

**SCHOOL OF PUBLIC HEALTH**

**COLLEGE OF HEALTH SCIENCES**

**UNIVERSITY OF GHANA**

**ASSESSMENT OF THE EMERGING TREND OF SHISHA  
SMOKING IN ACCRA METROPOLIS**

**BY**

**JEFFREY MARTIN ASHIAMAH**

**(10197759)**

**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF  
GHANA, LEGON IN PARTIAL FULFILMENT OF THE  
REQUIREMENT FOR THE AWARD OF THE MASTER OF PUBLIC  
HEALTH DEGREE**

**SEPTEMBER, 2016**

## DECLARATION

I, Jeffrey Martin Ashiamah, hereby declare that apart from the references used and duly acknowledged, this dissertation is my own work, done under the supervision of my supervisor, Dr. Dzodzomenyo. All references to other researchers' materials used have been duly acknowledged. I further declare that the study has not, in part or whole been presented to any institution for any award.

Jeffrey Martin Ashiamah

(Student)

.....

(Signature)

.....

(Date)

Dr. Dzodzomenyo

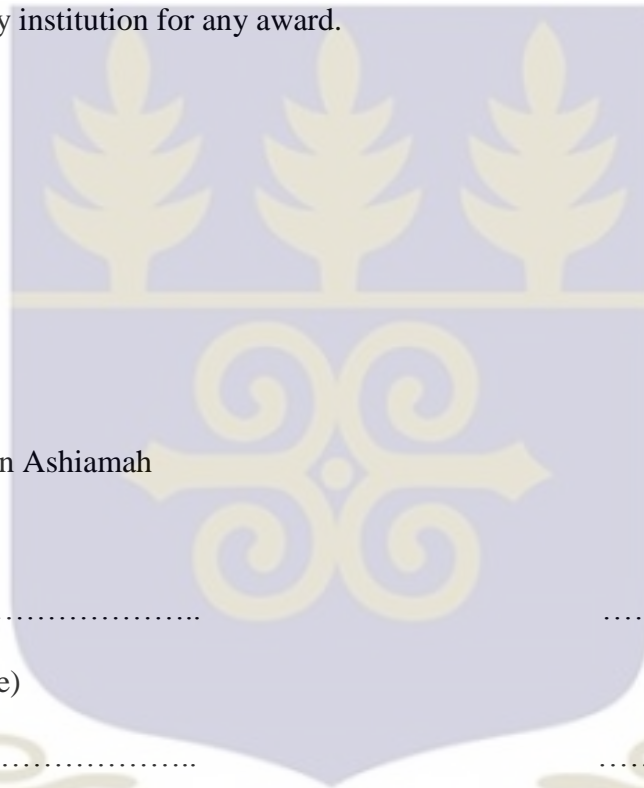
(Supervisor)

.....

(Signature)

.....

(Date)



## DEDICATION

This work is dedicated to my family for their sacrifices and unflinching support which contributed to the success of this work.



## ACKNOWLEDGEMENTS

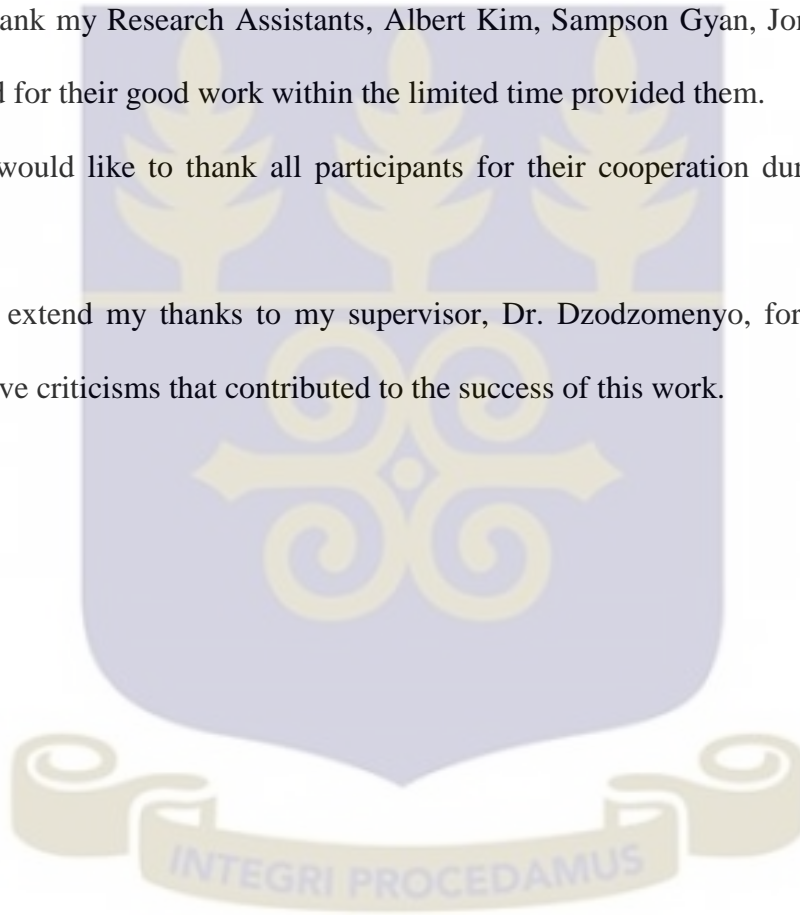
I express my sincere gratitude to all the under listed who contributed to the success of this work. Without the Grace of God, I would not have come this far.

I would also like to thank my family for their financial and moral support throughout the course of the work.

Next, I thank my Research Assistants, Albert Kim, Sampson Gyan, Jonathan Quaye and Richmond for their good work within the limited time provided them.

Again, I would like to thank all participants for their cooperation during the interview sessions.

Finally, I extend my thanks to my supervisor, Dr. Dzodzomenyo, for his patience and constructive criticisms that contributed to the success of this work.



## ABSTRACT

### Background

Water pipe (shisha) smoking is gaining popularity worldwide, but no research has been undertaken to determine the drawers and facilitating factors in Ghana. This dissertation was aimed at assessing the characteristics of the shisha smoking population in selected areas in the Accra Metropolis and the factors influencing their choice of shisha.

### Methodology

This study was a descriptive cross-sectional study involving 210 participants between the ages of 18 – 59, who had smoked shisha in the last 30 days in the Accra Metropolis. The snowball sampling technique was employed to select participants. Quantitative data obtained was entered into the STATA software package Version 13, and analyzed using frequencies, percentages, logistic regression,  $\chi^2$  and Kruskal-Wallis' test.

