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RESEARCH TECHNICAL REPORT

EFFECTS OF PICTORIAL HEALTH WARNINGS ON CIGARETTE PACKAGES ON SMOKERS' BEHAVIOUR AND PERCEPTION

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

CTPR	Control of Tobacco Product Regulation
COPD	Chronic Obstructive Pulmonary Diseases
FCTC	Framework Convention on Tobacco Control
ITC	International Tobacco Control Policy Evaluation
KK	Klinik Kesihatan
OHS	Other health services
PHWs	Pictorial health warnings
QSS	Quit Smoking Services
WHO	World Health Organization

ABSTRACT

Introduction

To address the health burden of tobacco consumption effectively in Malaysia, Ministry of Health has adopted the recommendation of Article 11 of Framework Convention on Tobacco Control. The inclusion of pictorial health warnings on cigarette packages which occupy 40% of the front display panel and 60% of the back package becomes mandatory under Regulation 15 of the Control of Tobacco Regulations (Amended) 2008 since June 2009. Pictorial health warnings on cigarette packages provide smokers with universal access about the health risks associated with smoking. They are extremely cost-effective for public health intervention.

Objectives

To determine the effects of pictorial health warnings on cigarette packages among smokers seeking Quit Smoking Services (QSS) and Other Health Services (OHS) in government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

Methods

This is a cross-sectional study involving 120 smokers seeking Quit Smoking Services and 120 smokers seeking other health services at selected government hospital / health clinics in Wilayah Persekutuan Kuala Lumpur and Putrajaya. Data were collected using self-administered questionnaire.

Results

More than 90% of the respondents were current, regular smokers; majority smoked 11 – 20 cigarettes/ day. More smokers attending QSS as compared to those attending OHS often thought of the harm caused by smoking (46.7% vs 36.7%) and thought hard or seriously about quitting smoking (32.5% vs 22.5%). More than 85% of all smokers tried to quit smoking. More than 80% of all smokers somewhat worried that smoking will damage their health in the future. However, only 22.5% and 25% of the smokers attending QSS and OHS respectively would forgo a cigarette. Majority of all smokers had the opinion that smoking is bad or very bad. A great majority of the smokers did not make any effort to avoid looking or thinking about pictorial health warning (PHWs).

Majority of all smokers had the knowledge on smoking-related diseases and other health problems such as miscarriage. More smokers attending OHS (76.7%) noticed PHWs, read or looked closely at PHW on cigarette packages. About 50% of all smokers reported that PHWs somewhat led them to think about the health risks of smoking. About three quarter of all smokers never stopped having a cigarette when about to smoke one by looking at PHWs.

The comparison study between plain package and colourful package, found that colourful background packages were more attractive and received higher mean score as compared to plain packages. The testing of several new PHWs were based on seven item questions mainly focused on their ability to motivate smokers' noticing, thinking about harms, thinking about quitting, supporting quitting, and creating feelings of disgust, fear and regret. Based on these criteria, the efficacy study showed that among throat cancer mocked-up visuals, visual 1 (A1) and visual 2 (A2) are more efficacious which was consistent with smokers attending QSS and OHS. Among mouth cancer visuals, visual 3 (B3) was most efficacious among smokers attending OHS but B1 and B3 among smokers attending QSS. Mocked-up visuals of gangrene, visual 2 (C2), blindness visual 2 (D2), stroke visual 3 (E3) and emphysema visuals, visual 2 (F2) were more efficacious. The findings were consistent with both groups of smokers.

Conclusion

The existing PHWs may not seem to elicit strong affective responses or effectively increase the desire to quit smoking especially when it is associated with strong addiction. However, the impacts of PHWs on proximal variables were obvious. Therefore, new messages and images which could evoke a strong negative emotional reaction to smokers should be regularly introduced to maintain warning salience. Based on the efficacy testing using repeated measure, we recommended new visuals of throat cancer, mouth cancer, gangrene of the leg, blindness, stroke and emphysema to be used in the second round of Malaysian cigarette packages. The use of mass media to communicate risk messages of smoking to smokers should be intensified in line with the WHO FCTC obligations or recommendations.

1. Introduction

The use of tobacco remains the leading cause of preventable death and accounts for one of the ten global deaths. Each year almost 5 million people died from tobacco related disease, which equates to one person every 6.5 seconds[1]. Cigarette smoking kills one out of two long-term users globally, making tobacco consumption one of the most important public health issues for nations all over the world. If the epidemic is left unchecked, it could result in one billion deaths in the 21st century[2]. In recognition of the health and economic burden from tobacco use, 171 countries have ratified the Framework Convention on Tobacco Control (FCTC) - the first international treaty devoted to public health that obligate ratifying countries to broaden comprehensive tobacco control policies, among which is packaging and labelling of tobacco products[2-3]. Article 11 of FCTC states that countries ratify the FCTC are required to implement health warnings on cigarette packages that cover at least 30% of the surface and are "large, clear, visible, and legible"[2]. Beyond these minimum requirements, Article 11 of FCTC also recommends that warnings "should" cover 50% or more of package's principal surface, and "may" be in the form of picture[2]. Malaysia becomes a party to FCTC on December 2005.

Health concerns within the Ministry of Health Malaysia have been the primary force in the implementation of tobacco control legislation in an effort to control tobacco consumption. There is a strong political will, which enables the Malaysian Government to implement strong tobacco control measures. In 1995, the Control of Tobacco Regulations 1993 (CTR 1993) was first enacted under Section 36 of the Food Act 1983 (Act 281)[4]. Subsequent to this, on 7 September 2004 the said Regulation was amended to the Control of Tobacco Product Regulations 2004, which gave more clout on enforcement on the sales of tobacco products[5].

On 1 January 2009 under Regulation 15 of the Control of Tobacco Regulations (Amended) 2008, the principal Regulations were amended by inserting the following regulations on "Health information, sale restriction and other particulars on cigarette packaging". Under this regulation, all cigarette packages must carry pictorial health warnings (PHWs) that occupy 40% of the front display panel and 60% of the back package[6]. Six variants of pictorial health warnings on cigarette packages that communicate health diseases caused by smoking were introduced by Ministry of Health as alternative ways to increase the level of public awareness. In the first six months of its implementation, each of cigarettes' brands must have at least two of its products with these warnings and by June 2009, all cigarette packs of all brands were

mandatory to display these labels. The six different types of images are mouth cancer, throat cancer, lung cancer, premature birth, miscarriage and gangrene. In addition to the PHWs, the side of the cigarette pack must be printed with these information "Prohibition for selling cigarette to teenagers below 18 years" and "Cigarette smoke contains 4,000 types of chemicals". Info line number is also provided on cigarette packs as a source of information for smokers who are desired to quit smoking[6].

To effectively address the health burden of cigarette smoking among Malaysians, the government of Malaysia has also implemented among others the followings:

- Increasing the excise tax on cigarettes
- Prohibition on smoking in prohibited places
- Prohibition on smoking against minor (underage)
- Ban on advertising and sponsorship by the tobacco industries

Cigarette packages with PHWs that include images are a particularly powerful and cost-effective vehicle for communicating health risks to both smokers and non smokers. Pictorial health warnings on cigarette packages provide smokers with universal access to information on the dangers of smoking. PHWs also increase public awareness of the serious health risks of tobacco use and help to ensure that the packaging tells the truth about the deadly product within.

Research on pictorial health warnings showed that they are:

- More likely to be noticed than text-only warning labels[7-15]
- More effective for educating smokers about the health risks of smoking and for increasing smokers' thoughts about the health risks[11,13]
- Associated with increased motivation to quit smoking[9-12]
- Are subjected to "wear out", i.e. newly implemented warnings are most likely to be noticed and rated as effective by smokers[16-17]
- Noticed by the majority of adolescents, increase adolescents' cognitive processing of these messages and have the potential to lower smoking intentions and the introduction of graphic warning labels may help to reduce smoking among adolescents[18]

The effectiveness of prominent PHWs on cigarette packages in Malaysia had been evaluated on 2000 smokers by the International Tobacco Control Policy Evaluation (ITC), carried out by the Clearinghouse for Tobacco Control during their wave 4 data collection in 2009. Their findings[19] showed that :

- Almost 95% smokers noticed the new PHWs on cigarette packs. Among those who noticed, 70% of them had noticed PHWs often to very often;
- Almost 95% smokers read and looked closely at the new PHWs on cigarette packs. Among this group, almost 56% had read and looked closely often and very often;
- More than 70% smokers feel alarmed, unpleasant and worried as a result from noticing, reading and looking closely at PHWs;
- 85% of smokers reported that the PHWs had made them think about the health risks of smoking and among this group, 13% had thought it a lot;
- More than half of smokers reported that PHWs had made them stopped from having a cigarette when they were about to smoke one. Among those who said yes, 60% had stopped a few times to many times;
- Almost 83% smokers said that PHWs had made them more likely to quit and among those who said yes, almost 22% of them had thought a lot about likelihood to quit.
- Smokers who were very worried were almost 10 times more to think about health risk of smoking than those who were not worried at all (OR: 9.93; 95% C, $p<0.05$)

The descriptors and design elements on the cigarette packs produced by tobacco companies sent misleading perceptions especially among youth such as light and mild cigarettes are less harmful than others[20]. The colour of the packs are also associated with false believe about tar delivery and health risk; packs with light colours are rated as less harmful and easier to quit[20,21]. Therefore most of the countries for example Australia are now moving towards plain cigarette packs policy.

It is vital to recommend introducing generic or plain packaging as it would prohibit the use of colours,logos, brands images, promotional information, distinctive font size, low figure-ground contrast, misleading descriptive phrases. The plain packaging would only allow for the display of the brand name in a standard colour, font style and size.

Research evidence for implementation of plain packages is lacking in Malaysia and also it is very important to change the graphic warnings on cigarette packs at least once in two years to overcome wear-out effects of the existing graphic warnings. A recent study suggests that there might be health promoting advantages in changing the health warnings from time to time[12]. It is very important that the proposed new graphic health warnings to replace the existing ones should be tested for self efficacy in terms of motivating smoker's noticing, thinking about harms, thinking about quitting, supporting quitting, and creating feelings of disgust, fear and regret.

2. Rationale of the study

The rationale of the study is as follows:

- The Control of Tobacco Product Regulation (Amendment) 2008 on Health Pictorial Warnings at Packaging Cigarettes aims at propagating health information and serve as a formal platform to publicise health warnings to consumers through enforcements of this Regulation
- To evaluate the impact of pictorial health warnings as an effective medium to transmit anti-tobacco messages especially to smokers in local setting
- A survey on the effects of the pictorial health warnings on cigarette packages among smokers will give an insight as to the effectiveness of this mode of disseminating health derived information

3. Conceptual framework of the study

The conceptual framework of the study is as shown in Figure 1 (page 6).

