UNSUCCESSFUL QUITTERS AMONG SMOKERS IN STOP SMOKING SERVICES IN PERLIS: THE PROPORTION AND ITS ASSOCIATED FACTORS

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by

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LIST OF SYMBOLS

≥	Equal and more than
≤	Equal and less than
>	More than
<	Less than
A	Alpha
B	Beta
Z	Z-score
Δ	Precision
X	Multiplication
%	Percentage
N	Number of samples

LIST OF ABBREVIATIONS

AdjOR	Adjusted Odd ratio
CI	Confident Interval
df	Degree of freedom
FCTC	Framework Convention on Tobacco Control
SD	Standard Deviation
WHO	World Health Organization

ABSTRAK

KEGAGALAN BERHENTI MEROKOK DI KALANGAN PEROKOK DALAM PROGRAM BERHENTI MEROKOK DI PERLIS: PERKADARAN DAN FAKTOR-FAKTOR PENYUMBANG

Latar belakang: Merokok tembakau adalah salah satu faktor boleh diubah suai yang menyumbang kepada penyakit tidak berjangkit di seluruh dunia. Oleh itu, sebagai strategi pencegahan, salah satu cadangan WHO *Framework Convention on Tobacco Control* (FCTC) adalah untuk menyediakan perkhidmatan berhenti merokok di kemudahan kesihatan terutama dalam perawatan kesihatan primer. Perkhidmatan Berhenti Merokok diperkenalkan di Malaysia pada tahun 2004. Walau bagaimanapun, kadar kejayaan adalah tidak memberangsangkan dan banyak faktor-faktor penyumbang yang kurang diketahui. Oleh itu, adalah mustahak untuk mengenal pasti kumpulan berisiko untuk penambahbaikan hasil rawatan dalam Perkhidmatan Berhenti Merokok.

Objektif: Kajian ini bertujuan untuk mengukur peratusan dan mengenal pasti faktor-faktor yang berkaitan dengan kegagalan untuk berhenti merokok di kalangan perokok yang menyertai Perkhidmatan Berhenti Merokok di klinik kesihatan kerajaan di Perlis.

Metodologi: Ini adalah kajian tinjauan rekod retrospektif yang menggunakan data dari kad pendaftaran Perkhidmatan Berhenti Merokok dan fail pesakit antara Januari 2017 hingga Jun 2019. Sistem pendaftaran ini bermula sejak tahun 2004 bertujuan untuk menyeragamkan pengurusan pelanggan berhenti merokok dan untuk memantau hasil perkhidmatan. Ini termasuk 427 data yang memenuhi kriteria. Semua pelanggan yang mendaftar dengan perkhidmatan berhenti merokok di klinik

kesihatan Perlis dimasukkan dalam analisa. Regresi logistik berganda digunakan untuk menilai faktor-faktor yang berkaitan dengan penghenti yang tidak berjaya. Faktor yang terpilih adalah umur, jantina, etnik, status perkahwinan, tahap pendidikan, penyakit hipertensi, jumlah sesi klinik, percubaan berhenti sebelumnya, tempoh merokok dan jenis rawatan. Pada tahap univariat, faktor dengan *p*-value <0,25 dipilih untuk regresi logistik berganda. Regresi logistik berganda ditunjukkan sebagai *adjusted odd ratio* (AdjOR), 95% CI dan *Wald statistic*. Kegagalan berhenti merokok ditakrifkan sebagai pelanggan yang gagal berhenti merokok dalam tempoh 6 bulan selepas tindakan susulan.

Keputusan: Kadar kegagalan berhenti merokok di kalangan perokok yang menghadiri klinik berhenti merokok di Perlis dari Januari 2017 hingga Jun 2019 adalah 63%. Regresi logistik berganda menunjukkan bahawa mereka yang menghadiri sekurang-kurangnya empat kali sesi klinik (AdjOR 0.15; 95% CI: 0.10, 0.24) dan telah berkahwin (AdjOR: 0.36; 95% CI: 0.14, 0.93) menyumbang kepada berhenti merokok di kalangan perokok. Ia meramalkan kemungkinan berjaya dan bukannya tidak berjaya.

Kesimpulan: Jumlah perokok yang gagal berhenti merokok dari kalangan perokok yang menyertai Perkhidmatan Berhenti Merokok di klinik kesihatan Perlis adalah tinggi. Bilangan sesi klinik yang dihadiri dan status perkahwinan adalah faktor berkaitan dengan berhenti merokok dari kalangan perokok di Perlis.

KATA KUNCI: gagal berhenti, perokok, faktor yang berkaitan, Perkhidmatan Berhenti Merokok

ABSTRACT

UNSUCCESSFUL QUITTERS AMONG SMOKERS IN STOP SMOKING SERVICES IN PERLIS: THE PROPORTION AND ITS ASSOCIATED FACTORS

Background: Tobacco smoking is one of the modifiable factor that contribute to non-communicable disease worldwide. Thus as a preventive strategy, one of the WHO Framework Convention on Tobacco Control (FCTC) recommendation is to provide–stop smoking services in health facility especially in primary health care. Stop Smoking Services was introduced in Malaysia in 2004. However, the success rate has been mixed and not much has been known about the associated factors. Therefore it is important to identify risk group to improve the outcome of the treatment in the Stop Smoking Services.

Objectives: This study aimed to measures the proportion of, and identifies the factors associated with, unsuccessful quitters among smokers in Stop Smoking Services in government health clinics in Perlis.

