily living for applicants below five (5) years of age.

II. Down syndrome

It was attributed to the disorder of the chromosome, which is in chromosome 21.

III. Attention-deficit Hyperactivity Disorder (ADHD)

It was a life-long inconvenience that involves the focus level and impulse control.

IV. Autism (Autism Spectrum Disorder)

Autism is a neurological disorder that negatively impacts children in terms of social interaction skills and imagination.

V. Intellectual

Intellectual disability is a shortage in terms of intellectual function (retardation sense/mental retardation) for children aged five (5) years and above.

VI. Specific Learning Disability (Specific LD)

Dyslexia: The difference in the brain's way of thinking in connecting the visual symbol and sound then lead to difficulty in reading, writing, understanding, spell, and counting.

Dyscalculia: A condition that influences the ability of applicants to dominate/acquiring arithmetic skills.

Dysgraphia: A condition that influences the ability of smooth motor skills of the applicant, in turn, has difficulty forming letters, writing, and others.

3.10.5 Other disability

Type of disability other than learning disability; earing, vision, physical, speech, mental disability, and multiple disabilities

3.10.6 Level of disability;

In my study it is based on ADL dependent score (>18 years old) and mobility limitation score (≤ 18 years old) from *Borang Permohonan Pendaftaran Orang Kurang Upaya BPPOKU.* The level of disability was categorized into 'no difficulty' for the score 0 and 'with difficulty' for score ≥1.

3.10.7 Overweight;

Overweight has been categorized as overweight by nutritionist or doctor using WHO BMI Classification ≥25.0% and using BMI for age Classification table for age ≤ 18 years old and below, as stated in *Borang Reten Bulanan PDK 201A Pind. 2013*.

3.10.8 Obesity:

Obesity has been categorized as obesity by nutritionist or doctor using WHO BMI Classification ≥ 30.0% and using BMI for age Classification table for age ≤ 18 years old and below, as stated in *Borang Reten Bulanan PDK 201A Pind. 2013*.

3.10.9 Stay at home

Stay at home was define as the trainer in PDK but need to stay at home due to multifactor such as limitation in movement or bedridden.

3.11 Statistical analysis

Data entered and analysed using SPSS version 24. Descriptive statistics used to summarise the socio-demographic characteristics of subjects. Numerical data presented as mean (SD) or median (IQR) based on their normality distribution. Categorical data presented as frequency (percentage). The level of disability was changed to categorical data by divide it into no difficulty and with difficulty. The type of disability also had been categorized into two categories, which were an other disability and learning disability. It was because the majority of the disabled in this study was a learning disability type and some type of other learning disability was very small in number.

The statistical analysis for objective 1 was a descriptive study and presented as frequency (percentage). Statistical analysis for objective 2 was multiple logistic regression. However, before proceeding to multiple logistic regression, the simple logistic regression had been carried out to analyse each factor, including cofounder and factor of interest (independent variable; type and level of disability) and be presented as crude OR. Then, multiple logistic regression was being applied for all factors of interests and cofounder that result of p-value was >0.25. The result had been presented as adjusted OR.

3.12 Ethical consideration

Permission for data access was obtained from Kelantan's State Health Department. The only researcher will access to the data. Patients confidentiality will be protected as no name or identity will be disclosed. Data was protected via the setting of a

complex password to access to the database. Ethical clearance approval was obtained from the National Medical Research Register, Ministry of Health (NMRR), and Ethics Committee, Science University of Malaysia (JEPeM).
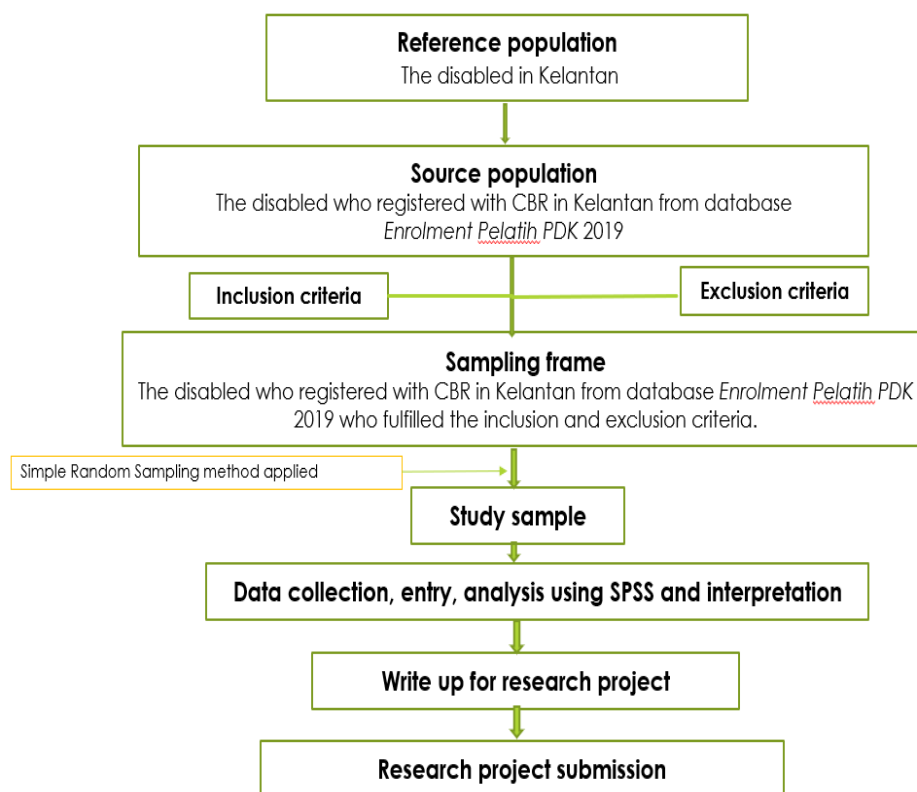
3.13 Study flowchart

Figure 3.1 Flow chart of the study