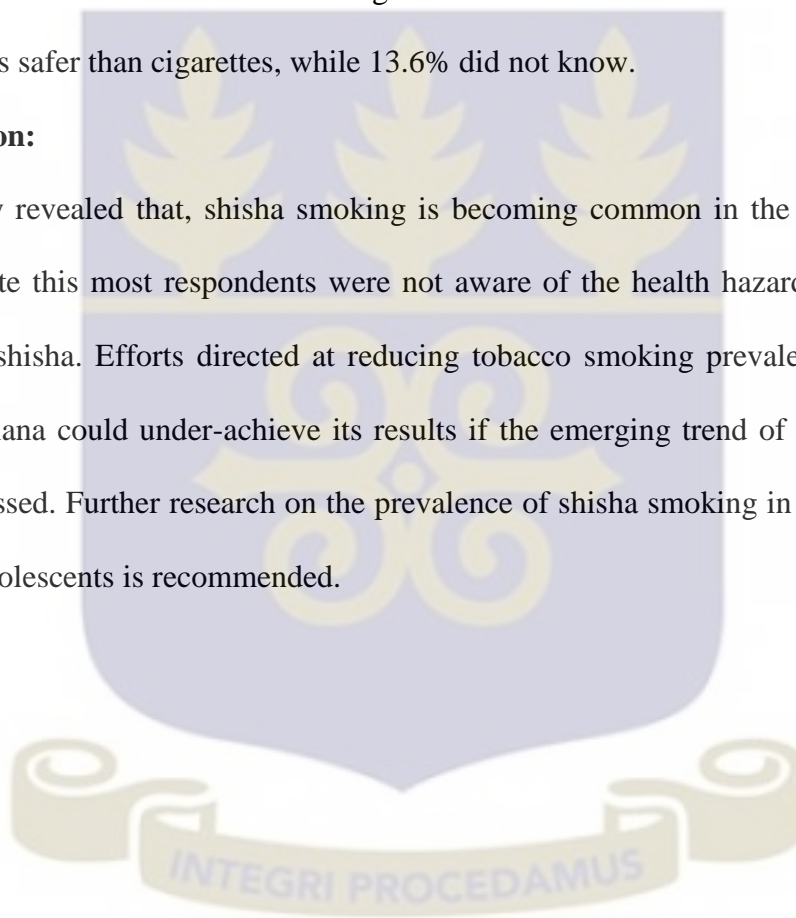
### Results:

Shisha smoking was initiated by respondents at a mean age of  $23.2 \pm 4.6$  years. Moassel was the most common type of tobacco, smoked by 56.3% of participants. Water was most frequently used by respondents (68.4%) as the liquid in the “water bowl”. Weed (marijuana) was reported as a constituent of the shisha smoked by about 10% of respondents. Using the Kruskal-Wallis test, significant differences in the mean days smoked in the past 30 days were found by age ( $\chi^2=9.6$ ,  $p<0.0223$ ), gender ( $\chi^2=4.1$ ,  $p<0.0427$ ), employment status ( $\chi^2=6.5$ ,  $p<0.0387$ ), religion ( $\chi^2=12.5$ ,  $p<0.0289$ ), smoking status (mixed/exclusive smoker) and the perception that shisha was safer than cigarettes ( $\chi^2=9.7$ ,  $p<0.0078$ ). Females were 3 times [OR (95% CI)=3.1(1.3, 7.4),  $p<0.011$ ] more likely to quit smoking shisha compared to males. The bar/club emerged as the most

popular place where shisha was smoked by participants (52%). About half of the participants was drawn to shisha because of the sweet smell, taste and fashionable appeal. About 58% of participants reported being first introduced to shisha by a friend. Only 15% of participants had seen health warnings on shisha packages. A significant difference ( $\chi^2=18.7$ ,  $p<0.0001$ ) was observed between first time smokers' ability to predict that shisha contained tobacco and that of regular smokers. About 72% of respondents assumed shisha was safer than cigarettes, while 13.6% did not know.

**Conclusion:**

The study revealed that, shisha smoking is becoming common in the Accra Metropolis and despite this most respondents were not aware of the health hazards associated with smoking shisha. Efforts directed at reducing tobacco smoking prevalence and narcotics use in Ghana could under-achieve its results if the emerging trend of shisha smoking is not addressed. Further research on the prevalence of shisha smoking in Ghana and its use among adolescents is recommended.