Methodology: This was a retrospective record review study using data from the Stop Smoking Services registry and patient file card between January 2017 and Jun 2019. The registry system started from 2004 aiming to standardize the management of stop smoking clients and to monitor the outcome of the services. It included 427 data that fulfil criteria. All clients who registered with stop smoking services in Perlis health clinics were included. Multiple logistic regression was used to assess for factors associated with unsuccessful quitters. Factor that included were age, gender, ethnicity, marital status, education level, hypertension disease, number of clinic session, previous attempt to quit, duration of smoking and type of treatment. At

univariate level, factors with p-value <0.25 was chosen for multiple logistic regression. Multiple logistic regression was presented as adjusted odd ratio (AdjOR), 95% CI and Wald statistic. Unsuccessful quitters define as clients who fail to quit smoking within 6 months of follow up.

Results: Prevalence of unsuccessful quitters among smokers who attended stop smoking clinics in Perlis from January 2017 to Jun 2019 was 63%. Multiple logistic regression showed that those who attended at least four times the clinic session (AdjOR 0.15; 95% CI: 0.10, 0.24) and being married (AdjOR: 0.36; 95%CI: 0.14, 0.93) contributed to unsuccessful quitters among smokers. They predicted the likelihood of being successful instead of unsuccessful.

Conclusion: The proportion of unsuccessful quitters among smoker in Stop Smoking Services in Perlis health clinic was high. The number of clinic session attended and marital status were factors associated with unsuccessful quitters among smoker in Perlis.

KEYWORD: Unsuccessful quitters, smokers, factors associated, Stop Smoking Services

CHAPTER 1

INTRODUCTION

1.1 Introduction

Generally, there are two types of Tobacco usage which are smoke tobacco and smokeless tobacco. The smoke tobacco can be in form of roll your own (RYO), manufactured cigarettes, bidis, water pipes, pipes, cigars, kreteks and stick where cigarettes account for 96% of tobacco sales and consumption around the world while the smokeless tobacco may take in form of dry snuff, wet snuff and chewing tobacco (Drope *et al.*, 2018). Beside the two types of tobacco, nicotine inhalation via e-cigarettes is currently a trend among youth and young adults (Burt and Li, 2020). A tobacco smoker is define as someone who smokes any tobacco product, either daily or occasionally (WHO, 2008). It is estimated that there are around 1.1 billion people who smoke tobacco cigarettes and at least 367 million peoples who use smokeless tobacco worldwide. Nicotine, the pharmacological active drug inside the tobacco is highly addictive that may cause quitting a challenge (WHO, 2019). More than three quarter of male smokers and more than half of female smoker live in high Human Development Index (HDI) countries (Drope *et al.*, 2018). It has been estimated that about more than 8 million died from the tobacco use globally (WHO, 2019).

Tobacco Smoking is one of the risk factors for many chronic diseases such as Diabetes Mellitus, Hypertension, cancer and cardiovascular disease. Results from the National Health Morbidity Survey (NHMS) 2015, showed approximately 22.8% of Malaysian aged 15 years and above were smokers where 43.0% of men and 1.4% of women smoked manufactured cigarettes, hand rolled or smokeless cigarettes. Furthermore, smoking causes 15% hospitalization and 35% inpatient death in Malaysia. In fact, smoking cause 20000 death per year in Malaysia (Hum, 2016).

To minimise the impact of tobacco use, the World Health Organisation (WHO) had promoted the Framework Convention on Tobacco Control (FCTC) which is the only public health treaty under the auspices of WHO. The Framework was put into force on 27th February 2005 and currently comprises of 180 parties. Malaysia has been part of the framework since September 16th 2005 (Abidin, 2016). The FCTC also introduced the MPOWER package in 2008 as a technical measure and resources that will assist in reducing the demand for tobacco products at country-level (WHO, 2005).

The MPOWER package stands for **M**onitoring the tobacco use and prevention policies, **P**rotecting people from tobacco smoke, **O**ffering help to quit tobacco use, **W**arning about danger of tobacco, **E**nforcing bans on tobacco, advertising, promotion and sponsorship and **R**aising tobacco taxes (WHO, 2005). There are a total of 38 articles in the framework recommended for tobacco control (WHO, 2005). Specifically, in offering help to quit tobacco use, article 14 suggested that "*each party shall take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence"* (WHO, 2005).

Majority of smokers have made attempts at quitting. According to the Global Adult Tobacco Survey, over 60% of smokers indicated that they intend to quit and over 40% had attempted to quit in the 12 months preceding the survey (WHO, 2019). Since the implementation of Stop Smoking Services, almost 30% of world population currently has access to the services. From the initiative, the prevalence of tobacco smoker showed a 15% reduction in global average from 22.5% to 19.2% between 2007 and 2017 (WHO, 2019).

Malaysia aimed to reduce smoker prevalence, where by 2025, the national smoking prevalence should be less than 15% and for the long term target Malaysia had target the endgame to reduce the prevalence of smoker to less than 5% by 2045 (Awang *et al.*, 2017; Ministry of Health, 2016). To achieve the target, Malaysia had offer several approaches including Stop Smoking Services in primary care. Some of the function of the Stop Smoking Services include to educate the smoker regarding ill effect of smoking, provide a step by step approach as support for smokers to quit and motivation for ex-smoker to remain abstinence (Latifah *et al.*, 2012).

Stop Smoking Services at health clinic in Malaysia was started in 2004 (Mahayiddin *et al.*, 2003). Treatment provided at the Stop Smoking Services generally can be categorized either by Counselling and Pharmacotherapy (Rigotti, 2012).

In Perlis, Stop Smoking Services are provided by medical officer, trained paramedics and pharmacists. Counselling only and Combine Counselling and Pharmacotherapy treatment are provided in this service. Counselling, also known as Behaviour Therapy can be delivered individually or as a group (Lancaster and Stead, 2017). A study was done before showing that individual counselling itself may increase the chance of quitting by 40%-80% (Lancaster and Stead, 2017). Older age, longer duration of smoking, previous quit attempt and number of cigarette smoked per day may also contribute to success of quitting from smoking (Mohammad *et al.*, 2018; Wee *et al.*, 2011).