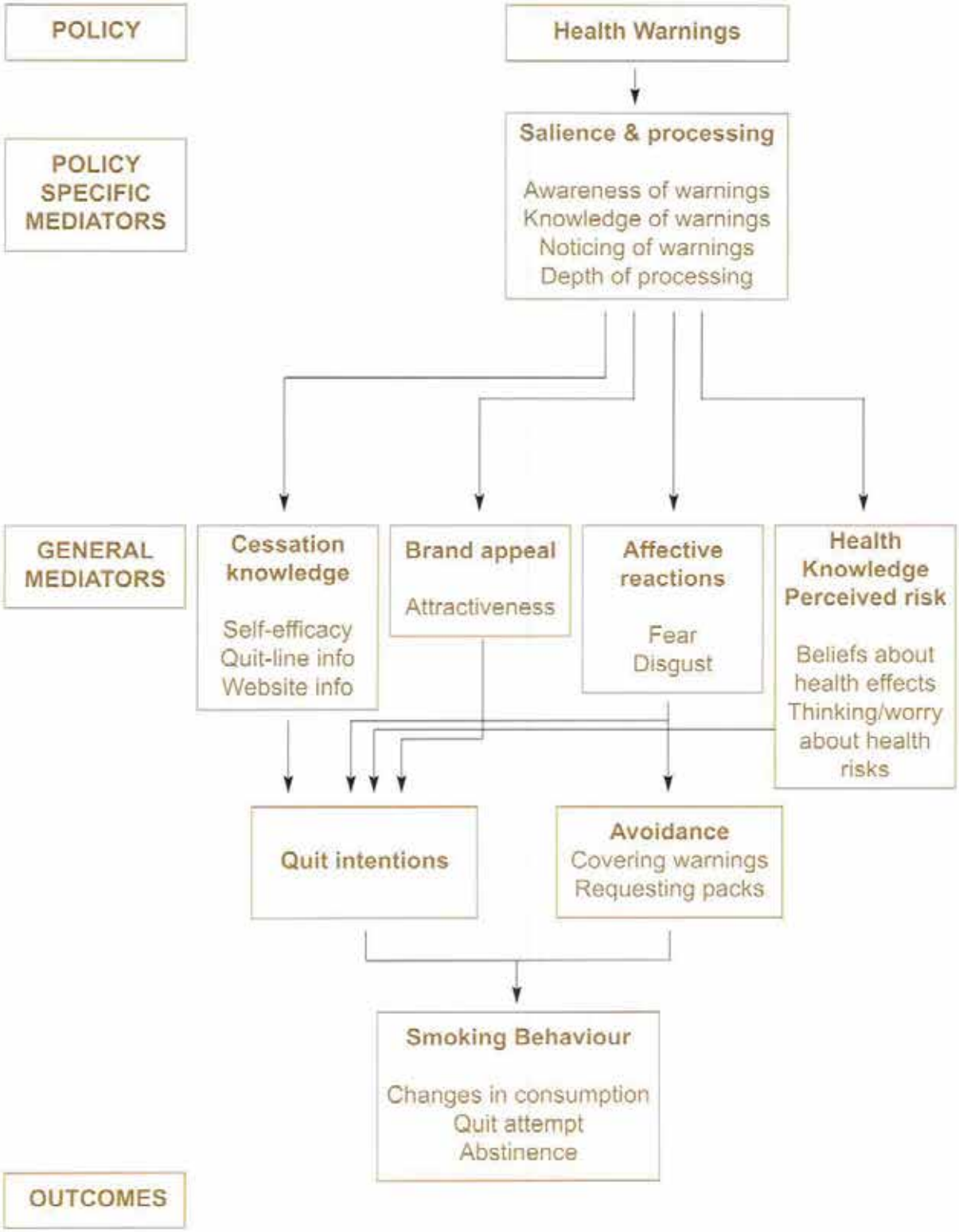


Figure 1: Conceptual framework for the Evaluation of health warning policies

4. Objectives

4.1 General Objective

To determine the effects of pictorial health warnings on cigarette packages among smokers seeking health services at government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

4.2 Specific Objectives

i. To determine the socio-demographic characteristic of smokers seeking health services at government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

ii. To determine the behaviour (number of cigarettes smoke per day, quit intention, quit attempts,use of medication to quit smoking) of smokers in relation to pictorial health warnings, who sought health services at government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

iii. To determine the perceptions and beliefs of smokers towards pictorial health warnings, who sought health services at government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

iv. To evaluate the impact of existing pictorial health warnings on noticing and reading by smokers (measure of salience) and thinking of quitting by smokers, who sought health services at government health facilities in Wilayah Persekutuan Kuala Lumpur and Putrajaya.

v. To determine the impact of plain packaging among smokers

vi. To determine the relative efficacy of each one of the six warning labels with either three or two different visuals depicting each disease.

5. Methods

5.1 Study design

The study design was cross-sectional.

5.2 Study population

The study population were two groups of smokers; one group seeking Quit Smoking Services (QSS) and another group seeking other health services (OHS) at government health facilities (hospital or health clinics) in Wilayah Persekutuan Kuala Lumpur and Putrajaya meeting the inclusion criteria.

5.3 Inclusion and exclusion criteria

Inclusion criteria

i. Adult smokers aged 18 years and above
ii. Smokers who smoked cigarettes only
iii. Smokers who had smoked at least 100 cigarettes and smoked at least one cigarette per day before joining Quit Smoking Services
iv. Smokers who started smoking at least a year prior to the survey
v. Smokers who attended Quit Smoking Services or other health services for not more than 6 months (May – October 2010) prior to the survey

Exclusion criteria

i. Known psychiatric illness in the past, verified with medical records and by asking the patient.
ii. Patients with any form of cognitive impairment such as dementia or mental retardation verified with medical records and by asking the patient/ staff nurse/ accompanying relatives.

5.4 Study sites

There are a total of nine hospitals or health clinics with Quit Smoking Services in Wilayah Persekutuan Kuala Lumpur and Putrajaya. Three health clinics with smokers attending QSS of less than five smokers from January to July 2010 were excluded from the study. The hospital and health clinics selected for the study were as shown in Table A.

5.5 Sample size

Based on the study by Hammond et al on measuring the effectiveness of new graphic health warning over text warnings in four country ITC survey[17], the percentage of participants thinking and had intention to quit smoking was between 24% to 44%. Therefore to detect a 20% response on thinking and have intention to quit smoking in relation to graphic health warnings on cigarette packages, with 80% power and a 5% error rate, the number of respondents needed was 100 plus 20 (oversample) respondents each for smokers attending QSS and smokers attending OHS respectively using Power and Sample Size Program.

5.6 Sampling technique

A two stage sampling technique was employed for the study. In the first stage, a hospital and all eight clinics in the Wilayah Persekutuan Kula Lumpur and Putrajaya which offer quit smoking services were included (Hospital Putrajaya, Klinik Kesihatan (KK) Putrajaya, KK Bandar Tun Razak, KK Tanglin, KK Jinjang, KK Batu, KK Pantai, KK Pandan and KK Setapak). In the second stage, hospital/ clinics with ≤5 smokers were excluded from the study. Based on the sample size calculated above, the estimated number of smokers from each hospital/ clinic was calculated proportionate to the number of smokers attending QSS from January to July 2010. The table below detailed the sample size allocation.

Table A: Number of Smokers From Each Hospital / Health Clinic

Hospital / Health Clinics	No. of Smokers Attending QSS	No. of Smokers Attending OHS
1. Hospital Putrajaya	37	37
2. Klinik Kesihatan Putrajaya	24	24
3. Klinik kesihatan Tanglin	31	31
4. Klinik kesihatan Jinjang	13	13
5. Klinik kesihatan Batu	8	8
6. Klinik kesihatan Pantai	7	7
TOTAL	120	120

5.7 Study period

October to November 2010.

5.8 Ethical consideration

This study was registered with National Medical Research Registry and ethical approval was obtained from the Medical Research Ethics Committee.

5.9 Data Collection

5.9.1 Instrument

5.9.1.1 Self-administered questionnaire adapted from the International Tobacco Control Policy Evaluation (ITC) survey

The instrument for the collection of data is self-administered questionnaire, bi- lingual in Bahasa Malaysia and English. The questionnaire used was a specially generated questionnaire which was originally adapted and modified from the International Tobacco Control Policy Evaluation Project, translated into Bahasa Malaysia and validated for used by other studies in Malaysia[19,22]. The questionnaire comprised of the following components:

i. Socio-demographic data.
ii. Smokers' smoking behaviour (number of cigarettes smoke per day, quit intention, quit attempts, use of medication to quit smoking) in relation to cigarette packages with pictorial health warnings.
iii. Smokers' perception in relation to cigarette packages with pictorial health warnings.
iv. Impact of existing pictorial health warnings on noticing and reading (measure of salience) by smokers and thinking of health risk.
v. Impact of plain packaging among smokers.

5.9.1.2 Plain packaging cigarette packs and mocked-up cigarette packs with new proposed designs of PHWs with a seven items questionnaire (based on the ITC questionnaires).

The second section of the questionnaire comprised of seven items (7 questions) which was to evaluate PHWs in term of their ability to motivate smoker's thinking about harms, thinking about quitting, supporting quitting (increasing self-efficacy), and creating feelings of disgust, fear and regret (Appendix I).

Plain Packs

Six very common brands were selected (Dunhill, L & M, Marlboro, Winston, Kent and B & H) to examine the impact of plain packaging. Plain versions of these packs were created by eliminating all brands imagery and colour for a plain "white" background. The name of each brand was printed in Arial 14 font size (Figures 1- 7). Respondents were asked to compare each of the plain pack with normal packs with colour and brands (Figures 1-7). Each pair of designs had different pictorial health warning covering 40% of the front of the pack and 60% of the back in anticipation of the pictorial warnings that were implemented in Malaysia in January 2009. Respondents were asked to tick the best design that is suitable for answering one of seven questions (Appendix 1) by comparing two types of packs (plain and colour with brand logo).

Mocked-ups designs

Mock-ups were prepared to resemble cigarette pack warning labels on six health diseases (i.e. throat cancer, mouth cancer, gangrene, blindness, stroke, emphysema). For each health diseases there were either three (for Throat cancer, Mouth cancer, Gangrene and Stroke) or two different (Blindness and Emphysema) mock-up visuals depicting the disease (labelled 1, 2, and 3 or 1 and 2).

Comparisons between different designed mocked-ups

Respondents were asked to compare all possible pairs of designs among each health diseases and to tick the best design that is suitable for answering one of seven questions

in the second part of the questionnaire by comparing two different pictures of each of the same disease

Calculations of scores gained by each visual

The total possible scores was calculated for each visual (1, 2, and 3), for each question and among each health diseases ranged from zero to 2 or zero to one. Appendix II demonstrates how scores were calculated for each visual and question.

5.9.2 Consent

Written consent was obtained from respondents attending Quit Smoking Services and other health services at selected health centres in Wilayah Persekutuan Kuala Lumpur.