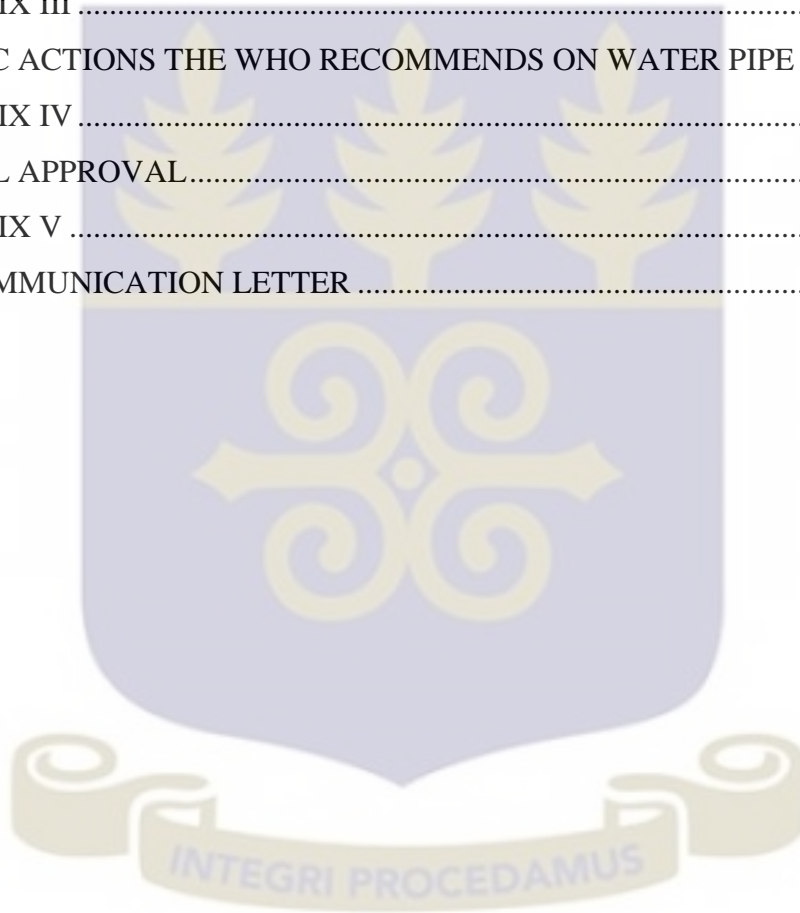
**TABLE OF CONTENTS**

DECLARATION.....	i
DEDICATION .....	ii
ACKNOWLEDGEMENTS .....	iii
ABSTRACT .....	iv
LIST OF TABLES .....	x
LIST OF FIGURES.....	xi
LIST OF ACRONYMS.....	xii
DEFINITION OF TERMS.....	xiii
CHAPTER 1.....	1
1.0 INTRODUCTION.....	1
1.1 Background Information .....	1
1.2 Statement of the Problem .....	3
1.3 Justification / Rationale.....	4
1.4 Research Questions .....	5
1.4.1 General Objective.....	6
1.4.2 Specific Objectives.....	6
CHAPTER 2.....	7
2.0 LITERATURE REVIEW .....	7
2.1 Constituents of Shisha.....	7
2.1.1 Nicotine and nicotine-free dry particulate matter (NFDM) .....	7
2.1.2 Carbon monoxide and Carboxyhemoglobin.....	8
2.1.3 Polycyclic aromatic hydrocarbons (PAHs) .....	8
2.1.4 Nitrosamines and primary aromatic amines.....	9
2.1.5 Volatile aldehydes, phenolic and furanic compounds.....	9
2.1.6 Heavy metals, radioactive substances, and ultra-fine particles .....	9
2.2 Studies on Perceptions and Predictors of Shisha Smoking: .....	10
2.3 Shisha Smoking and Socio-economic status.....	12
2.4 Studies on Health Effects of Shisha Smoking.....	13

2.5 Smoking Locations.....	16
2.6 The WHO’s Campaign against Tobacco (and shisha) smoking.....	16
CHAPTER 3.....	18
3.0 METHODOLOGY .....	18
3.1 Study Design and Tools .....	18
3.2 Study Area.....	18
3.3 Variables.....	19
3.3.1 Dependent Variables .....	19
3.3.2 Independent Variables.....	20
3.4 Study Population .....	20
3.5 Sample Size Calculation.....	20
3.6 Sampling Technique.....	21
3.6.1 Inclusion Criteria.....	21
3.6.2 Exclusion Criteria.....	21
3.7 Data capture and statistical analysis .....	21
3.8 Quality Control.....	22
3.9 Ethical Consideration .....	22
3.9.1 Risks and Benefits .....	22
3.9.2 Compensation/ Payment.....	23
3.9.3 Right to refuse .....	23
3.9.4 Anonymity and confidentiality.....	23
3.9.5 Consent.....	23
3.9.6 Data storage/ Security and Usage.....	24
3.9.7 Conflict of Interest.....	24
CHAPTER 4.....	25
4.0 RESULTS.....	25
4.1 Distribution of Participants .....	25
4.2 Demographic Characteristics .....	27
4.3 Smoking Behaviour of Participants.....	28

4.3.1 Smoking status .....	28
4.3.2 Type of shisha smoked .....	28
4.3.3 Liquid used in “water bowl” .....	28
4.3.4 Where shisha was last smoked .....	29
4.3.5 Attempts at quitting shisha .....	31
4.3.6 Smoking initiation age.....	32
4.3.7 Number of days smoked.....	32
4.4 Factors that Influence Shisha Smoking .....	32
4.4.1 Reasons for smoking shisha .....	32
4.4.2 Mode of first introduction to shisha .....	33
4.4.3 Flavour preferences .....	34
4.4.4 Why participants do not smoke cigarettes.....	34
4.4.5 Willingness to recommend shisha to a friend .....	35
4.4.6 Participants with smokers in family .....	35
4.5 Health Perceptions of Participants .....	36
4.6 Health Knowledge of Participants.....	37
4.7 Relationship between Mean Number of Days Smoked and Selected Variables.....	38
CHAPTER 5 .....	42
5.0 DISCUSSION .....	42
5.1 Characteristics and distribution of participants:.....	42
5.2 Smoking Behaviour of Participants:.....	43
5.3 Factors that Influence Shisha smoking:.....	45
5.4 Health Perceptions of Participants .....	46
5.5 Health Knowledge of Participants.....	48
CHAPTER 6.....	49
6.0 CONCLUSION .....	49
6.1 Recommendations .....	50
6.2 Limitation Of Study: .....	51

REFERENCES.....	52
APPENDICES.....	56
APPENDIX I.....	56
INFORMED CONSENT FORM .....	56
APPENDIX II.....	59
QUESTIONNAIRE.....	59
APPENDIX III .....	64
SPECIFIC ACTIONS THE WHO RECOMMENDS ON WATER PIPE SMOKING .....	64
APPENDIX IV .....	66
ETHICAL APPROVAL.....	66
APPENDIX V .....	67
FDA COMMUNICATION LETTER .....	67



**LIST OF TABLES**

Table 1: Demographic Characteristics of Participants .....27

Table 2: Smoking Behaviour of Participants.....30

Table 3: Health Perceptions of Participants .....36

Table 4: Health Knowledge of Hazards linked with Shisha.....37

Table 5: Comparison of the Mean Days Smoked in the past month across Demographic  
Groups.....40



## LIST OF FIGURES

Figure 1: A typical shisha water pipe and schematic showing main parts .....	3
Figure 2: Map of Accra Metropolis.....	19
Figure 3: Distribution of Study Participants by Residence .....	26
Figure 4: Participants who made quit attempt in past year .....	31
Figure 5: Participants who would consider quitting in future .....	31
Figure 6: Reasons why participants smoked shisha .....	32
Figure 7: Mode by which participants were first introduced to shisha .....	33
Figure 8: Reasons why exclusive shisha smokers do not smoke cigarettes .....	34
Figure 9: Participants who would recommend shisha to a friend .....	35
Figure 10: Participants who had family members who smoked shisha.....	35