There are several limited studies regarding factor associated with unsuccessful quitters in Malaysia. These studies found that age less 40 years old,

smokes less than 10 cigarettes per day, less motivation and less clinic attendance may contribute toward unsuccessful quitters (Ezat *et al.*, 2008; Lee *et al.*, 2013).

1.2 Problem Statement and Study Rationale

Despite the various preventive programs against smoking, the prevalence is still increasing in Malaysia. In 1986, the prevalence of smokers was 21.5% where 40.9% are male and 4.1% are female; in 2015 the smoker prevalence had increased to 22.8% where male smoker increased to 43% and female smoker improving to 1.4% (Awang *et al.*, 2017).

A study by Fiore *et al.*,(2009) describe that majority of smokers that attend Stop Smoking Services will attempt to quit with assistant, hence stop smoking services should play a role in giving the assistant . A study done by Wee *et al.*, (2011) in Malaysia showed that the average unsuccessful quitter's rate from Stop Smoking Services was 51.8% within 24 weeks of follow-up. This figure showed that Stop Smoking Services still didn't function optimally to achieve its aim in getting smokers to quit.

This study is a population based state-wide survey where it will be conducted through all health clinics in Perlis as compared with other single centred study done in Malaysia that may not represent the true general population (Mohammad *et al.*, 2018; Wee *et al.*, 2011; Zainal *et al.*, 2017). A study at single centered or hospital setting may show difference outcome as compared with health clinic because of their client characteristic (Bickerstaffe, 2014).

Study done in Malaysia has demonstrated that smokers who are less than 40 years old, smokes less than 10 cigarettes per day, had previous quit attempt had low

motivation and attended less than four times to the Stop Smoking Clinics may contribute to being unsuccessful quitters (Ezat *et al.*, 2008). Fagerstrom score, a measure of nicotine dependence, may contribute to success or unsuccessful of quitting. A difference in Fagerstrom score level may cause difference adherence to follow up (Hughes and Davies, 2019). The lower adherence of client toward follow up, the higher risk of unsuccessful quitters (Karadogan *et al.*, 2018). Thus, any possibility of interaction between the Fagerstrom score and number of clinic session will be identified. This concept has not been explore locally thus giving an additional value to this study.

Even though the Stop Smoking Services started in 2004, there has been no study looking into the success or unsuccessful quitters' rate in Perlis. Perlis also has the highest prevalence of adolescent smokers in Malaysia (Aris *et al.*, 2016) thus there is an urgent need to have evidence to improve the services. This study hopes to produce the necessary timely evidence for such urgent matter.

1.3 Research Questions

1. What is the proportion of unsuccessful quitters among smokers who attend the stop smoking clinic in Perlis?
2. What are the factors associated with unsuccessful quitters among smokers who attend stop smoking clinics in Perlis?

1.4 Objectives

1.4.1 General: To measures the proportion of unsuccessful quitters and identify the factors associated with unsuccessful quitters in Stop Smoking Services in government health clinics in Perlis.

1.4.2 Specific:

1. To measures the proportion of unsuccessful quitters in Stop Smoking Services in government health clinics in Perlis.
2. To identify the factors associated with unsuccessful quitters in Stop Smoking Services in Perlis.

1.5 Research Hypothesis

$H_{A:}$ Sociodemographic, client status, type of treatment are significantly associated with unsuccessful quitters in Stop Smoking Services in Perlis.

CHAPTER 2

LITERATURE REVIEW

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2.1 Prevalence of Unsuccessful Quitters among Smokers and Factors Associated

Stop Smoking Services generally meant for primary care, where the service should be provided at health clinic. Secondary care like hospital base might having a problem since the inpatient period to short and patient might having bigger problem during the stay like decision for surgery or any procedure that may influence the decision to quit smoking (Bickerstaffe, 2014). Intensive therapy like bedside smoking cessation counselling program with comprehensive module with follow up upon discharge needed to tackle stop smoking service in hospital setting (Rigotti, 2000).

Malaysia started the Stop Smoking Services in 2004. Treatment provided in Stop Smoking Services can be given via counselling only or combine counselling and pharmacotherapy by medical officer, trained medical assistant and pharmacist (Latifah *et al.*, 2012). The Stop Smoking Services in Malaysia provided as a free treatment where it is fully covered by Ministry of Health. Clients only need to pay the RM 1.00 for registration fee. Even though the trend of tobacco smoker from 2007 to 2017 showing reducing in trend globally, it doesn't applied at local level. Statistic show that the prevalence of smoker above 18 years old in Malaysia, showing a reducing trend only at early phase from 24.8% to 22.8% (1996-2006) of Stop Smoking Services implementation. However the trend increase and remain at 25% from 2011 to 2015 in trend as the prevalence (Hum, 2016).

Globally, the risk of unsuccessful quitters once the client attempt to quit ranged between 75-84.2% (Borsari *et al.*, 2018; Zhou *et al.*, 2009). Several studies done in Malaysia showing the prevalence of unsuccessful quitters in stop smoking services ranging from 40% to 82.7% (Blebil *et al.*, 2014; Ezat *et al.*, 2008; Wee *et al.*, 2011). The difference is due to global study mostly focusing on limited population (e.g.; specific disease or receiving specific treatment) (Zhou *et al.*, 2009).