6. Analysis

Data was analysed with SPSS Version 16[23]. Descriptive and comparative analyses were conducted. Socio-demographic characteristics, behaviour of smokers, smokers' perception to cigarette packages with PHW, measure of salience and thinking of health risk in relation to PHW among smokers were determined.

ANOVA with repeated measure analysis and dependent t-test were used to obtain comparative estimates of the relative efficacy of studied designs according to the total scores. For each evaluating item (i.e. question), scores were computed for all the six health diseases topics (i.e. throat cancer, mouth cancer, gangrene, blindness, stroke and emphysema) with 8 was the maximum possible rate (2 score x 4 health diseases) for three visual comparisons and 2 for (1 score x 2 health diseases) 2 visual comparisons. Final total scores were computed for each disease by multiplication of health diseases topics and evaluating items (2 score x 4 topics x 7 questions) for 3 visuals and (1 score x 2 topics x 7 questions) for 2 visuals with the computed maximum score of 56 and 14 respectively. Finally Pair-wise comparisons were conducted using Bonferroni test for three visual diseases and dependent-sample t-test two visual items. All the analyses were stratified by cases (smokers attending quit smoking services) and controls (smokers attending other health services).

7. Results

Table 1: Socio-demographic Characteristics of Smokers Attending Quit Smoking Services and Other Services at Government Hospital / Health Clinics

Socio-demographic Characteristics	Smokers Attending QSS		Smokers Attending OHS	
	No.	%	No.	%
Gender				
Male	116	96.7	120	100
Female	4	3.3	0	0
Ethnicity				
Malay	90	75	103	85.8
Chinese	18	15	2	1.7
Indian	8	6.7	12	10.0
Others	4	3.3	3	2.5
Mean age (years)	38.9 ±12.6		36.9 ±12.7	
Level of Education				
Primary School	6	5.0	6	5.0
Secondary School	62	51.6	65	54.2
University/College	52	43.4	49	40.8
Religion				
Muslim	92	76.7	105	87.5
Hinduism	6	5.0	10	8.3
Christianity	5	4.2	2	1.7
Buddha	15	12.5	2	1.7
Tribal/folk religion	1	0.8	1	0.8
Employment status				
Full time employed	97	80.8	99	82.5
Part time employed	2	1.7	4	3.3
Retired or pension	4	12.5	10	8.3
others	6	4.0	7	5.9
Household income				
RM 10,000 - RM 14,999	17	14.1	12	10
RM 15,000 - RM 29,999	31	24.9	49	40.7
RM 30,000 - RM 59,999	56	46.7	40	33.4
RM 60,000 - RM 89,999	10	8.4	17	14.1
RM 90,000 - RM 120,000	5	4.2	2	1.7

Table 1 shows the socio-demographic characteristics of smokers attending QSS and other health services at government hospital / health clinics who participated in the study. The socio-demographic characteristics of these smokers were very similar. Almost all the smokers were male and majority were Malays and Muslims. The mean age of the smokers who attended QSS and OHS were 38.9 ±12.6 and 36.9 ±12.7 years old respectively. More

than 50% of all smokers attained secondary education. More than 80% of the respondents had full time employment and majority of the respondents had an annual household income between RM 15,000 to RM 89,999.

Table 2: Smoking Behaviour of Smokers Attending Quit Smoking Services and Other Health Services at Government Hospital / Health Clinics

Behaviour of Smokers	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
Frequency of smoking		
Every day	115 (95.8)	109 (90.8)
Less than every day	5 (4.2)	11 (9.2)
Average no of cigarette smoked / day*		
1 - 10 cigarettes	31 (27.0)	46 (42.9)
11 -20 cigarettes	66 (57.2)	54 (50.6)
21-40 cigarettes	20 (14.0)	7 (6.5)
>40 cigarettes	2 (1.8)	0 (0.0)
Duration of smoking in years	16.8 ± 10.6	20.5 ± 11.6
Age smoked first cigarette		
1 - 10 years	0 (0)	1 (0.8)
11 - 20 years	104 (86.7)	105 (88.3)
21 – 30 years	16 (13.3)	11 (9.3)
31 - 40 years	1 0.8)	2 (1.6)
>40 years	1 (0.8)	0
Pack information/brand appeal		
Information about cigarettes smoked at the time of interview		
Having a pack of cigarette at the time of interview?		
Yes	28 (23.2)	47 (39.2)
No	92 (76.7)	73 (60.8)
Did the cigarette have a brand?		
Yes	119 (99.2)	118 (98.3)
No	1 (0.8)	2 (1.7)
Did the cigarette have any special flavour?		
No	111 (92.5)	105 (87.5)
Menthol	4 (3.3)	14 (11.7)
Cloves	-	1 (0.8)
Others	2 (1.7)	6 (5.0)
Don't know	3 (2.5)	2 (1.7)
The number of cigarettes / pack		
12	3 (2.5)	2 (1.7)
14	6 (5.0)	8 (6.7)
20	111 (92.5)	110 (91.7)
Did the cigarette pack have a pictorial health warning and text?		
Yes	111 (92.5)	115 (95.8)
No	9 (7.5)	5 (4.2)

Behaviour of Smokers	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
Decision to choose a specific brand smoked at the time of interview		
The taste of cigarettes		
Yes	98 (81.7)	97 (80.8)
No	22 (18.3)	23 (19.2)
The price of cigarettes		
Yes	24 (20.0)	19 (15.8)
No	96 (80.0)	101 (84.2)
They may not as bad for health		
Yes	18 (15.0)	20 (16.7)
No	102 (85.0)	100 (83.3)
Health knowledge, Perceived Risk and depth of processing (Beliefs about health effects. Thinking / worry about health risks)		
In the last one month, how often did you think of the followings?		
Think about the harm caused by smoking to oneself?		
Never	7 (5.8)	17 (14.2)
Once in a while	54 (45.0)	55 (45.8)
Often	56 (46.7)	44 (36.7)
Very often	3 (2.5)	4 (3.3)
Think about the harm your smoking might be doing to other people?		
Never	8(6.7)	4 (3.3)
Once in a while	59(49.2)	61 (50.8)
Often	49(40.8)	50 (41.7)
Very often	4(3.3)	5 (4.2)
Think hard or seriously about quitting smoking?		
Never	2 (1.7)	10 (8.3)
Once in a while	73 (60.8)	81 (67.5)
Often	39 (32.5)	27 (22.5)
Very often	6 (5.0)	2 (1.7)
Think about the money spent on smoking?		
Never	50 (41.7)	67 (55.8)
Once in a while	52 (43.3)	37 (30.8)
Often	14 (11.7)	13 (10.8)
Very often	4 (3.3)	3 (2.5)
How worried are you, smoking will damage your health in the future?		
Not at all	2 (1.7)	3 (2.5)
Somewhat	96 (80.0)	107 (89.2)
Very much	22 (18.3)	10 (8.3)

Behaviour of Smokers	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
Cessation - Quit attempts by smokers		
Ever try to quit smoking?		
Yes	115 (95.8)	104 (86.7)
No	9 (7.5)	16 (13.3)
No. Of times try quitting smoking?*		
1	23 (21.5)	24 (28.6)
2	31 (29.0)	32 (38.1)
3	27 (25.2)	20 (23.8)
4	15 (14.0)	4 (4.8)
5	2 (1.9)	3 (3.6)
>5	9 (8.4)	1 (1.2)
On last attempt, how do you stop smoking?*		
Stopped suddenly	56(46.7)	47(39.2)
Gradually cut down	59(49.2)	57(47.5)
Cessation knowledge		
Heard of any medication to help stop smoking?		
Yes	115 (95.8)	91 (75.8)
No	5 (4.2)	29 (24.2)
Ever used any medication to stop smoking?*		
Yes	93 (77.5)	14 (11.7)
No	23 (19.2)	77 (64.2)
Behavioural outcome (Quit intention, avoidance, quit attempt, stub/stopped when about to smoke)		
In the last month, have you stubbed out a cigarette before finishing because thought about the harm of smoking?		
Yes	27 (22.5)	30 (25.0)
No	93 (77.5)	90 (75.0)
Belief about smoking		
Consider oneself being addicted to cigarette?		
Not at all addicted	5 (4.2)	8 (6.7)
Somewhat addicted	67 (55.8)	86 (71.7)
Very addicted	48 (40.0)	26 (21.7)
What is your overall opinion about smoking?		
Good	1 (0.8)	0
Neither good nor bad	22 (18.3)	32 (26.7)
Bad	71 (59.2)	60 (50.0)
Very bad	26 (21.7)	28 (23.3)

Table 2 shows the smoking behaviour of smokers attending QSS and OHS at government hospital / health clinics. More than 90% of the respondents were current smokers. A higher proportion of smokers attending OHS at government hospital / health clinics smoked 1 – 10 cigarettes/day whereas more smokers attending QSS smoked 11 – 20 cigarettes/day. The mean duration of smoking among smokers attending QSS and OHS at government hospital / health clinics were 16.8 ± 10.6 and 20.5 ± 11.6 respectively. Majority of the smokers from both groups smoked their first cigarette between 11-20 years.

At the time of interview, 23% and 39% of smokers attending QSS and OHS had a pack of cigarette with them respectively. Almost all smokers smoked cigarettes with a brand name, without flavour, buying cigarettes at a pack size of 20 cigarettes and cigarette packs with pictorial health warnings. The decision to choose a specific brand of cigarette lied mainly on the taste of cigarettes.

More smokers attending QSS as compared to those attending OHS often thought of the harm caused by smoking (46.7% vs 36.7%) and think hard or seriously about quitting smoking (32.5% vs 22.5%). Almost equal proportion of smokers from both groups often thought about their smoking might harm other people. However, majority of all smokers never thought about the money spent on smoking.

More than 85% of all smokers tried to quit smoking. More smokers attending OHS had tried up to two times than those attending QSS. However, more smokers attending QSS attempted more than two times, with 8.4% having tried more than five times. Almost equal numbers of smokers from both settings stopped smoking suddenly or gradually cut down on their last attempt to stop smoking.

A higher proportion of smokers attending QSS heard of medications to help stop smoking and ever used those medications to stop smoking than smokers attending OHS at government health centres.

On the question of smoking and health, more than 80% of all smokers somewhat worried that smoking will damage their health in the future. However, only 22.5% and 25% of the smokers attending QSS and OS respectively would stub out a cigarette before finishing smoking. Majority of the smokers in both groups had the opinion that smoking is bad or very bad. More smokers attending OHS claimed to be somewhat addicted to cigarettes. On the other hand, a higher proportion of smokers attending QSS were very addicted to cigarettes as compared to smokers attending OHS.