## LIST OF ACRONYMS

ASH.....	Action on Smoking and Health
CDC.....	Center for Disease Control
CO.....	Carbon Monoxide
COHb.....	Carboxyhemoglobin
FDA.....	Food and Drugs Authority
GATS.....	Global Adult Tobacco Survey
GDHS.....	Ghana Demographic and Health Survey
GYTS.....	Global Youth Tobacco Survey
IARC.....	International Agency for Research on Cancer
MSS.....	Main Stream Smoke
NFDM.....	Nicotine and Nicotine-free dry Particulate Matter
PAA.....	Primary Aromatic Amines
PAHs.....	Polycyclic Aromatic Hydrocarbons
SES.....	Socio-Economic Status
SOPs.....	Standard Operational Procedures
WHO.....	World Health Organization
WP.....	Water pipe

## DEFINITION OF TERMS

### **Environmental Tobacco Smoke:**

A mixture of tobacco smoke from both side stream smoke and exhaled main stream smoke

### **Exclusive Smoker:**

A person, who smokes only shisha

### **Exhaled Main Stream Smoke:**

Tobacco smoke which is exhaled by the smoker during the smoking process

### **Main Stream Smoke:**

Smoke that is directly inhaled by the smoker during the smoking process

### **Mixed Smoker:**

A person, who smokes shisha and cigarettes

### **Second Hand Smoker:**

A person, other than the one performing the smoking act, who is exposed to side stream smoke and exhaled main stream smoke from a nearby smoker

### **Side Stream Smoke:**

Tobacco smoke which comes from the burning end of a tobacco-smoking instrument (e.g. cigarette or water pipe)

**Water pipe/ Shisha/ Hookah:**

A simple multi-stemmed instrument which is used to smoke tobacco or non-tobacco herbal mixtures, where the smoke is designed to pass through water or other liquid before reaching the smoker



## CHAPTER 1

### 1.0 INTRODUCTION

#### 1.1 Background Information

Water pipe smoking, also known as shisha, hookah, narghile or hubble-bubble is a form of smoking, which employs a simple or multi-stemmed instrument, to smoke flavoured or non-flavoured tobacco or herbal mixtures (WHO, 2015; ASH, 2013; CDC, 2012). The main types of tobacco that may be smoked using the water pipe are moassel, tumpak (ajami) and jurak (WHO, 2006; Khater, Abd El-Aziz, Al-Sewaidan, & Chaouachi, 2008). Moassel comprises a mixture of crude tobacco fermented with molasses, but tumpak and jurak comprise plain tobacco (Khater et al., 2008).

A typical water pipe has four main parts; a head, body, water bowl and a flexible hose with a mouthpiece (Anjum, Ahmed, & Ashfaq, 2008). In a typical operation, a tobacco or herbal mixture is put on top of the head, which is usually covered with a perforated aluminium foil (ASH, 2013). Burning charcoal is placed on top of the foil to heat the tobacco mixture, and on breathing through the hose, a mixture of the charcoal and smoke is drawn through the body of the instrument and into the bowl of water (Anjum et al., 2008; ASH, 2013). This causes a vacuum in the air space above the water, resulting in smoke passing through the water, producing bubbles into the hose and finally, into the mouth of the user.

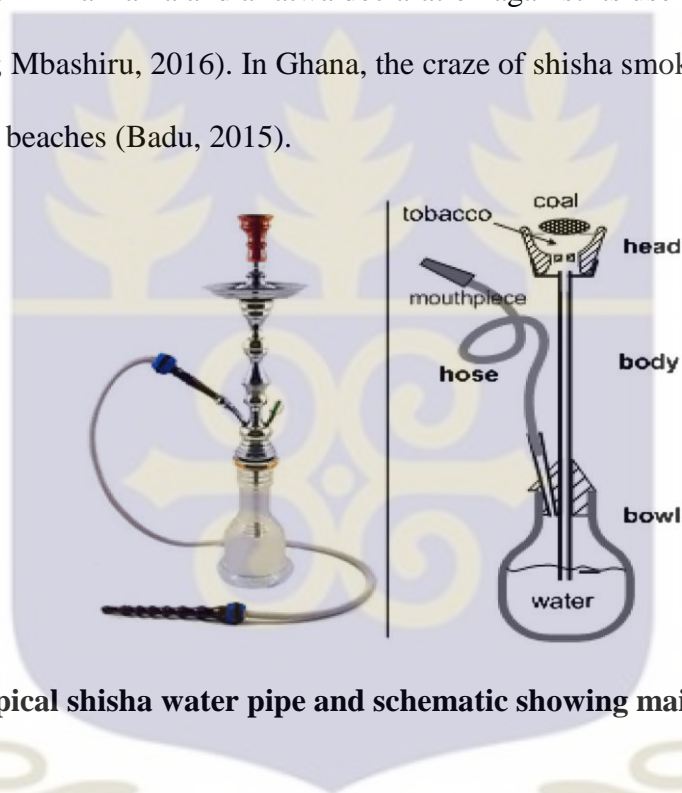
Smoking of shisha is usually done in groups as a social activity (CDC, 2012). The practice is documented to have started at least four centuries ago, by the indigenes of

Africa and Asia (WHO-TobReg, 2005). Popularity has grown among younger people in recent times due to the introduction of flavoured tobacco, a more acceptable alternative to its non-flavoured counterpart which was common among older people in the earlier part of the 20<sup>th</sup> century (WHO, 2015; Kakodkar & Bansal, 2013; Jawad et al., 2013). Over 300 flavours including strawberry, apple, mint, cherry, chocolate, coconut, etc. have been documented (CDC, 2012; ASH, 2013; Schubert et al., 2011). There are an estimated 100 million people, who smoke shisha worldwide (Kakodkar & Bansal, 2013; Anjum et al., 2008).

Contrary to broad perception that shisha smoking is less harmful than cigarettes (WHO, 2015; ASH, 2013; Anjum et al., 2008), because it passes through water or other liquid, studies have shown that shisha smoking is not only as harmful as cigarette smoking, but presents an additional risk to both primary and secondary smokers due to the smoke which emerges from burning charcoal, and the higher tendency to smoke for longer hours (CDC, 2012; Kakodkar & Bansal, 2013).

The growing trend of shisha smoking has been identified by the WHO as an important public health issue, since it is often overlooked by regulators. It became one of the topics of focus at the 16<sup>th</sup> World Conference on Tobacco Health. According to the WHO tobacco expert, Edouard d'Espaignet, "a single puff from a water pipe nearly equals the volume of smoke inhaled from an entire cigarette, while one session of shisha can equal smoking 20 to 30 cigarettes in a go". Again, the Ghana Health Service and Food and Drugs Authority acknowledged the evolution of shisha use among the Ghanaian population at the 2016 celebration of World No Tobacco Day (WHO, 2016).