There are many factor that may contribute toward unsuccessful quitters from smoking like low motivation, living with another smoker, unemployed and living alone (Challenger *et al.*, 2007; Lee *et al.*, 2013). Those living situation are exposed toward smoking attitude. Smoker less than 10 cigarettes per day may show higher chance of fail quit among smoker (Kim, 2014). It might be because low of insight toward abstinence since the amount of cigarettes smoke per day is little and not harmful to health (Kim, 2014). Measurement of motivation level might be difficult since its subjective and need a proper questionnaire to be analyze. However, a measurement frequency of attendance to Stop Smoking Services may be seen as another dimension level of motivation (Challenger *et al.*, 2007).

Study showed that age <40 years old less likely to quit compare to the rest (Ezat *et al.*, 2008). This consistent with a study done by Khuder *et al.*, (1999) where the study suggest that a smoker more than 40 years old more likely increase their awareness toward their health and more easier to quit smoking. As Malaysian smoker prevalence more predominantly among 25-44 years old (28%) as mention in Institute for Public Health (2015), consideration to identify the association factor that contributing to fail quitting in those group is important to make sure more intensive intervention can be done. This age is the working age group where they predispose to

work related stress that may cause the tobacco smoking especially those are expose in manual occupation (Heo *et al.*, 2015).

Commonly, lack of stress management, low support to quit from health professional and high prevalence and acceptability of smoking within communities may contribute to unsuccessful quitters (Mohammad *et al.*, 2018). Most substance abuse including tobacco started during adolescence phase. It's suggested due to a risk of how they cope with emotional stress and environment adaptation. Due to immaturity, they tend to smoke tobacco as a way to cope with the situation (Sigfusdottir *et al.*, 2016). Beside, youth also tend to try smoking out of curiosity and peer pressure and these group tend to be highly nicotine dependent as they become adult and prone to be as unsuccessful quitters or relapse (Irfan *et al.*, 2016; Su *et al.*, 2012). This is consistent with a study showing that if a smoker start to smoke before age of 16 years old, it significantly increase risk of being as unsuccessful quitter with twice the risk as compared to those who start to smoke at later age (Khuder *et al.*, 1999). The same study also showed that age of start smoking from 16 to 19 years old increase risk of being unsuccessful quitters with odd ratio of 1.3 (0.9-1.9) as compared who start to smoke at later age.

Fagerstrom score is the scoring system to measure the level of nicotine addiction and indicates addiction (Heatherton et al., 1991). High Fagerstrom score may increase risk of unsuccessful quitters (Rigotti, 2002). There was a study mention that there are unique inter relation between Fagerstrom score in predicting the attendance of smoker to stop smoking services (Hughes and Davies, 2019). Very low and very high Fagerstom score associated with high chance of default treatment. A smoker who had lower nicotine dependence level may increase the risk of becoming unsuccessful quitters among smokers (Irvin and Brandon, 2000).

Client who registered to Stop Smoking Services will had an appointment with physician for consultation. A meta-analysis from seven studies show that the physician advise may increase the rate of successful rate quitting from smoking with odd ratio of 1.3 (95% CI, 1.1-1.6) with estimated of 10.2% successful quit rate versus 7.9% quit rate in the no advise group (Tonnesen, 2004). Thus an adherence toward appointment may influence the outcome of the stop smoking services as it measure the contact with the physician. The optimum Stop Smoking Services should at least contain an appointment with four to five sessions with 10-15 minutes of advice (Tonnesen, 2004). An intensive therapy is more effective than brief therapy, so theoretically this means frequency of attendance at stop smoking services predicts successful quitting (Fiore *et al.*, 2009). However in Malaysia, many service providers do not follow the standard guideline as suggested by Latifah *et al*., (2012) where flexible appointments are usually given. Ezat *et al*., (2008) suggested smokers are more likely to quit if they attended the stop smoking services at least 4 times. Lower rate of compliance toward treatment may increase the risk of unsuccessful quitters among smokers (Azevedo and Fernandes, 2011).

Higher education had proven to increased risk of unsuccessful quitters among smoker (Azevedo and Fernandes, 2011). However other study showed an inverse relationship between education level and risk of unsuccessful quitters from smoking (Khuder *et al.*, 1999; Kim, 2014). This maybe the study done a University hospital with a care profile characterized by high demand, limited space and participation of students and other professionals in training as observers. In addition, the language adopted in the groups indicated that most participants in this study had a low educational profile. Besides, the sampling is small and done by convenient sampling which only include client keen for quit that may lead to selection bias (Azevedo and

Fernandes, 2011). Low risk of unsuccessful quitters among higher educated people because they had a higher receptiveness of harmful effect by smoking (Cargnin *et al.*, 2015).

Low income may predispose to unsuccessful quitters. The same goes with low education level (Kim, 2014). This might be low awareness toward the bad effect of smoking subsequently low insight and motivation to stop smoking. This situation may predispose to stress that may lead to tobacco smoking. When the smoker belief that smoking may reduce the negative affect which is the stress, the risk of likelihood to become unsuccessful quitters increase (Garey *et al.*, 2017) . Stress factor become worsen when there is lack of leisure activity among smokers. Lack of leisure activity like participating in social function, visiting religious place and bonding with family members significantly lead to risk of unsuccessful quitters among smokers (Azevedo and Fernandes, 2011).

For smoker that already in the program, type of treatment also played a role in predicts the outcome. Treatment available for treatment of smoker can be divided by counselling or pharmacological. Simple counselling covering the 5As (Ask, Advise, Assess, Assist and Arrange) aspect may increase the risk of quitting (Aubin *et al.*, 2014). However base on review of multiple study, counselling only for Stop Smoking Services is less effective compare to combination of both counselling and pharmacotherapy (Stead *et al.*, 2016).