Table 3: Perception and Belief of Smokers towards Pictorial Health Warnings on Cigarette Packages

Perception and Belief of Smokers Towards PHW	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
In the last month, did you make any effort to avoid looking at or thinking about PHW by:		
Covering the PHW?*		
Yes	20 (17.1)	16 (13.3)
No	97 (82.9)	104 (86.7)
Keeping the pack out of sight?*		
Yes	14 (12.0)	15 (12.5)
No	103 (88.0)	105 (87.5)
Using a cigarette case or some other pack?*		
Yes	13 (11.1)	17 (14.2)
No	104 (88.9)	103 (85.8)
Not buying packs with particular labels*		
Yes	6 (5.1)	5 (4.2)
No	111 (94.9)	115 (95.8)

Table 3 shows the perceptions and beliefs of smokers towards pictorial health warnings on cigarette packages. There was not much difference between the two groups of smokers using different ways to avoid looking at or thinking about PHW. A great majority of the smokers do not make any effort to avoid looking or thinking about pictorial health warning. Only about 5% of all smokers bought cigarettes packs with particular PHW.

Table 4: Knowledge of Smokers on Cigarette Smoking and Its Associated Diseases

Cigarette Smoking and Its Associated Diseases	Smokers Attending QSS n (%)			Smokers Attending OS n (%)		
	Yes	No	Don't know	Yes	No	Don't know
Does smoking cause stroke in smokers?	106 (88.3)	3 (2.5)	11 (9.2)	107 (89.2)	5 (4.2)	8 (6.7)
Does smoking cause impotence in male smokers?	43 (35.8)	37 (30.8)	40 (33.3)	47 (39.2)	32 (26.7)	41 (34.2)
Does smoking cause premature ageing?	54 (45.0)	47 (39.2)	19 (15.8)	49 (40.8)	42 (35.0)	29 (24.2)
Does smoking cause mouth cancer in smokers?	115 (95.8)	4 (3.3)	1 (0.8)	112 (93.3)	3 (2.5)	5 (4.2)
Does smoking cause chronic obstructive pulmonary disease (COPD)?	117 (97.5)	2 (1.7)	1 (0.8)	117 (97.5)	1 (0.8)	2 (1.7)
Does smoking cause heart failure?	117 (97.5)	2 (1.6)	1 (0.8)	115 (95.8)	3 (2.5)	2 (1.7)
Does smoking cause gangrene?	100 (83.3)	13 (10.8)	7 (5.8)	106 (88.3)	6 (5.0)	8 (6.7)
Does smoking cause miscarriage?	112 (93.3)	3 (2.5)	5 (4.2	112 (93.3)	3 (2.5)	5 (4.2)

Table 4 shows the knowledge of smokers on cigarette smoking and its associated diseases. Majority of the smokers from both groups had the knowledge that smoking causes strokes, mouth cancer, COPD, heart failure, gangrene and miscarriage. There was much lower knowledge that smoking causes impotence in males and premature ageing among both groups of smokers.

Table 5: Impact of Existing Pictorial Health Warning on Noticing and Reading by Smokers

Impact of existing PHW on noticing and reading by smokers	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
In the last month, how often do you notice PHW on cigarette packages?		
never	3 (2.5)	0
once a while	30 (25.0)	13 (10.8)
often	81 (67.5)	92 (76.7)
very often	6 (5.0)	15 (12.5)
In the last month how often do you read or look closely at PHW on cigarette packages?*		
never	23 (19.7)	17 (14.2)
once in a while	66 (56.4)	70 (58.3)
often	23 (19.7)	27 (22.5)
very often	5 (4.3)	6 (5.0)
In the last month, have PHW stopped you from having a cigarette when you were about to smoke one?		
Never	85 (72.6)	84 (70.0)
Once	10 (8.5)	14 (11.7)
A few times	16 (13.7)	18 (15.0)
Many times	6 (5.1)	4 (3.3)
To what extent does PHW makes you think about the health risks of smoking?		
not at all	11 (9.4)	12 (10.0)
a little	47 (40.2)	36 (30.0)
somewhat	56 (47.9)	68 (56.7)
a lot	3 (2.6)	4 (3.3)
To what extent does PHW makes you more likely to quit smoking?		
not at all	22 (18.8)	33 (27.5)
a little	61 (52.1)	47 (39.2)
somewhat	29 (24.8)	38 (31.7)
a lot	5 (4.3)	2 (1.7)
How do the existing PHW make you feel?		
very alarmed	5 (4.3)	2 (1.7)
somewhat alarmed	57 (48.5)	58 (48.3)
neither alarmed nor calm	53 (45.2)	58 (48.3)
somewhat calm	1 (0.9)	1 (0.8)
very calm	1 (0.9)	1 (0.8)
How realistic are the existing PHW?*		
Not at all realistic	19 (16.2)	12 (10.0)
A little realistic	45 (38.5)	41 (34.2)
Somewhat realistic	27 (23.1)	27 (22.5)
Very realistic	20 (17.1)	37 (30.8)
Extremely realistic	6 (5.1)	3 (2.5)

Impact of existing PHW on noticing and reading by smokers	Smokers Attending QSS n (%)	Smokers Attending OHS n (%)
How often do you think of the information on toxin and chemicals that are harmful to health on cigarette packages?*		
Never	59 (50.4)	57 (47.5)
Once in a while	52 (44.4)	55 (45.8)
Often	4 (3.4)	7 (5.8)
Very often	29 (1.7)	1 (0.8)
In the last 6 months, how often do you notice advertising in the newspaper about PHW on cigarette packages?		
never	5 (4.2)	6 (5.0)
once in a while	89 (74.2)	84 (70.0)
often	24 (20.0)	29 (24.2)
very often	2 (1.7)	1 (0.8)
In the last 6 months, how often do you notice advertising or information that talks about the dangers of smoking or encourages quitting?		
never	5 (4.2)	1 (0.8)
once in a while	90 (75.0)	88 (73.3)
often	22 (18.3)	30 (25.0)
very often	3 (2.5)	1 (0.8)

Table 5 shows the impact of existing PHW on noticing and reading by smokers. More smokers attending OHS (76.7%) noticed PHW on cigarette packages often as compared to smokers attending QSS (67.5%). Almost similar proportion of smokers form both groups read or look closely at PHW on cigarette packages once in a while. About three quarter of all smokers never stopped having a cigarette when about to smoke one by looking at PHW. However, a small percentage of smokers; 5.1% and 3.3% of smokers attending QSS and OHS respectively stopped having a cigarette when about to smoke one by looking at PHW in many occasions.

Smokers reported that PHW somewhat led them to think about the health risks of smoking (47.9% and 56.7% for smokers attending QSS and OHS respectively). PHW made them a little more likely to quit smoking (52.1% and 39.2% for smokers attending QSS and OHS respectively).

About one in two smokers from each of both groups of smokers felt somewhat alarmed at the PHW on cigarette packages. A low proportion (17.1%) and a third of smokers attending QSS and OHS respectively thought that existing PHW very realistic. Almost similar proportion of smokers form both groups never thought about the information on toxin and chemicals that are harmful to health on cigarette packages.

A very small proportion of all smokers (about 5%) thought of the information on toxin and chemicals that are harmful to health on cigarette packages. Majority (>70%) of all smokers only noticed once in a while regarding advertising in the newspaper about PHW on cigarette packages or information that talks about the dangers of smoking or encourage quitting.

7.1 Testing of new proposed PHW and plain packaging using repeated measure

7.1.1 Comparison between plain and colourful packaging among six different health diseases visuals based on self administrative seven questions related to notice and thinking.

Figure 2 describes overall mean score between two different visuals wit more prominent background (A MOH) and plain background (A plain) carrying the message of throat cancer. The mean score was calculated based on seven item questions. Overall mean score on visual A (MOH) was higher (3.06) than A (Plain) (2.26). Table 6 describes the mean differences of these two visuals among smokers attending QSS and OHS respectively. Among smokers attending QSS, the mean score of visual A (MOH) was significantly higher than the A (plain) packages (p=0.04).

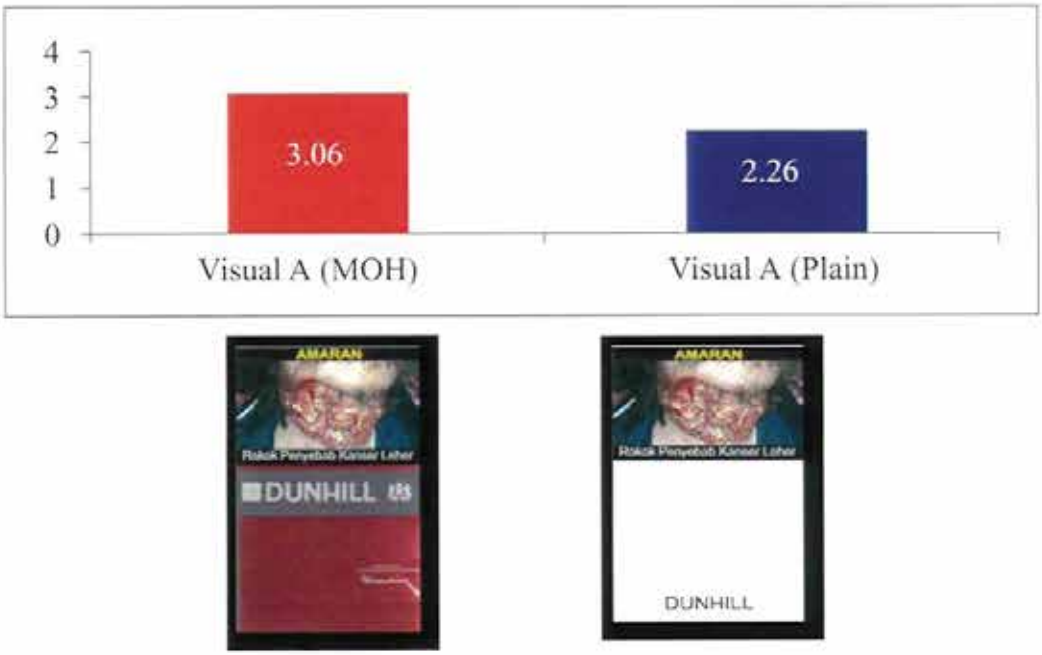


Figure 2: Visuals of Throat Cancer

Table 6: Pair-wise comparison between A (MOH) with A (Plain) for the health diseases topic e.g. "Throat cancer"

	Smokers attending QSS		Smokers attending OHS	
Visual (Throat Cancer)	Mean difference[a] (95% CI)	P-value[b]	Mean difference[b] (95% CI)	P-value[b]
A-MOH - A-Plain	1.12 (0.05,2.19)	0.04	0.47 (-.66,1.60)	0.41

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison mean difference by using dependent-sample t-test; A (MOH): "Visual of Throat cancer" and, A (Plain): "Visual of Throat cancer".

Figure 3 describes overall mean score between two different visuals with more prominent background (B MOH) and plain background (B plain) carrying the message of mouth cancer. The mean score was calculated based on seven item questions. Overall mean score on visual B (MOH) was higher (3.12) than B (Plain) (2.21). Table 7 describes the mean differences of these two visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS, the mean score of visual B (MOH) was significantly higher than the B (plain) packages (p=0.04).