Some of the toxicants that have been linked with shisha include carbon monoxide, nicotine, heavy metals, tar and respirable particulate matter (WHO, 2015; ASH, 2013; Chaouachi, 2009). Some of the associated health risks of smoking shisha include oral, bladder and lung cancers and low birth weight (CDC, 2012; Khater, Abd El-Aziz, Al-Sewaidan, & Chaouachi, 2008). The growing evidence on the health effects of shisha use has led to its ban in Tanzania and a fatwa declaration against its use in Malaysia (Tobacco Reporter, 2016; Mbashiru, 2016). In Ghana, the craze of shisha smoking is rife in lounges, night clubs and beaches (Badu, 2015).



**Figure 1:** A typical shisha water pipe and schematic showing main parts (Maziak, 2014)

### 1.2 Statement of the Problem

The smoking of shisha is a growing trend which has been widely reported by the WHO, around the world, and currently by the media in Ghana. An official communication from the Tobacco Control Unit of the Food and Drugs Authority of Ghana (FDA) confirmed this emerging trend. The communication revealed that, twenty percent (20%) of facilities the FDA visited as part of monitoring in the Greater Accra Region from November 2015 to December 2015, operated shisha services (Appendix V). In 2005, the WHO

recommended for research on national and global trends on water pipe (shisha) smoking; but published data does not currently exist on the demographics of people who smoke shisha in Accra or Ghana, why they smoke it, or their knowledge about shisha. Regulations specific to shisha control in Ghana also do not currently exist or are only in the developmental stages.

Studies have shown that majority of shisha smokers are unaware about the health risks of shisha smoking, and are merely driven by the social appeal which the flavour component provides (WHO, 2014; Anjum et al., 2008; Kakodkar & Bansal, 2013; Martinasek, McDermott, & Martini, 2011).

In a longitudinal study in the Middle East, shisha smoking prevalence was found to increase by 40% within 2 years of follow-up among the youth (WHO, 2015).

As regulations specific to shisha control do not currently exist in Ghana, there is a high likelihood that policies tailored at reducing tobacco smoking prevalence in the country could fall short of expected outcomes if shisha smoking is not addressed. In addition, the calculation of tobacco smoking prevalence rates in Ghana, does not also take into consideration the smoking of shisha, establishing the possibility of under reporting the actual smoking prevalence as more adolescents and women are reported to be smoking shisha (Roditis & Halpern-Felsher, 2015; Martinasek, McDermott, & Martini, 2011).

### **1.3 Justification / Rationale**

According to the 2008 Ghana Demographic and Health Survey (GDHS), the national prevalence of tobacco use in men and women aged 15-59 in Ghana stood at 8.2% and 0.4% respectively (GDHS, 2009). This prevalence was shown to have stabilized in

women and decreased to 6.3% in men, according to the GDHS (2014). Adjusting for both sexes, this translates to a total reduction from approximately 4.16% in 2008 to 2.23% in 2014.

While the reported trend of tobacco smoking in Ghana seems to be decreasing, the emergence of shisha smoking, another type of tobacco smoking, could increase the overall prevalence of tobacco smoking in Ghana and the associated health risks to both the smoker and second hand smoker. Given that the practice is new on the Ghanaian terrain, data on the shisha smoking population do not exist, though an important requisite for policy implementation.

This study will therefore give a snapshot of the demographic characteristics (age, gender, educational status, employment status and nationalities) of the shisha smoking population in the Accra Metropolis, assess the reasons behind their preference, and evaluate their perceptions on the health risks to which they may be exposed as a result of their smoking behaviour. The knowledge acquired from this study will provide a critical input into how future interventions tailored at addressing tobacco smoking are planned in Ghana.

#### **1.4 Research Questions**

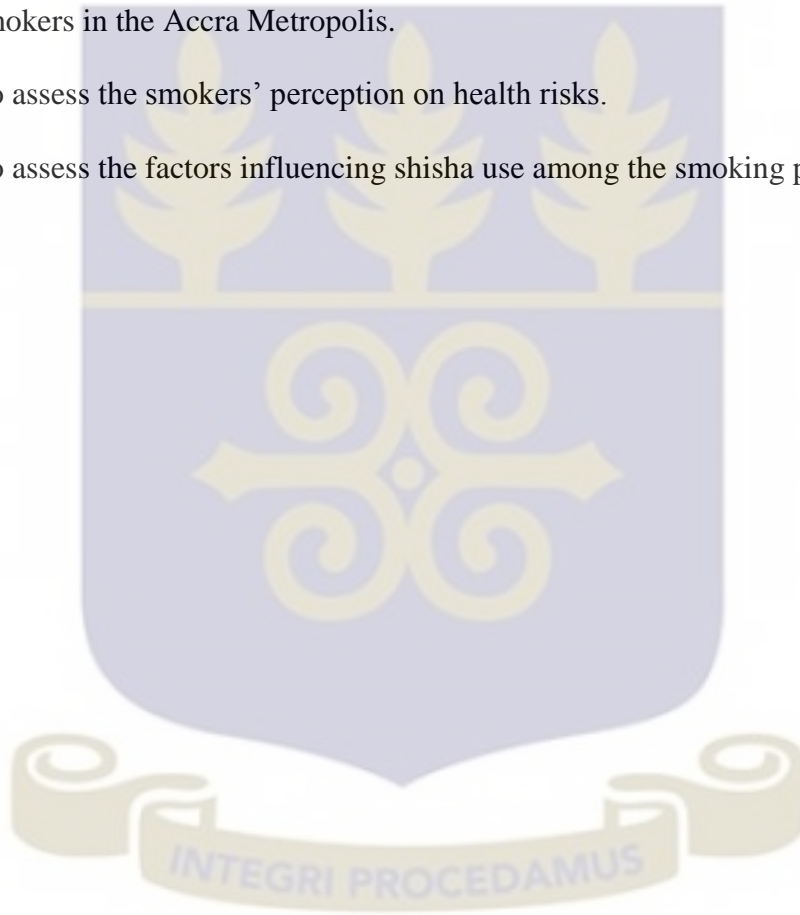
1. What are the characteristics of Shisha smokers in Accra Metropolis?
2. What is the distribution of Shisha smoking in Accra Metropolis?
3. What factors influence Shisha smoking in Accra Metropolis?
4. What types of Shisha are smoked in Accra Metropolis?