Even though presence of comorbidity showing high chance of quitting, it doesn't mean we can take lightly with those who don't have the comorbid because if those group persistent smoker, the chance of getting comorbid is higher (Kim, 2014; Su *et al.*, 2012). Those clients with no comorbidity may percept that the impact of

smoking is not harmful, thus may increase the likelihood of unsuccessful quitters (Kim, 2014). This finding consistent with a study showing that where the lack of tobacco related disease like cardiovascular and respiratory disease may increase risk of unsuccessful quitters among smokers (Azevedo and Fernandes, 2011).

Smoker usually may have an idea about the negative impact of smoking after been exposed to health education or counselling during stop smoking services. However curtained smoker may be categorise as a hardened smoker where they don't have an intention to stop in the first place. This hardening hypothesis can be measure through the present of previous attempt (Docherty and McNeill, 2012). Attempt to quit define as attempt to stop smoking in the last year and often requires ≥ 24 hrs of abstinence. A previous attempt to quit has proven to increase risk of successful quit among smoker with odd ratio of 1.78 (0.99-3.23) as compared with no previous attempt to quit (Mohammad *et al.*, 2018). An attempt to quit from smoking may influence by environment and constitution like comorbidity, motivation, nicotine dependence, genotype and poverty. The outcome of the attempt either successfully quit or not also influence by the same factors (Hughes, 2011). These hardened smokers are predisposed to be unsuccessful quitters.

Being a chronic smoker increased the risk of being an unsuccessful quitters when attempt to quit. This is due related to increase of nicotine dependence (Abdullah *et al.*, 2006). A study by Abdullah *et al*., (2006) showing that the increment of duration of smoking by years may cause successful quit rate with odd ratio of 0.98 (0.95-1.00) as compared with 1 year less of smoking. In other word, the longer duration of smoking, the higher the risk of being an unsuccessful quitter. However, this finding was not consistent with Ezat et al., (2008) where it shows a smoker with duration of more than 15 year showing significant risk of being as

successful quitters as compared to 15 years or less of smoking. This different may be due different age group population studied by Abdullah *et al*., (2006) only focusing the 60 years old and above with low socioeconomic status while Ezat *et al*., (2008) covering the general population attending the Stop Smoking Services.

2.2 Conceptual Framework

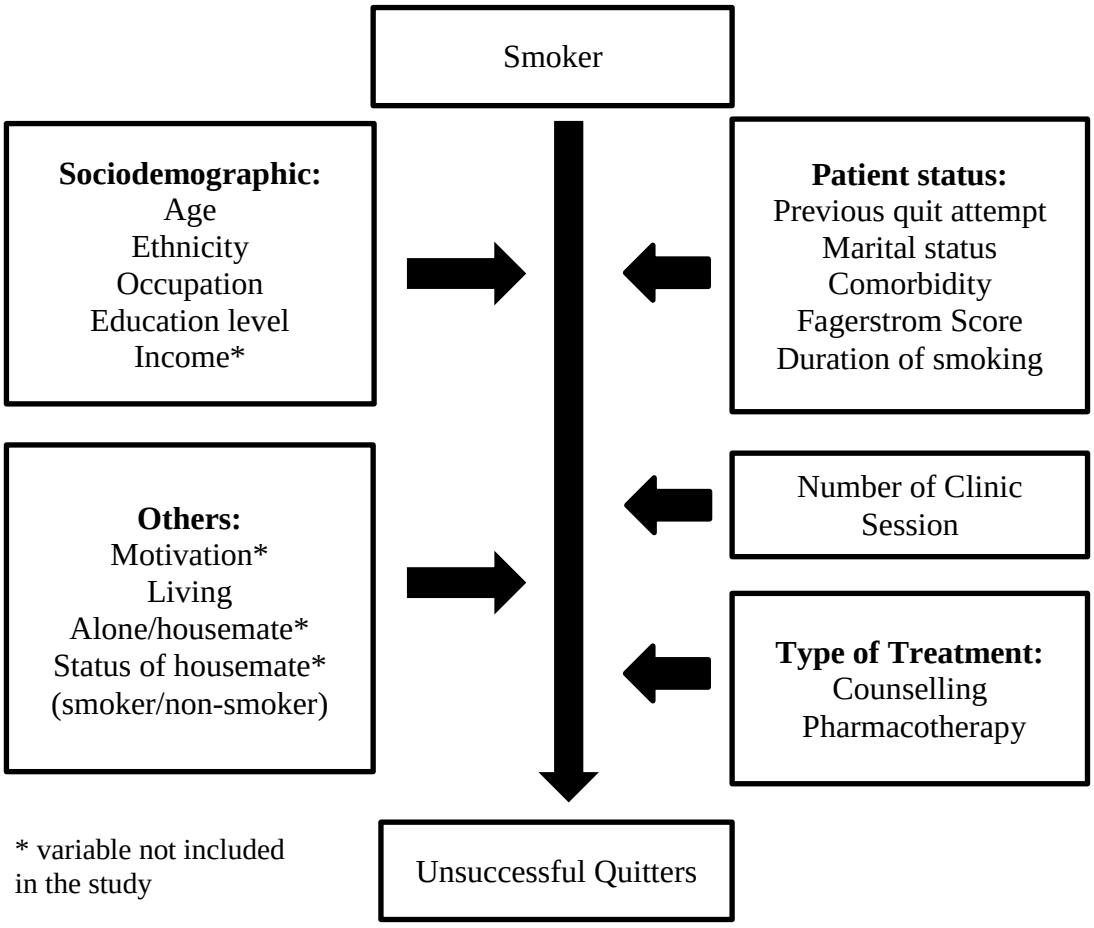

Figure 2.1: Conceptual Framework of Factors Associated with Unsuccessful Quitters among Smokers

Based on literature review, there were several factors which associated with unsuccessful quitters. The identified factors were socio demographic characteristics including age, sex, ethnicity, occupation, education level and income; patient status including previous quit attempt, comorbidity and marital status. Beside, Fagerstrom

score, duration of smoking, type of treatment and number of clinic session also may influence toward unsuccessful quitters. However, due to limitation of secondary data, income, level of motivation, living status and housemate status can’t be asses in this study.