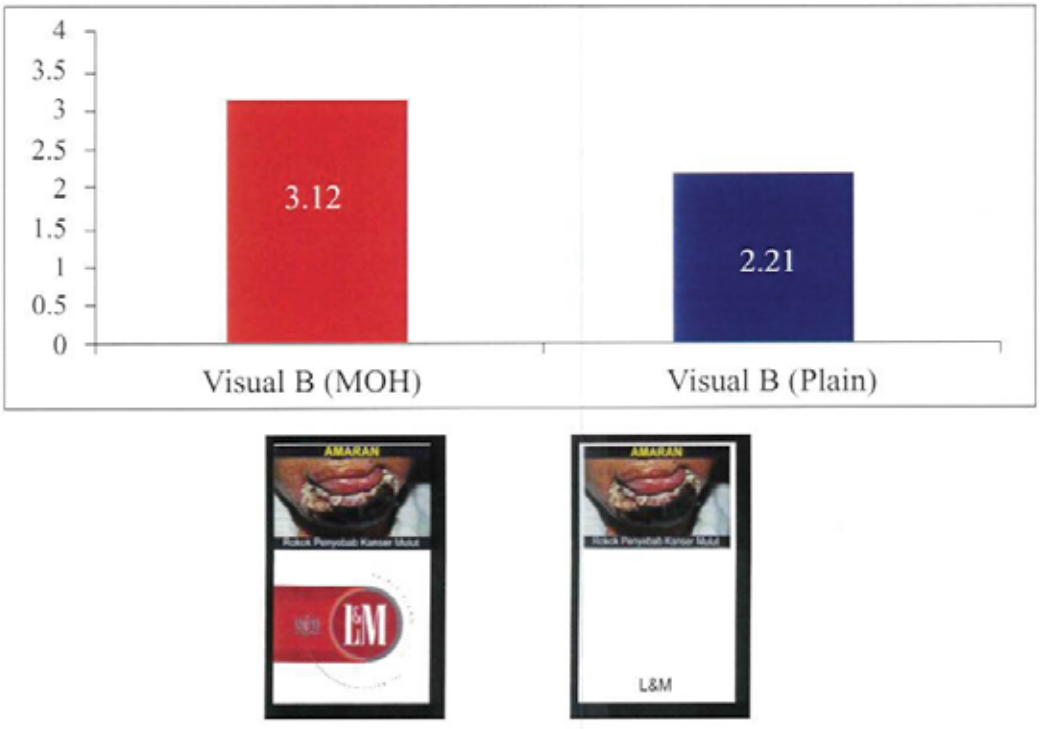


Figure 3: Visuals of Mouth Cancer

Table 7: Pair-wise comparison between B (MOH) with B (Plain) for the health diseases topic e.g. "Mouth cancer"

	Smokers attending QSS		Smokers attending OHS	
Visual (Mouth Cancer)	Mean difference[a] [a](95% CI)	P-value[b]	Mean difference[b] [a](95% CI)	P-value[b]
B-MOH - B-Plain	1.10 (0.03,2.17)	0.04	0.71 (-.42,1.83)	0.22

[a]Difference in total mean scores which were compued from seven items (questions); [b]comparison mean difference by using dependent-sample t-test; B (MOH): "Visual of Month cancer" and, B (Plain): "Visual of Mouth cancer".

Figure 4 describes overall mean score between two different visuals with more prominent background (C MOH) and plain background (C plain) carrying the message of gangrene. Overall mean score on visual C (MOH) was higher (3.09) than C (Plain) (2.24). Table 8 describes the mean differences of these two visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS, the mean score of visual C (MOH) was significantly higher than the C (plain) packages (p=0.04).

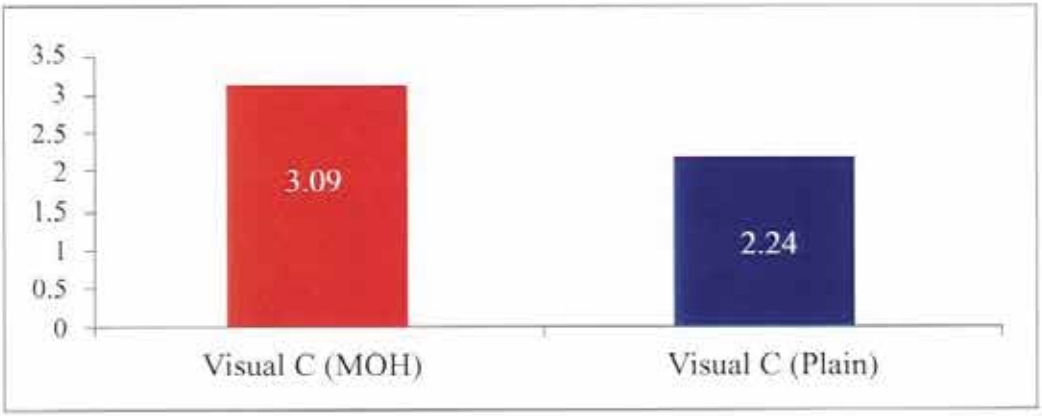


Figure 4: Visuals of Gangrene

Table 8: Pair-wise comparison between C (MOH) with C (Plain) for the health diseases topic e.g. "Gangrene"

	Smokers attending QSS		Smokers attending OHS	
Visual (Gangrene)	Mean difference[a] [a](95% CI)	P-value[b]	Mean difference[b] [a](95% CI)	P-value[b]
C-MOH - C-Plain	1.10 (0.03,2.17)	0.04	0.59 (-.54,1.72)	0.30

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison mean difference by using dependent-sample t-test; C (MOH): "Visual of Gangrene" and, C (Plain): "Visual of Gangrene"

Figure 5 describes overall mean score between two different visuals with more prominent background (D MOH) and plain background (D plain) carrying the message of blindness. The overall calculated mean score on visual D (MOH) was higher (3.03) than D (Plain) (2.27). Table 9 describes the mean differences of these two visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS the mean score of visual D (MOH) was higher than the D (plain) packages (p=0.05).

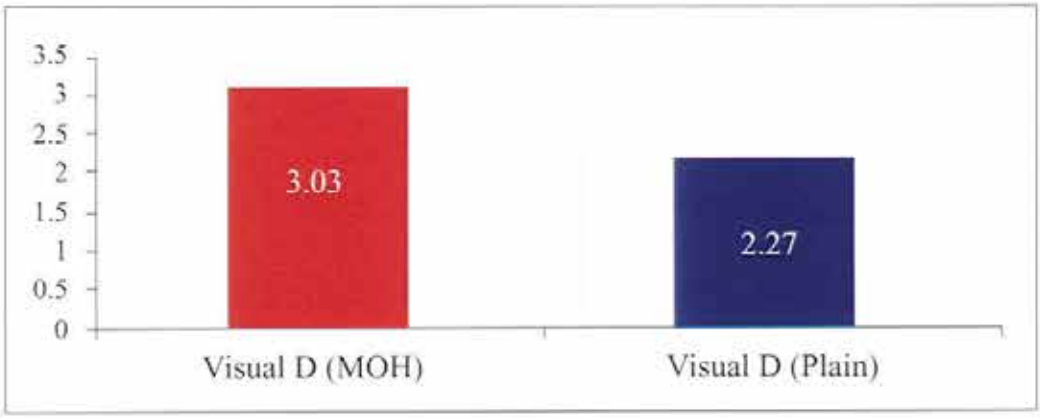


Figure 5: Visuals of Blindness

Table 9: Pair-wise comparison between D (MOH) with D (Plain) for the health diseases topic e.g "Blindness"

	Smokers attending QSS		Smokers attending OHS	
Visual Blindness	Mean difference[a] [a](95% CI)	P-value[b]	Mean difference[b] [a](95% CI)	P-value[b]
D-MOH - D-Plain	1.05 (.02,2.12)	0.05	0.47 (-.66,1.60)	0.41

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison mean difference by using dependent-sample t-test; D (MOH): "Visual of Blindness" and, D (Plain): "Visual of Blindness".

Figure 6 describes overall mean score between two different visuals with more prominent background (E MOH) and plain background (E plain) carrying the message of stroke. The mean score was calculated based on seven item questions. Overall mean score on visual E (MOH) was higher (3.06) than E (Plain) (2.24). Table 10 describes the mean differences of these two visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS, the mean score of visual E (MOH) was higher than the E (plain) packages (p=0.05).

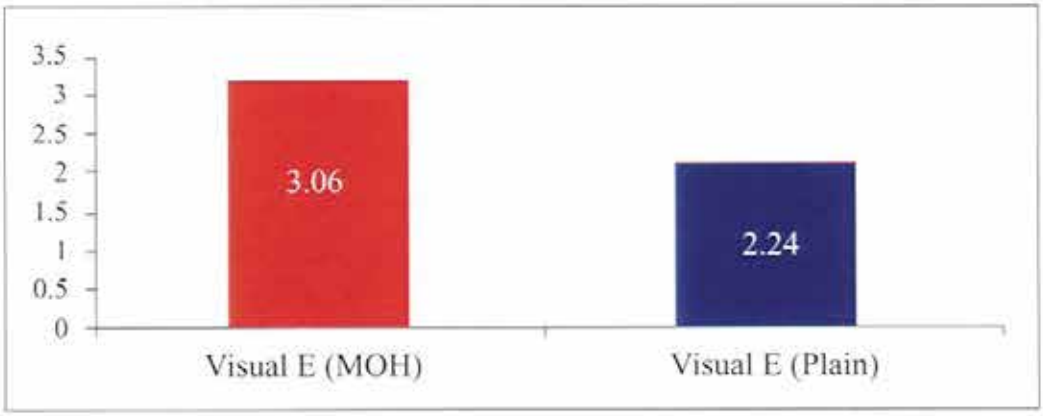


Figure 6: Visuals of Stroke

Table 10: Pair-wise comparison between E (MOH) with E (Plain) for the health diseases topic e.g. "Stroke"

	Smokers attending QSS		Smokers attending OHS	
Visual (Stroke)	Mean difference[a] [a](95% CI)	P-value[b]	Mean difference[b] [a](95% CI)	P-value[b]
E-MOH - E-Plain	1.05 (.02,2.12)	0.05	0.59 (-.54,1.72)	0.30

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison mean difference by using dependent-sample t-test; E (MOH): "Visual of Stroke" and, E (Plain): "Visual of Stroke".

Figure 7 describes overall mean score between two different visuals with more prominent background (F MOH) and plain background (E plain) carrying the message of emphysema. The mean score was calculated based on seven item questions. Overall mean score on visual F (MOH) was higher (3.03) than F (Plain) (2.27). Table 11 describes the mean differences of these two visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS, the mean score of visual F (MOH) was higher than the F (plain) packages but not statistical significant (p=0.06).