#### **1.4.1 General Objective**

To study the characteristics of the shisha smoking population in selected areas in the Accra Metropolis.

#### **1.4.2 Specific Objectives**

1. To determine the types of shisha smoked, the distribution and behaviours of shisha smokers in the Accra Metropolis.
2. To assess the smokers' perception on health risks.
3. To assess the factors influencing shisha use among the smoking population.



## CHAPTER 2

### 2.0 LITERATURE REVIEW

Evidence is still growing on the toxicity, potential health effects, and predictors of shisha smoking in comparison to cigarettes, as researchers seek to establish its enormity as a public health issue. Below is a summary of relevant literature, identified on the subject.

#### 2.1 Constituents of Shisha

Fakhreddine, Kanj & Kanj (2014), conducted an extensive review of literature and found the following constituents:

##### 2.1.1 Nicotine and nicotine-free dry particulate matter (NFDM)

In the review, nicotine was noted as the main chemical constituent of different forms of tobacco, a major cause of tobacco dependence, and a marker of the carcinogen content in the smoke of a cigarette. It was said to vary according to the type of tobacco used in the water pipe; e.g. a flavoured tobacco (moassel) has 67mg per head. The trio cited literature indicating that the Main Stream Smoke (MSS) of nicotine and NFDM range between 2.25- 7.75mg/session and 242-949 mg/session respectively.

Other studies have also shown that plasma nicotine levels increase after water pipe smoking (Maziak, 2014). Nicotine boost correlates with the total smoking session, cumulative duration of a puff as well as mean puff, and the total smoke inhaled in the session (Fakhreddine et al., 2014).

### **2.1.2 Carbon monoxide and Carboxyhemoglobin**

Fakhreddine, Kanj & Kanj (2014) wrote that, many cases of water pipe-linked carbon monoxide have been reported in literature, with levels of carboxyhemoglobin ranging from 7.3% to 31.1%. Their review also found that the MSS levels exceed those in cigarettes many times over, with charcoal, contributing close to 90%. The end-expiration CO levels could increase approximately 8 times, compared to pre-smoking levels, according to the review.

### **2.1.3 Polycyclic aromatic hydrocarbons (PAHs)**

Fakhreddine, Kanj & Kanj (2014), noted in their review that, few studies had investigated the concentration of PAH in the mainstream smoke of water pipes. They defined PAH as organic pollutants, produced by incomplete combustion of organic materials. According to them, many PAHs have been linked to “Carcinogenesis of several tumors” notably the lung, skin, “colorectal and pancreatic cancers”.

They cited 16 PAHs as having been identified and measured in the MSS of water pipes, with naphthalene and phenanthrene, dominating. They agreed in their review that most of the PAHs identified were IARC (International Agency for Research on Cancer) group 2B and group 3 compounds (implying they “are possible carcinogens” and “not classifiable as to its carcinogenicity to humans” respectively), but Benzo [a] pyrene and Di-benzo [a,h]anthracene, were mentioned as definite carcinogens and probable carcinogens respectively, according to IARC classifications. The authors also noted that water pipe smoke has 20 times more PAH and 3 times more Benzo[a]pyrene compared to cigarette smoke.

#### **2.1.4 Nitrosamines and primary aromatic amines**

According to Fakhreddine, Kanj & Kanj (2014), tobacco-specific nitrosamines are created as a result of the nitrosation of nicotine and other tobacco alkaloids. They continued that, 9 primary aromatic amines (PAA) have been identified in the mainstream smoke of water pipes, including 2-naphthylamine, which is classified as an IARC group 1 carcinogen, and directly linked with urinary bladder cancer in humans.

#### **2.1.5 Volatile aldehydes, phenolic and furanic compounds**

Again, in their review, Fakhreddine, Kanj & Kanj (2014), quoted formaldehyde as a notable constituent in the mainstream smoke of water pipes. They mentioned the latter as a known IARC group 1 human carcinogen, with linkages to “naso-pharyngeal carcinoma, sinonasal cancer and leukemia”.

Seven phenol compounds, and six furanic compounds, were also reported as present in the mainstream smoke of water pipes, though the water in the water bowl of the pipe is said to filter majority of these constituents.

#### **2.1.6 Heavy metals, radioactive substances, and ultra-fine particles**

Some of the heavy metals found to be associated with water pipe smoke include Arsenic, Chromium, Lead, Beryllium, Nickel and Cobalt (Fakhreddine, Kanj & Kanj, 2014) . The radioactive elements cited include Thorium ( $^{234}\text{Th}$ ), Uranium ( $^{238}\text{U}$ ), Lead ( $^{210}\text{Pb}$ ) and Potassium ( $^{40}\text{K}$ ) (Khater e al., 2008). Ultrafine particles with an average diameter of 40nm have also been reported.

In another publication, Schubert, Luch, & Schulz (2013), analyzed 12 commercially available water pipe tobaccos namely “Two apples”(3 tobaccos), “Apple”(3 tobaccos), “3

apples flavour”(1 tobacco), “Melon”(1 tobacco), “Raspberry” (1 tobacco), “Five stars”(1 tobacco), “Banana”(1 tobacco) and “Fruits Molasses” (1 tobacco).

Seventy-nine (79) volatile flavour compounds present in water pipe smoke were identified using “the static headspace gas chromatography-mass spectrometry (SHS-GC-MS), out of which 11 were quantitatively analyzed (ethyl 2-methylbutyrate, hexanal, limonene, 1-hexanol, cis-3-hexen-1-ol, benzaldehyde, linalool, menthol, benzyl acetate, trans-anethole and benzyl alcohol).

The results of their experiment again revealed high quantities of the benzyl alcohol fragrance, and substantial amounts limonene, linalool and eugenol (compared to cigarette tobacco), which are collectively known to be allergenic in human skin, according to the authors, and are restricted in toys or cosmetic products.

They concluded that as a result of the high amounts of flavouring compounds in the water pipe tobacco, the nice smell masks the perception of smokers as to its harmfulness. They also pointed the likely major health risks linked to the flavouring additives “would not result from an increase in toxicity of the smoke, but rather from a wider acceptance among the human population”

## **2.2 Studies on Perceptions and Predictors of Shisha Smoking**

Aljarrah, Ababneh, & Al-Delaimy (2009), conducted a study involving 235 participants in San Diego, to assess their beliefs about the harmful nature of hookah. Most were males and about 14% did not smoke cigarettes. They found no significant difference in gender on the wrong perception question that shisha is less harmful than cigarettes. They also found that half of shisha smokers believed that it is less harmful than cigarette smoking.