CHAPTER 3

METHODOLOGY

3.1 Operational Definition

- **Unsuccessful Quitters:** Clients who fail to quit smoking within 6 months of follow up (Latifah *et al.*, 2012).
- **Success Quitters:** Clients who manage to complete abstinence from smoking for six months (Latifah *et al.*, 2012).
- **Level of Nicotine dependence:**

  Assess by Modified Fagerstrom Test which is scored from 0 to 10.

  - ❖ 0-3 points: Low dependent
  - ❖ 4- 5 points: Moderately dependent
  - ❖ 6-10 points: Highly dependent
- **Comorbidity:** Client either having at least 1 of those diseases:

  Hypertension, Diabetes Mellitus, Ischaemic Heart Disease, Asthma or Pulmonary Tuberculosis.
- **Previous Attempt to quit:** Client that had previous attempt to quit from smoking for at least once.

3.2 Research Design

This is a retrospective record review study where data from the Stop Smoking Clinics and registry in Perlis were used.

3.3 Study Area, Time and Duration

Perlis is the smallest state in Malaysia, situated in the most northern tip of Peninsular Malaysia. It's bounded with Thailand in North and Kedah in the South.

Perlis has coverage an area of 816 km² with total of 250,000 population (Department of Statistic Malaysia, 2019). Perlis has one general government hospital, one private hospital, 10 government health clinic and 30 government rural clinics and 29 private clinic (Clinical Research Centre, 2010). This study involved all 10 government health clinics and clients registered in the Stop Smoking Services between January 2017 and Jun 2019.

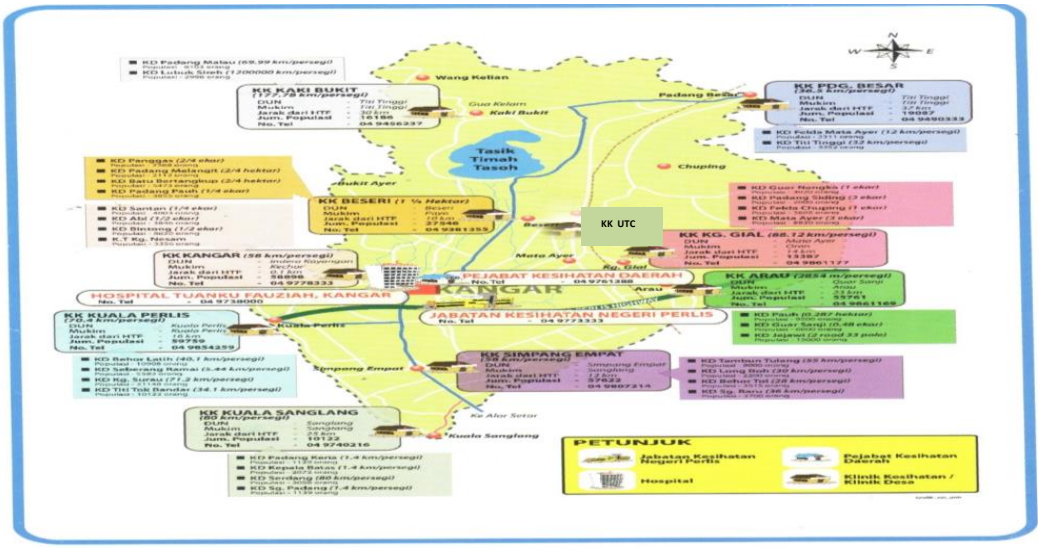

Figure 3.1: Distribution of Government Health Facilities in Perlis

These are the list of health clinic in Perlis that provide Stop Smoking Services:

1. *Klinik Kesihatan* Kangar
2. *Klinik Kesihatan* Beseri
3. *Klinik Kesihatan* Padang Besar
4. *Klinik Kesihatan* Kaki Bukit
5. *Klinik Kesihatan* Simpang Empat
6. *Klinik Kesihatan* Arau
7. *Klinik Kesihatan* Kuala Perlis
8. *Klinik Kesihatan* Kg Gial
9. *Klinik Kesihatan* Kuala Sanglang
10. *Klinik Kesihatan* UTC

3.4 Reference Population

All smokers in Perlis.

3.5 Source Population/Sampling Pool

Smoker that responded 'Yes' upon screening by asking whether he/she is a smoker or not.

3.6 Study Population

Smoker who attended Health Clinic

3.7 Sampling Frame

Smoker who registered in Stop Smoking Services.

3.8 Study Criteria

3.8.1 Inclusion Criteria

1. Smoker registered in Stop Smoking Services between January 2017 and Jun 2019.
2. Aged ≥ 18 years old.

3.8.2 Exclusion Criteria

1. Incomplete data (at least ≥20% incomplete data).

3.9 Sample Size Calculation

1. The estimated sample size for objective 1 is determined by using simple proportion formula:

$$n = [z/\Delta]^2 * p\ (1 - P)$$

Where:

z = 1.96 Δ = 5% (0.05)

P= Proportion of unsuccessful quitters

Table 3.1: Sample Size Calculated using Single Proportion Formula

Z	Δ	P	N	n+10%	Reference
1.96	0.05	0.52	384	**427**	(Wee *et al.*, 2011)