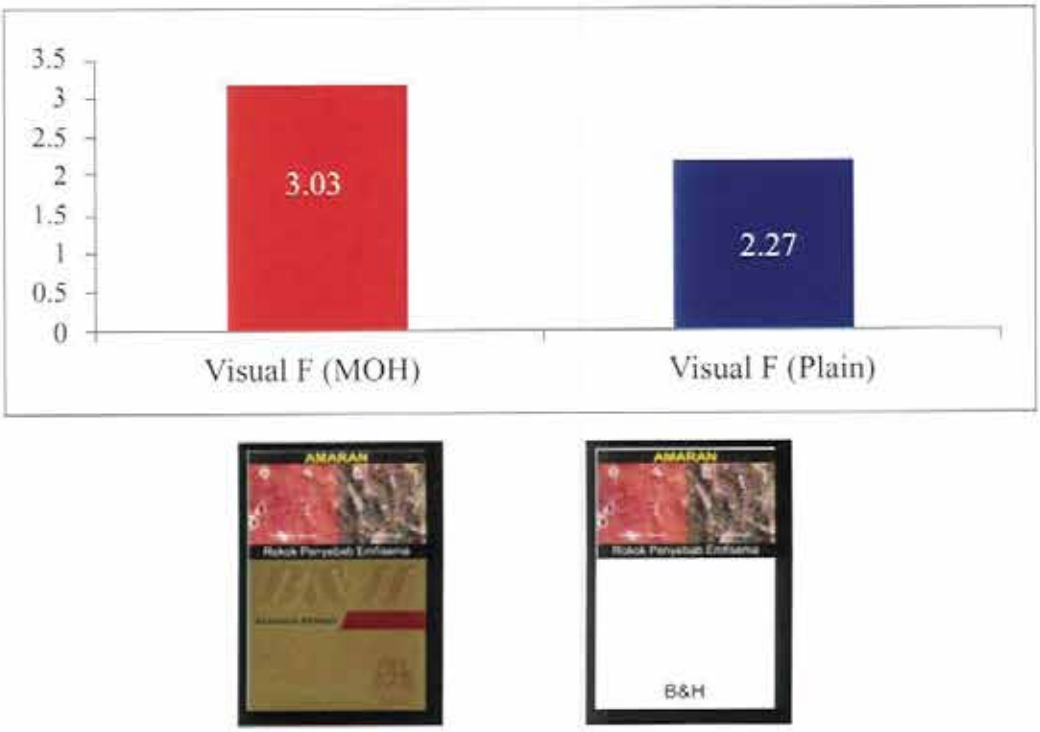


Figure 7: Visuals of Emphysema

Table 11: Pair-wise comparison between F (MOH) with F (Plain) for the health diseases topic e.g. "Emphysema"

	Smokers attending QSS		Smokers attending OHS	
Visual (Emphysema)	Mean difference[a] [a](95% CI)	P-value[b]	Mean difference[b] [a](95% CI)	P-value[b]
F-MOH - F-Plain	1.03 (-.04,2.10)	0.06	0.47 (-.66,1.60)	0.41

[a]Difference in total scores which were computed from seven items (questions); [b] comparison mean difference by using dependent-sample t-test; F (MOH): "Visual of Emphysema" and, F (Plain): "Visual of Emphysema".

7.1.2 Computing the total scores from the seven items (questions) for each visual (from 1-3 or 1-2) presented by different health diseases topics and pair wise mean score comparison between the visuals.

Figure 8 shows the computed total mean scores and standard error bar (SE) for each visual (design A1 to A3) presented by throat cancer health topic. Visual A3 has shown overall lowest mean value compare to other two visuals. Table 12 illustrates the mean differences of the three visuals among smokers attending QSS and smokers attending OHS. Compare with visuals A1 and A2, visual A3 had significantly lower mean values ($p<0.001$). This was consistent in both smokers attending QSS and smokers attending OHS.

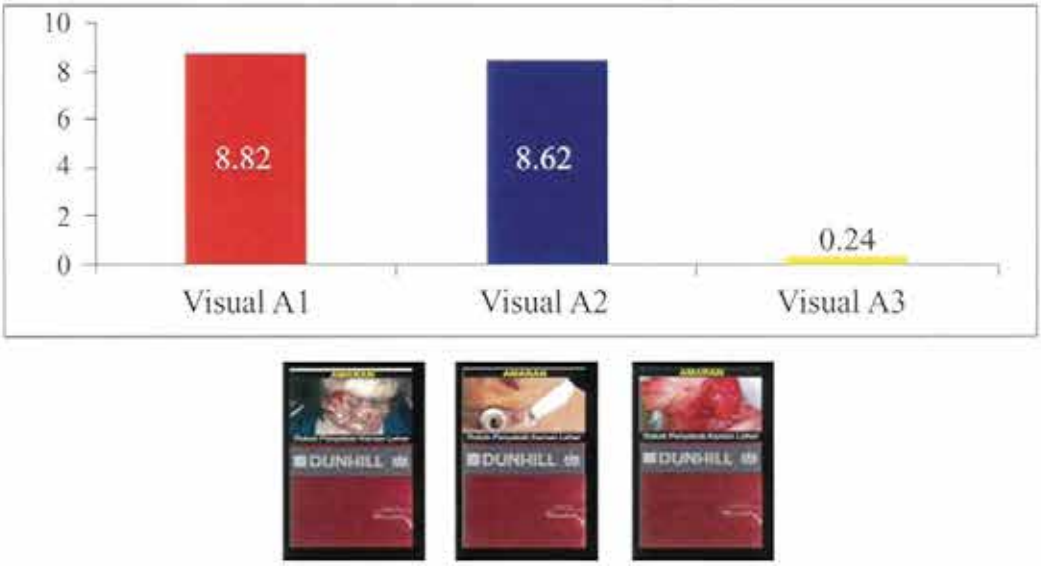


Figure 8: Visuals of Throat Cancer

Table 12: Pair-wise comparisons among different designs (from A1 to A3) for the health diseases topic e.g. "Throat Cancer"

		Smokers attending QSS		Smokers attending OHS	
Visual		Mean difference[a]	P-value[b]	Mean difference[b]	P-value[b]
(Throat)		[a](95% CI)		[a](95% CI)	
A1	A2	-.06 (1.54,1.43)	1.000	.47 (-.96,1.90)	1.000
	A3	8.06 (6.61,9.516)	<0.001	9.12 (7.94,10.29)	<0.001
A2	A3	8.12 (6.83,9.40)	<0.001	8.65 (7.49,9.81)	<0.001

[a]Difference in total mean scores which were computed from seven items (questions); [b]multiple comparisons using Bonferroni test; A1: "Visual 1 of Throat Cancer", A2: "Visual 2 of Throat cancer", and A3: "Visual 3 of Throat cancer".

Figure 9 shows the computed total mean scores and standard error bar (SE) for each visual (design B1 to B3) presented by mouth cancer health topic. Visual B2 has shown overall lowest mean value compare to other two visuals. Table 13 illustrates the mean differences of the three visuals among smokers attending QSS and smokers attending OHS. Among smokers attending QSS, visual B2 had significantly lowest mean value compare to other two visuals and there was no significant mean difference between B1 and B3. Among smokers attending OHS, respondents' visual B3 had significantly highest mean value compare to other two visuals.

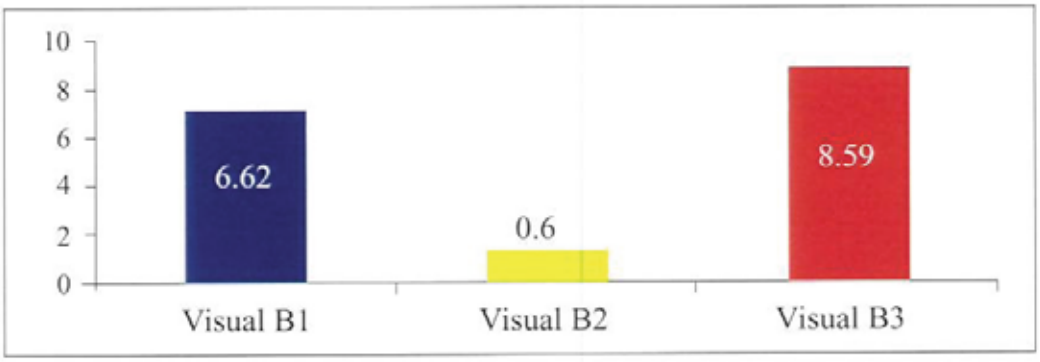


Figure 9: Visuals of Mouth Cancer

Table 13: Pair-wise comparisons among different designs (from B1 to B3) for the health diseases topic e.g. "Mouth cancer"

Visual		Smokers attending QSS		Smokers attending OHS	
		Mean difference[a]	P-value[b]	Mean difference[b]	P-value[b]
		[a](95% CI)		[a](95% CI)	
B1	B2	5.93 (4.43,7.43)	<0.001	6.12 (5.09,7.14)	<0.001
	B3	-.35 (-2.05,1.36)	1.000	-3.59(-4.96,2.21)	<0.001
B2	B3	-6.28 (4.70,7.86)	<0.001	-9.71(8.34,11.07)	<0.001

[a]Difference in total scores which were computed from seven items (questions); [b]multiple comparisons using Bonferroni test; B1: "Visual 1 of Mouth cancer", B2: "Visual 2 of Mouth cancer", and B3: "Visual 3 of Mouth cancer".

Figure 10 shows the total mean scores computed from the seven questions, and standard error bar (SE) for each visual (design C1 to C3) presented by gangrene health topic. Visual C2 has shown overall highest mean value compare to other two visuals. Table 14 illustrates the mean differences of the three visuals among smokers attending QSS and smokers attending OHS. In both groups of smokers, visual C2 had significantly highest mean score compare to other two groups.

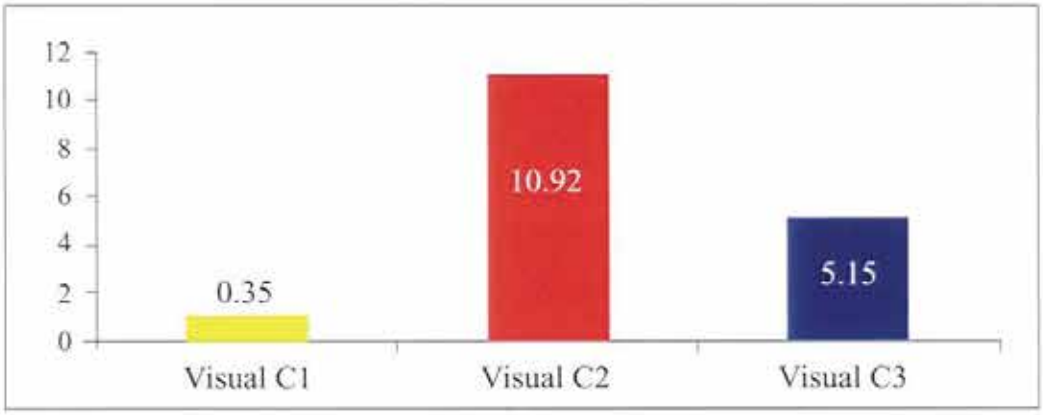


Figure 10: Visuals of Gangrene

Table 14: Pair-wise comparisons among different designs (from C1 to C3) for the health diseases topic e.g. "Gangrene"

Visual		Smokers attending QSS		Smokers attending OHS	
		Mean difference[a]	P-value[b]	Mean difference[b]	P-value[b]
		[a](95% CI)		[a](95% CI)	
C1	C2	-10.08 (-11.56, 8.60)	<0.001	-11.06 (-12.32,-9.80)	<0.001
	C3	-3.82 (-5.05,-2.60)	<0.001	-5.77 (-6.54,-4.99)	<0.001
C2	C3	6.25 (4.98,7.53)	<0.001	5.29 (4.37,6.22)	<0.001

[a]Difference in total mean scores which were computed from seven items (questions); [b]multiple comparisons using Bonferroni test; C1: "Visual 1 of Gangrene", C2: "Visual 2 of Gangrene", and C3: "Visual 3 of Gangrene".