They concluded that compared to cigarettes a knowledge gap about the harmfulness of shisha smoking appears to exist among users, regardless of their demographics.

Similarly, Anjum et al. (2008), carried out a study to evaluate the impact of educational intervention on the knowledge, attitude and practices relating to water pipe smoking among adolescents in Karachi.

The participants were classified according to socio-economic status, and the impact of health messages was assessed two months after education sessions, targeting those classified as of high and middle socio-economic status.

Twelve percent more students reported water pipe smoking as addictive (a divergence of their prior opinions), after the intervention had been introduced.

The authors suggested that shisha smoking was probably more prevalent among people with high SES, as a result of cost, accessibility and availability, and resolved that the knowledge of the students regarding water pipe smoking improved after their educational intervention.

Likewise, Kakodkar & Bansal (2013), investigated the characteristics, behaviour and perceptions related to smoking of hookah among 238 youth smokers in Pune, India. Participants reported a mean “smoking start” age of at 17.3 years. Some of the reported nicotine effects after smoking hookah included light-headedness, dizziness and head ache, and the mean time of a smoking session was 1 hour, 19 minutes. About two-thirds smoked in hookah cafés, and majority of them, had misconceptions about how safe hookah smoking is, over cigarette smoking. More than half were also unaware of the health effects of hookah smoking.

The authors therefore concluded that educational intervention needs to be done to create awareness among the youth about hookah smoking's harmful effects.

### **2.3 Shisha Smoking and Socio-economic status**

The study above, also found significant associations with water pipe smoking and socio-economic status ( $p < 0.001$ ). Sugathan, S., Dagher, O. and Swaysi (2010), also studied the effect of socio economic status on shisha smoking status in Misurata, Libya, from 242 participants, using a structured questionnaire.

Majority of the smokers earned a high income, but the lower income earners reported starting shisha smoking at an earlier age ( $p < 0.001$ ). They found the duration of use to be longer in the low income group and concluded that lower education and lower income was significantly associated with early initiation (mean age  $23.69 \pm 5.83$ ) and long duration of hookah usage.

Jawad, L., & Millett (2014), went further to examine the relationship between water pipe and cigarette smoking, with a focus on low and middle income countries.

They therefore analyzed water pipe and cigarette smoking, using data from the Global Adult Tobacco Survey, of adults 15 years and above between 2008 and 2010, in low middle income countries (India, Russia, Egypt, Vietnam, Bangladesh, Brazil, China, Mexico, Philippines, Thailand, Turkey, Ukraine and Uruguay)

Their results showed, (after adjusting for age, gender, residence, education, occupation and smokeless tobacco use) that water pipe smoking was significantly higher among cigarette smokers than in non-cigarette smokers in India and Russia, but inversely associated in Egypt and not associated in Vietnam.

Overall, water pipe smoking was significantly associated with increased age, male gender, rural dwellers, and those with less than primary education.

They considered the lack of standardized collection of water pipe prevalence data as the main weakness of their study. They concluded that water pipe smoking is low in most Lower Middle income countries, but confirmed the existence of “important country-level differences including concurrent cigarette smoking” which should be considered during the design and evaluation of tobacco control interventions.

#### **2.4 Studies on Health Effects of Shisha Smoking**

Fromme & Schober (2014), in their review on the impact of water pipe smoking on health, mentioned the effect due to the high concentration of CO during a smoking session, as the most important effect which outlines acute toxicity of water pipe smoke.

According to the duo, numerable cases of CO poisoning have been recorded, such as in the case of a 19yr old man, who had neurological symptoms such as amnesia and dizziness, 4 hours after smoking a water pipe. The associated COHb level was 27.8%. They cited another case in Sweden, where a 15 year old who had smoked for 3 consecutive days was dizzy, had a headache, and became unconscious 1 hour after his last water pipe session.

The authors quoted Arziman et al. (2011), as reporting a series of five patients with water pipe-induced CO poisoning in Turkey. The subjects had “general neurological complaints like headaches, nausea, vomiting and vertigo”. Another 70 cases of poisoning in Germany was listed by the National Notification System for Poisoning Incidents, according to Fromme & Schober (2014).

Regarding long-term health effects, a review by Fromme & Schober found associations with lung cancer, respiratory illness, low birth-weight and periodontal disease. For instance, in a population based cohort study in Iran, 928 randomly selected subjects were followed for 10 years; water pipe smoking was seen as a risk factor for gastric cancer and precancerous lesions. Their review also found water pipe smokers to have significantly more DNA damage than non-smokers, using “chromosomal aberration assay”.

Diab, Abdelrahim & Esmail(2014), also investigated water pipe smoking as a risk factor for cardiovascular disease, using “High sensitivity C-reactive protein (hs-CRP) and flow mediated dilatation (FMD)” methods. Their study involved 77 male participants; 60 smokers and 15 non-smokers as a control group. They divided the smokers into two groups, 30 water pipe smokers and 30 cigarette smokers. Smokers were found to have a little higher hs-CRP level than non-smokers, though statistically insignificant. The number of subjects with endothelial dysfunction was also higher in smokers. Hs-CRP level was higher in water pipe smokers than in non-smokers, but the difference was not statistically significant.

With respect to water pipe smokers against cigarette smokers, no significant differences were found between these groups, concerning hs-CRP level and the risk categories.

Water pipe and cigarette smoking were associated with significantly lower FMD and a higher number of subjects with endothelial dysfunction respectively, which was attributed to a decreased nitric oxide bioavailability as a result of “the effect of free radicals, tar, nicotine, polycyclic aromatic hydrocarbons, heavy metals and other toxic components”.

Using univariate analysis, the study demonstrated that the effect of water pipe smoking on hs-CRP and FMD was similar to that of cigarette smoking, but suggested that, water pipe smoking is less likely than cigarette smoking to predict high likelihood of cardiac events. Apple flavoured water pipe smoking (as used in the study) did not predict high risk, but was associated with a significant risk of cardiovascular diseases. As this study was the first of its kind, the authors advocated for further studies on the subject matter.

(Maziak, 2014) in his study, also mentioned that deaths caused by tobacco could worsen as a result of the advent of shisha smoking, having risen as the second most widespread tobacco use among the youth in the United states and other western countries.