2. For objective 2, estimated sample size is calculated according to factors associated with unsuccessful quitters by using two proportion formulas:

$$n = \left(\frac{m+1}{2m}\right)\frac{(P_1(1-P_1)+P_0(1-P_0))}{(P_1-P_0)^2}\left(Z_{(1-\frac{\alpha}{\tau})}+Z_{(1-\beta}\right)^2$$

Where:

Table 3.2: Sample Size Calculated using PS Software for Categorical Data

Factors	P_0*	P_1	N	(nx2)+ 10%	Reference
Unmarried	0.25	0.40	167	334	(Kim, 2014)
High Fargestrom score	0.18	0.35	102	224	(Hughes and Davies, 2019)
Age start smoking <14	0.70	0.50	91	200	(Challenger *et al.*, 2007)
Counselling only therapy	0.20	0.35	136	299	(Kim, 2014)

95% CI, power of study 80%
P_0 = Proportion of Successful Quitters
P_1 = Estimated Proportion of Unsuccessful Quitters
Power of study = 80%
α = 0.05, m = 1

Therefore, the biggest sample size was 427.

3.10 Sampling Method

Simple Random Sampling from Stop Smoking Registry list base on sample size calculation using PS Software.

3.11 Source of Data

3.11.1 Registry List of Stop Smoking Services

Registry list of Stop Smoking Services had been used in all health clinics in Malaysia as a standard format to ensure the standard management to all clients and to monitor the outcome of the services. Data provided in Microsoft Excel contain variable Sociodemographic (name, age, ethnic), Client status (Previous stop smoking attempt, Fagerstrom score, Amount of attendance, Age start smoking, Comorbidity, Type of treatment) and Outcome (Quit smoking status). Compilation of data from all health clinics at State health Office is done biannually. For this study, the data was requested from the person in charge after permission was granted by the State Health Director.

3.11.2 Patient File Card

The patient File Card is a standard patient record kept at individual health clinics. This record keeps the details of patients which are not included in the Registry list of Stop Smoking Service. It records information such as sociodemographic data (marital status, education level, employment status).

3.12 Data Collection Method

Stop Smoking Services data from all health clinics in Perlis are compiled at the District Health Office and subsequently sent to the State Health Office

biannually. The data are compiled by a specific data manager into the Registry list of stop smoking services in the electronic format (Microsoft Excel). This was downloaded into the researcher's personal data storage and password locked. At this stage, specific information such as patient record number and individual health clinics was maintained as this was necessary to link this record to the Patient File Card at individual health clinics. This is necessary so as to allow other variables to be collected. After selecting the necessary sample by inclusion and exclusion criteria, simple random sampling was applied using Microsoft Excel.

For the Patient File Card, individual clinics was given a list of patients record number selected for this study (as per above). The researcher reviewed the files individually to extract the necessary data directly into a pro-forma excel sheet, thus securing all the data into one secured file. After all the data have been extracted, the patient record number was deleted in order to anonymise the data set.

3.13 Statistical Analysis

Data was entered and analysed using SPSS version *24*. Descriptive statistics was used to summarise the socio-demographic characteristics of subjects. Categorical data was presented as frequency (percentage).

The statistical analysis for the first objective was using descriptive statistic and was present as frequency and percentage. The nominator was the outcome either client successful or unsuccessful quit among smoker. The denominator was overall client registered in Stop Smoking Services.

The statistical analysis for the second objective was using multiple logistic regressions. First, data was assessed using Simple Logistic Regression and presented

as Crude Odd Ratio (OR). Variables with P<0.25 was selected for Multiple Logistic Regression (Bursac *et al.*, 2008). Age group was categorized into 18 to 24 years old, 25 to 39 years old, 40 to 54 years old and 55 years old or above (Cooper *et al.*, 2010). Gender was categorized as male and female. Female was use as a reference. Ethnicity was categorized as Malay, Chinese and others with Malay as the reference. Other ethnicity includes Indian and Siamese. Marital status was categorized as single, unmarried/widowed and married. Single, unmarried/widow as the reference category. Education level was categorized as 'No education/primary', 'secondary' and 'diploma or higher' with no 'education/primary' as the reference (Zainal *et al.*, 2017). Comorbidities which comprised of hypertension, diabetes mellitus, ischaemic heart disease, asthma and Pulmonary tuberculosis was categorized into either disease present for any of these comorbidities or not. 'No' for presence of disease was the reference category. Previous attempt to quit smoking was categorized into either 'Yes' for present of previous history of attempt or 'No' for no history of previous attempt with 'No' as the reference category. Age started smoking was categorized as 'less than 20 years old' and '20 years old or above' with '20 years old or above' as the reference (Mohammad *et al.*, 2018). Duration of smoking was categorized as '15 years or less' and 'more than 15 years' with '15 years or less' as reference (Ezat *et al.*, 2008). The Fagerstrom score was categorized as score of '0-3 (low)', '4-5 (mod)' and '6-10 (High)' (Latifah *et al.*, 2012). Type of treatment categorized as 'counselling only' and 'combined counselling and pharmacotherapy' with the 'counselling only' as a reference (Verbiest *et al.*, 2017).

There were missing data for the variable occupation, education level, marital status, Fagerstrom score and age started smoking. Missing data from Fagerstrom score and age of start smoking were replaced by mean value before proceeding to

simple logistic regression. After replacing the missing data, the variables were reassessed and there was no extreme deviation of the mean from original data for both variables. The variable 'Occupation' was not included in simple logistic regression since the missing data was not at random and was missing for more than 25% of the data.