Figure 11 illustrates the total mean scores computed from the seven questions, and standard error bar (SE) for each visual (designs D1 and D2) presented by blindness health topic. Visual D2 has shown overall highest mean value compare to visual D1. Table 15 illustrates the mean differences between the two visuals among smokers attending QSS and smokers attending OHS. In both smokers attending QSS and smokers attending OHS groups, visual D2 showed significantly higher mean score.

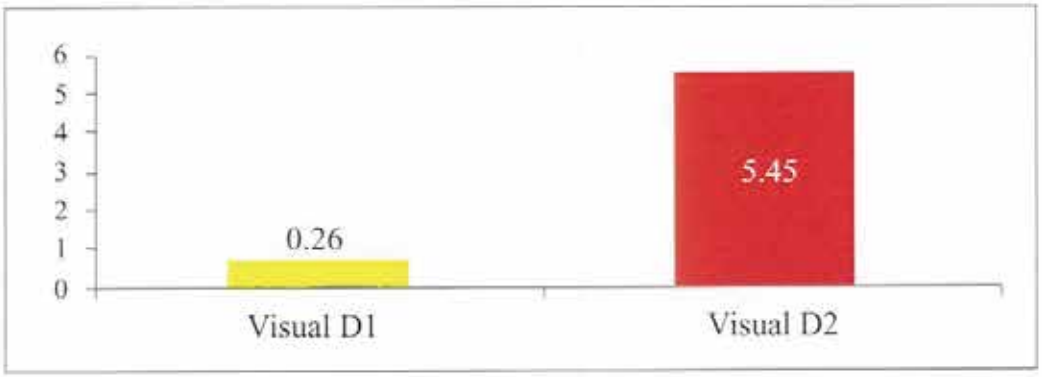


Figure 11: Visuals of Blindness

Table 15: Pair-wise comparisons among different designs (D1 and D2) for the health diseases topic e.g. "Blindness"

		Smokers attending QSS		Smokers attending OHS	
Visual		Mean difference[a]	P-value[b]	Mean difference[b]	P-value[b]
		[a](95% CI)		[a](95% CI)	
D1	D2	-4.95(-5.64,-4.26)	<0.001	-5.47 (-6.05,-4.89)	<0.001

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison of mean difference by using dependent-sample t-test; D1: "Visual 1 of Blindness", D2: "Visual 2 of Blindness".

Figure 12 shows the total mean scores computed from the seven questions, and standard error bar (SE) for each visual (design E1 to E3) presented by stroke health topic. Visual C3 has shown overall highest mean value compare to other two visuals. Table 16 shows the mean differences of the three visuals among smokers attending QSS and smokers attending OHS. In both groups of smokers, visual E3 had significantly highest mean score than other two visuals based of score from seven item questions.

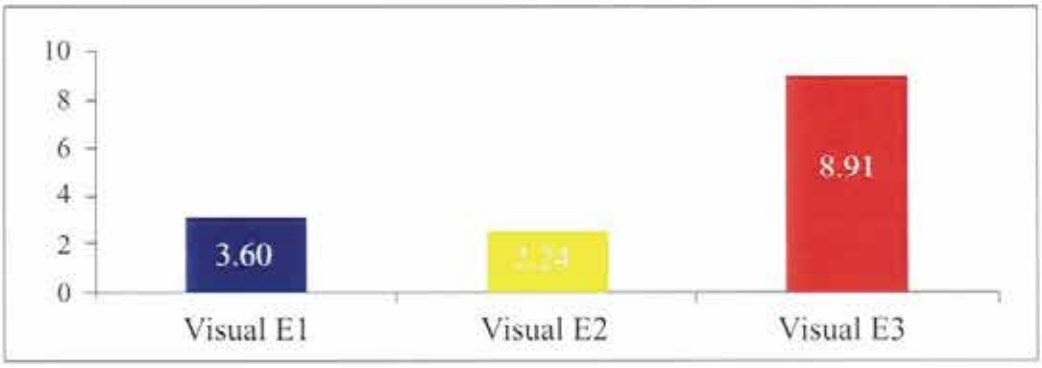


Figure 12: Visuals of Stroke

Table 16: Pair-wise comparisons among different designs (from E1 to E3) for the health diseases topic e.g. "Stroke"

		Smokers attending QSS	Smokers attending OHS	
Visual		P-value[b]	Mean difference[b]	P-value[b]
			[a](95% CI)	
E1	E2	1.000	2.18 (0.79,3.56)	<0.001
	E3	<0.001	-4.71 (-6.39,-3.02)	<0.001
E2	E3	<0.001	-6.88 (-8.95,-4.81)	<0.001

[a]Difference in total mean scores which were computed from seven items (questions); [b]multiple comparisons using Bonferroni test; E1: "Visual 1 of Stroke", E2: "Visual 2 of Stroke", and E3: "Visual 3 of Stroke".

Figure 13 illustrates the total mean scores computed from the seven questions, and standard error bar (SE) for each visual (designs F1 and F2) presented by emphysema health topic. Visual F2 has shown overall highest mean value compare to visual F1. Table 17 illustrates the mean differences between the two visuals among smokers attending QSS and smokers attending OHS. In both groups of smokers, visual F2 showed significantly higher mean score.

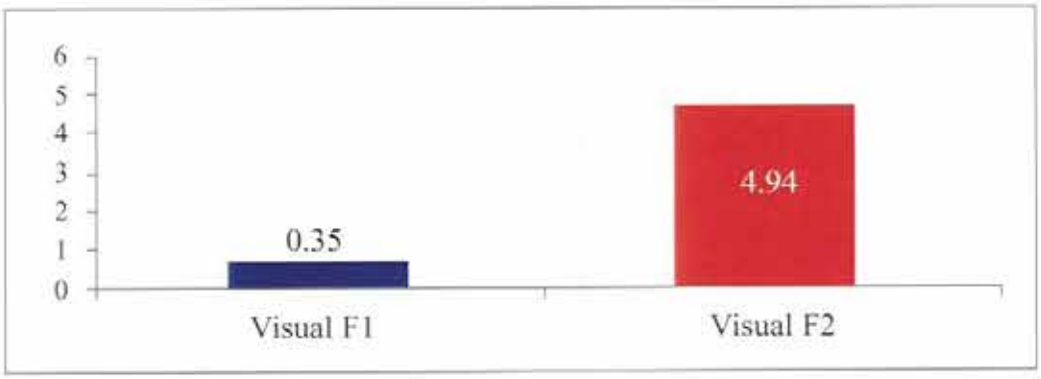


Figure 13: Visuals of Emphysema

Table 17: Pair-wise comparisons among different designs (F1 and F2) for the health diseases topic e.g. "Emphysema

		Smokers attending QSS		Smokers attending OHS	
Visual		Mean difference[a]	P-value[b]	Mean difference[b]	P-value[b]
		[a](95% CI)		[a](95% CI)	
F1	F2	-4.81 (-5.47,-4.15)	<0.001	-4.36 (-5.12,-3.61)	<0.001

[a]Difference in total mean scores which were computed from seven items (questions); [b]comparison of mean difference by using dependent-sample t-test; F1: "Visual 1 of Emphysema", F2: "Visual 2 of Emphysema".

8. Discussions

Pictorial health warnings on cigarette packages provide smokers with universal access about the health risks associated with smoking. They are extremely cost-effective for public health intervention; since pack-a-day smokers are potentially exposed to PHWs more than seven thousand times a year[24]. More than 90% of all the smokers participated in the study were current regular smokers and more than half of these respondents smoked 11-20 cigarettes per day. A total of 96% and 87% of the smokers attending QSS and OHS reported tried to quit smoking. In addition, more smokers attending QSS had attempted to quit smoking more than two times, with 8.4% tried more than five times. The results of the study provide a strong relationship between PHWs and smoking behaviour; i.e. there was increased motivation to quit smoking and greater attempts to quit. Our results were in line with findings from other studies[9,22,25].

The primary objective of PHWs is to communicate the health risks of smoking. Thus, measures of health knowledge and perceived risk represent critical component in the current study. Our results showed that a substantial proportion of smokers (47% of smokers attending QSS and 37% of smokers attending OHS respectively) reported PHWs made them thought about the harm caused by smoking to them. They were also worried about the harm their smoking might cause to others. Apart from that, more than 80% each of both groups of smokers somewhat worried about smoking would damage their health in the future. The findings were consistent with the primary intent of the PHWs and parallel to that of the Canadian study[24]. Both groups of smokers had comparable high level of knowledge (ranging from 88% to 98%) that smoking causes strokes, mouth cancer, chronic obstructive pulmonary disease, heart failure, gangrene and miscarriage. However, there was much lower knowledge that smoking causes impotence in males and premature ageing among both groups of smokers (ranging from 36% to 45%). These two PHWs may be unable to communicate the risk of health effects in a truthful and forthright manner. Our results were in contrast from two studies in China where over 90% of the respondents knew smoking was harmful to their health, while the knowledge of smoking-related disease, such as cardiovascular diseases and stroke was relatively low[26,27].

On the measure of avoidance, smokers were assessed whether they concealed the PHWs by using a cigarette case or transferring to some other packages or by avoid buying a specific warning label. Hammond et al[25] reported approximately 40% of the smokers had at least one avoidance behaviour. However, our study showed high proportions of smokers attending QSS (83% to 95%) and OHS (86% to 96%) were not making any effort to avoid looking or thinking about the PHWs. The results from our

study were consistent with the study conducted on 2006 adult smokers in Malaysia by Ahmad et al[22]. The results obtained in this study may suggest that both groups of smokers were not affected by the PHWs on their cigarette packages.

A measure of the depth of processing was developed to assess the salience of PHWs and the extent to which smokers attended to the warning labels. It was interesting to note that more smokers attending OHS (76.7%) noticed PHWs on cigarette packages often as compared to smokers attending QSS (67.5%). However, only about a quarter each of smokers form both groups read or look closely at PHWs on cigarette packages often. Apart from this, about three quarters of all smokers never stopped having a cigarette when about to smoke one i.e. forgoing cigarettes. The result showed that the PHWs had minimal impact on the intentions to quit smoking among these two groups of smokers. This finding may suggest by noticing PHWs on cigarette packages without taking further actions has no impact on quitting. In contrast, studies[8,18] elsewhere had shown noticing and reading the PHWs was positively associated with forgoing cigarettes with increased intentions to quit smoking; which may lead to a reduction in smoking. Almost 90% each of these two groups of smokers had thought about the health risks of smoking arising from the existing PHWs. However, only 4.3% of smokers attending OSS and 1.7% of smokers attending OHS had thought a lot about likelihood to quit. This result was in big contrast with the ITC study conducted by Clearinghouse for Tobacco Control in the year 2009[19].

The measure of affective reactions towards PHWs showed that about 50% of both groups of smokers were somewhat alarmed by the PHWs on cigarette packages and about 50% felt neither alarmed nor calm. Studies[25,28] had shown that smokers who reported greater negative emotional response were more likely to engage in cessation related behaviour such as attempts to quit, reductions in consumption or abstinence. The rather low proportion of the negative emotional response of the smokers from this study may be due to the effectiveness of the PHWs has eroded over time; i.e. "wear out" as smokers become desensitised to their messages after being exposed to the PHWs for more than a year since its implementation on 1 June 2009. It has been noted that the salience of advertising and health communications are greatest typically when first exposed[11,29,30]. Therefore the effectiveness of PHWs is strongly associated with the date of implementation.

For the PHWs to be realistic, health information presented, design and its source must be credible. There could be a trade-off between to be realistic and the vividness of the information in PHWs; i.e. if pictures and text become too striking or graphic, smokers may start to question the believability of the information and become more resistant to the messages. In our study, only about 16% and 10% of the smokers attending QSS

and OHS reported the existing PHWs were "not at all realistic"; i.e. those diseases presented in our PHWs were true-to-life.

Studies[11,12] have shown that there are advantages of using mass media to support the introduction of pictorial health warnings. Our results showed otherwise whereby more than 70% of both groups of smokers only once in a while "notice advertising in the newspaper about PHWs on cigarette packages" and "notice advertising or information that talks about the dangers of smoking or encourages quitting". This may be due to the fact that advertisement of PHWs on cigarette packages and information about the dangers of smoking or encouragement to quit smoking are advertised only once in a while in newspapers.

A study was conducted among 240 smokers to evaluate the impact of plain packaging among smokers and identify the most efficacious visual from each of six smoking related health effects such as throat cancer, mouth cancer, gangrene, blindness, stroke and emphysema. Each of these health effects depicted with three mock-up visuals. The study was mainly focused to compare the differences of above mentioned hypotheses between cases and controls.

Study between plain package and colourful package with logos

Based on our comparison study between plain package and colourful package with logos and brands infers that the colourful background packages are more attracted and had higher mean score compared to plain packages. This might be due to the eye catching colour and design from the tobacco industry that attracts viewers' noticing and attention. It is good evidence that if we eliminate the colour and logo from the packs the focus would be much on graphic health warning and it may enhance cognitive effect and quit intention and behaviour. It is further to be noted that there were significant impact on colourful packages with logos and brand among smokers attending QSS.

The most efficacious mock-up visual was identified based on following seven item questions mainly focused on their ability to motivate smoker's noticing, thinking about harms, thinking about quitting, supporting quitting (increasing self-efficacy), and creating feelings of disgust, fear and regret. Based on these criteria, our study infered that among throat cancer mock-up visuals, visual1 (A1) and Visual 2 (A2) were more efficacious which was consistent with smokers attending QSS and OHS. Among mouth cancer visuals visual 3 (B3) was most efficacious among smokers attending OHS but B1 and B3 among smokers attending QSS. Mock-up visuals of gangrene visual 2 (C2), blindness visual 2 (D2), stroke visual 3 (E3) and emphysema visual 2 (F2) were more

efficacious. The findings were consistent with both groups of smokers; i.e. smokers attending QSS and OHS.

9. Limitations

The study only assessed the effects of pictorial health warnings on cigarette packages on adult smokers who attended Quit Smoking Services and other health services in government hospital/ health clinics in Wilayah Persekutuan Kuala Lumpur and Putrajaya. Smoking among adolescents, ex-smokers and non smokers were not included in the study. In addition, the study was not able to carry out a pre-post measurement since PHW was introduced since 1 June 2009 and the data collection was carried out only in October – November 2010. Therefore, the study was unable to determine conclusively the sole effect of the pictorial health warnings on smokers' behaviour and perception. The study was carried out among 120 smokers each attending QSS and OHS in government hospital / health clinics in Wilayah Persekutuan Kuala Lumpur, therefore the results obtained could not be generalized to all smokers in Malaysia.

10. Conclusions

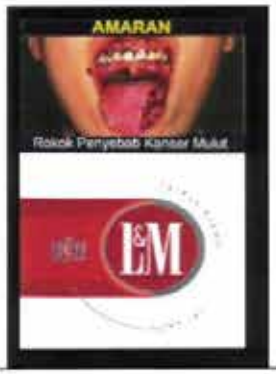
Despite of the limitations listed above, the present study provides valuable information on the effectiveness of the existing pictorial health warnings. Both group of smokers; i.e. those attending quit smoking services or other health services at the government hospital / health clinics in Wilayah Persekutuan Kuala Lumpur and Putrajaya agreed that smoking was bad for their health, the existing PHWs were realistic, thought about the health risks of smoking arising from the existing PHWs and they had high level of knowledge on smoking-related diseases except for impotence in males and premature ageing. However, the existing PHWs might not seem to elicit strong affective responses or effectively increase the desire to quit smoking. One needs to take into consideration that the PHWs had just fully implemented slightly more than a year when the study begun. Therefore, it might be unable to see the strong impact on more distal measures such as the desire to quit smoking when it is associated with strong addiction. Nevertheless, the impacts on proximal variables mentioned above were obvious. Therefore, new messages and images which could evoke a strong negative emotional reaction to smokers should be regularly introduced to maintain warning salience. Based on the efficacy testing using repeated measure, we recommend new visuals of throat cancer, mouth cancer, gangrene of the leg, blindness, stroke and emphysema to be used in the second round of Malaysian cigarette packages. In addition, the use of mass media to communicate risk messages of smoking to smokers should be intensified in line with the WHO FCTC obligations or recommendations.

11. Recommendation

1. Use Plain Packaging to focus attention to graphic health warning
2. Below is the list of most efficacious visuals

Throat Cancer

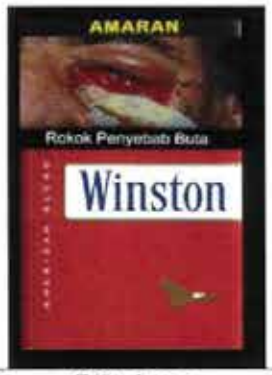
Throat Cancer



Mouth Cancer

Mouth Cancer

Gangrene of the leg



Blindness

Stroke

Ephysema

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Appendix I

Three visual and six health diseases topics used in the study

Insert mock-up throat cancer visual 1	Insert mock-up throat cancer visual 2	Insert mock-up throat cancer visual 3
A1	**A2**	**A3**
Insert mock-up mouth cancer visual 1	Insert mock-up mouth cancer visual 2	Insert mock-up mouth cancer visual 3
B1	**B2**	**B3**
Insert mock-up gangrene visual 1	Insert mock-up gangrene visual 1	Insert mock-up gangrene visual 1
C1	**C2**	**C3**
Insert mock-up blindness visual 1	Insert mock-up blindness visual 2	
D1	**D2**	
Insert mock-up stroke visual 1	Insert mock-up stroke visual 2	Insert mock-up stroke visual 3
E1	**E2**	**E3**
Insert mock-up emphysema visual 1	Insert mock-up emphysema visual 2	Insert mock-up emphysema visual 3
F1	**F2**	

A1 — A2

Questions	Tick on the most suitable answer		
	A	B	None
Which one of the two labels is more informative?			
Which one of the two labels makes you think about the harm your smoking might be doing to you?			
Which one of the two labels makes you think seriously about quitting smoking?			
Which one of the two do you think is most supportive of you trying to quit smoking?			
Which one of the two do you think is most frightening (scary)?			
Which one of the two do you think is most disgusting?			
Which one of the two labels is more likely to make you think about regretting being a smoker?			

A1 — A3

Questions	Tick on the most suitable answer		
	A	B	None
Which one of the two labels is more informative?			
Which one of the two labels makes you think about the harm your smoking might be doing to you?			
Which one of the two labels makes you think seriously about quitting smoking?			
Which one of the two do you think is most supportive of you trying to quit smoking?			
Which one of the two do you think is most frightening (scary)?			
Which one of the two do you think is most disgusting?			
Which one of the two labels is more likely to make you think about regretting being a smoker?			

A2 — A3

Questions	Tick on the most suitable answer		
	B	C	None
Which one of the two labels is more informative?			
Which one of the two labels makes you think about the harm your smoking might be doing to you?			
Which one of the two labels makes you think seriously about quitting smoking?			
Which one of the two do you think is most supportive of you trying to quit smoking?			
Which one of the two do you think is most frightening (scary)?			
Which one of the two do you think is most disgusting?			
Which one of the two labels is more likely to make you think about regretting being a smoker?			

Respondents will be asked to compare all possible pairs of visuals among each six health diseases topics and to tick the best design that is suitable to answer each question (Similar to this more five pairs were used)

Appendix II

Computing scores (zero to two) gained by each design for all the six health diseases topics

Letter	Label Component (e.g. for Throat Cancer	Scores							
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	T
A1	Visual 1								
A2	Visual 2								
A3	Visual 3								

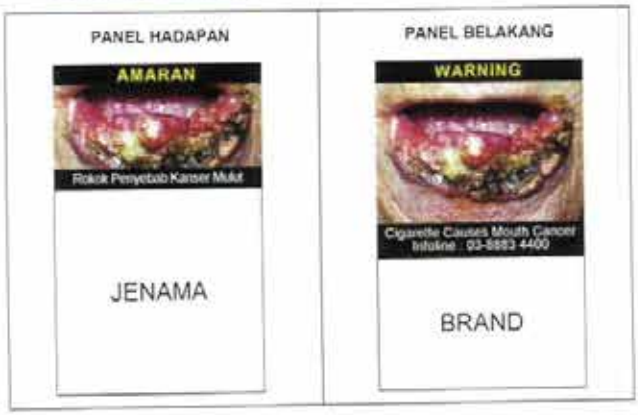
(Similar table was used for each of the six designs)

Appendix III

Existing pictorial health warnings on cigarette packages

i. Throat Cancer

ii. Mouth Cancer



iii. Gangrene of The Leg

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Malaysia.

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