From simple logistic regression, 10 factors were significant at $p<0.25$. These were selected into the multiple logistic regressions. These were age, gender, ethnicity, marital status, education level, hypertension disease, number of clinic session, previous attempt to quit, duration of smoking and type of treatment. The dependent variable was outcome of the stop smoking services either successful quitters or unsuccessful quitters with the successful quitters as the reference category. In multiple logistic regressions, further auto variable selection was done using forward and backward likelihood ratio from the 10 variable which were selected from simple logistic regression. Subsequently enter method was applied on selected variable (p-value<0.05) which were age, marital status and number of clinic sessions, representing as a final model. The analysis only includes 412 cases as marital status had 15 cases of missing data. There was no multicollinearity between factors as evidence of VIF <10. There was no interaction between variable as p-value>0.05. The goodness of fit model was checked with Hosmer Lameshow test, classification table and receive operator curve. The overall model fitness was good. Factor with p-value <0.05 was taken as significant. Multiple logistic regressions were presented as adjusted OR, 95% CI and Wald statistic.

3.14 Ethical Consideration

The ethical issue regarding this research is about confidentiality of the data collected from a service-based registry list from Stop Smoking Services and patient file card. Despite its confidentiality, the study will benefit the healthcare system to identify and prioritise the high risk group of unsuccessful quitters thus can improve the successful quit rate. Permission for data access was obtained from Perlis Health Director. Only researchers and dedicated Perlis health staff have access to the data. Patient's identification data was extracted from the database. However in order to form the linkage to the individual patient record at individual clinics, the researcher need to extract the patient record number from the registry. Once data collection at individual health clinics was completed, this patient number was deleted so as to anonymise the dataset. Information gained from the database was entered and saved into SPSS with anonymous non-identifiable code. Ethical approval was obtained from Jawatankuasa Etika Penyelidikan (Manusia) JEPeM of Universiti Sains Malaysia (JEPeM Code, Appendix B) and Malaysia Research and Ethics Committee (MREC) (NMRR-19-3235-51279, Appendix C).

3.15 Duration of Participant Involvement

This study conducted using secondary data. Hence, no participant was directly involved.

3.16 Flowchart of Study

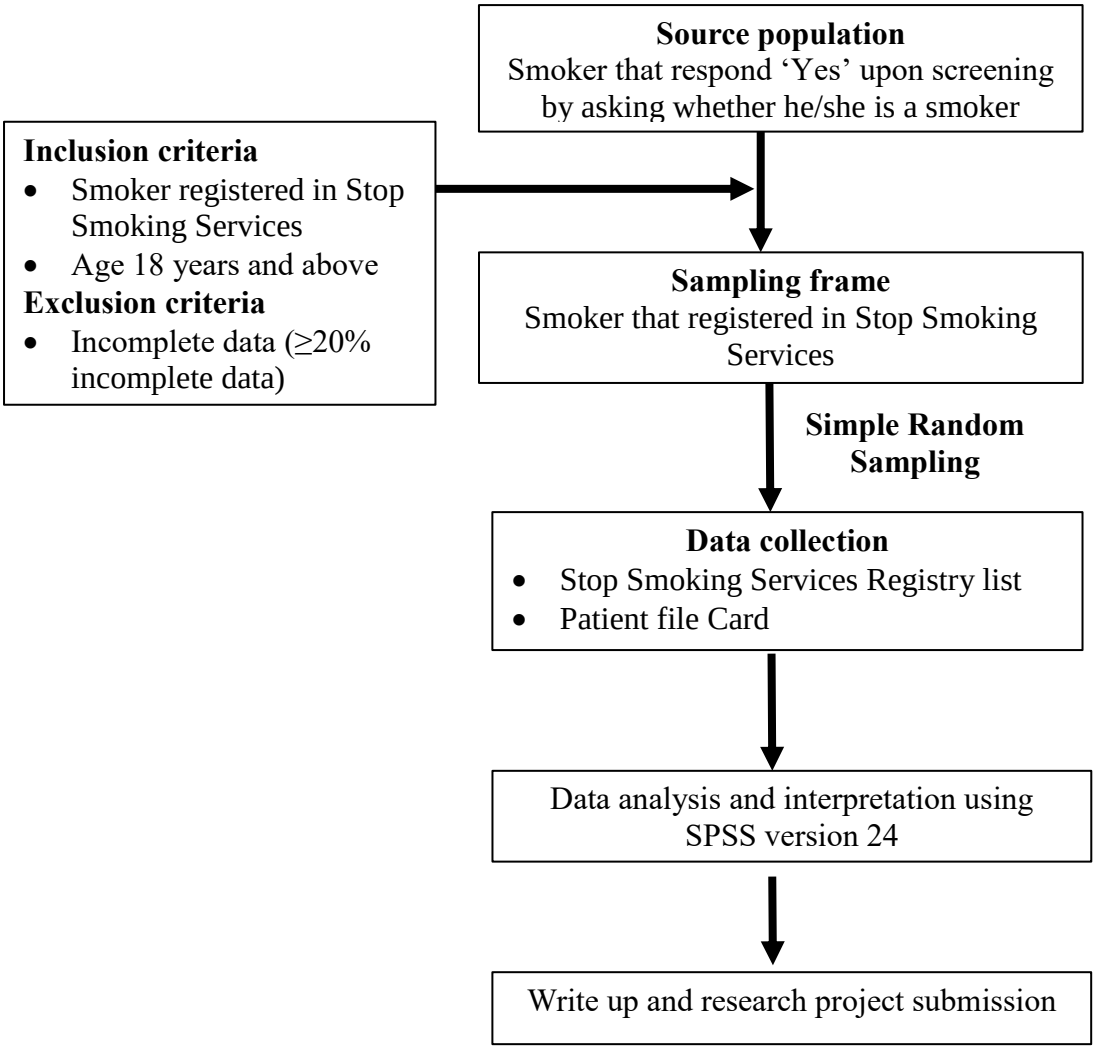

Figure 3.2: Flowchart of Study