Maziak also argued that water pipes serve as a bridge to cigarettes. He supported this assertion through a qualitative study, in which a participant acknowledged being “dominated” by smoking water pipes, though he is someone who likes to “take control”. He also cited studies conducted in the Middle East, where several cigarette smokers switch to water pipes instead of quitting altogether. He also found in Jordan that, “smokers at baseline” were twice as likely to become current cigarette smokers after the second year, in comparison to “never smokers”.

Chaouachi on the other hand, has been critical on the sensationalization of hazards posed by shisha smoking especially in experiments involving hypothetical instruments to measure smoking, and in studies where the type of tobacco smoked is not distinguished (Chaouachi & Sajid, 2010; Chaouachi, 2009, 2011). Chaouachi’s studies have also focused on ways water pipes could be designed to make them less harmful.

## 2.5 Smoking Locations

Popular locations for smoking shisha include restaurants, cafes, restaurants and beaches (WHO, 2015; Fakhreddine, Kanj, & Kanj, 2014; Kakodkar & Bansal, 2013). In certain cultures, shisha is smoked in homes (Fromme & Schober, 2014), where parents may share with their children (ASH, 2013).

Concerns have been raised about shisha smoking in enclosed environments in a number of studies. According to ASH (2013), a study conducted in Virginia in the USA, measured the air quality in 17 water pipe (shisha) cafes, five cigarette smoking restaurants and six smoke free restaurants and discovered that “both the smoking and non-smoking rooms in the water pipe cafes had poorer air quality than cigarette smoking and non-smoking rooms in restaurants and smoke free restaurants”.

In the UK, tobacco and herbal water pipe use in enclosed public places has been banned to eliminate the risk of second hand smoking unlike countries like the USA (ASH, 2013) and Ghana, where water pipe smoking is not covered by smoke free legislation.

## 2.6 The WHO’s Campaign against Tobacco (and shisha) smoking

The WHO, has for decades now, been keen on reducing tobacco consumption worldwide, since the latter has been implicated for claiming approximately 100 million lives during the 20<sup>th</sup> Century (WHO, 2015) . Notable among its efforts, is the inception of the WHO International Framework Convention on Tobacco Control (WHO FCTC), which entered into force in February 2005.

It is characterized by the **MPOWER** measures, which was established in 2008, to accelerate sustainable implementation of key WHO FCTC measures. **MPOWER** is an

acronym for **M**onitor tobacco use and prevention policies, **P**rotect from tobacco smoke, **O**ffer help to quit tobacco use, **W**arn about the dangers of tobacco, **E**nforce bans on tobacco advertising, promotion and sponsorship, **R**aise taxes on tobacco.

The WHO FCTC covers all tobacco products, and it is mandatory for all parties, that have signed to the Convention, to include water pipe tobacco use in developing and implementing tobacco control policies (WHO, 2015). According to the WHO, many tobacco control policy frameworks are based on cigarette policies, without necessarily addressing water pipe smoking, but work is in progress to set a premise for implementing interventions to address water pipe (shisha) smoking.

Ghana signed the WHO Framework Convention on Tobacco Control on 20 June, 2003 and ratified it on 29 November, 2004. Influenced by the framework, Section 6 of The Public Health Act (passed on 11 July, 2012) was devoted to Tobacco Control Measures. As at 31 December 2014, Ghana had set specific national government objectives in tobacco control, with an established technical unit at the FDA, the Tobacco Control unit. Please refer to Appendix III for specific actions the WHO recommends on water pipes.



## CHAPTER 3

### 3.0 METHODOLOGY

#### 3.1 Study Design and Tools

The study was a descriptive cross-sectional study of shisha smokers identified in clubs, hotels, lounges and beaches in selected areas in the Accra Metropolis. Quantitative tools were employed; questionnaires were developed using questions adopted from the Global Youth Tobacco Survey, Global Adult Tobacco survey and published literature available on the subject with some modifications (Global Adult Tobacco Survey, 2011; Kalsbeek et al., 2010; WHO, 2012). The questionnaires included questions on demographic characteristics (age, gender, nationality, religion, marital status, where participants live, level of education and employment status), smoking behaviour of participants, factors that influence their choice of shisha over cigarettes, health perceptions of shisha smoking and their knowledge about health hazards associated with shisha. The questionnaires were administered both via one-on-one interviews or self-administered in situations where one-on-one interviews were not permissible. Consent was sought from participants before being interviewed and no compensation was offered for their participation.

#### 3.2 Study Area

The study was conducted in the Accra Metropolis, which is the largest Metropolis in Ghana. It houses the seat of Government, making it a hub for both international and local commerce. It also represents the flagship of foreign influence in the country, and boasts of numerous upscale restaurants, malls, hotels, cafes and lounges, designed to reflect its contemporary mix. The inclusion of shisha smoking services on the menus of these

hangouts in the Accra Metropolis is becoming commonplace in consonance with public demand and the desire to sustain a competitive edge.

The Accra Metropolis has a total area of about 173 km<sup>2</sup> (AMA, 2011) and is inhabited by close to 2.5 million people out of the total population of Ghana. The geographical coordinates of Accra are 5° 33' 0" North and 0° 12' 0" West (Maps of World, 2015). The local dialect spoken is Ga, but other languages such as English, Twi and Fante are also popular due to the ethnic diversity in the region.



**Figure 2: Map of Accra Metropolis**

Source: Google images

### 3.3 Variables

#### 3.3.1 Dependent Variables

- Smoking behaviour (Number of days smoked, Type of shisha smoked, Where shisha was last smoked, Smoking initiation age, Whether mixed or Exclusive smoker, Attempts at Quitting Shisha)

### 3.3.2 Independent Variables

- Demographic characteristics (Age, Sex, Nationality, Religion, Marital status, Educational level, Employment status)
- Perception that shisha is safer than cigarettes

### 3.4 Study Population

The study population comprised shisha smokers who had smoked shisha in the past 30 days, identified from smoking hotspots such as lounges, cafes, hotels and beaches in the study area.

### 3.5 Sample Size Calculation

Sample size was calculated using the Cochran equation,  $n_0 = \frac{Z^2 pq}{e^2}$

Where  $n_0$  is the sample size

$Z^2$  is the abscissa of the normal curve that cuts off an area  $\alpha$  at the tails (and  $1-\alpha$  equals the desired level of confidence)

“e” is the desired level of precision

P is the estimated national prevalence of tobacco smoking for both sexes (GDHS, 2014), and q is (1-p)

Using a confidence interval of 95%, precision of  $\pm 2.0\%$  and assuming  $p= 2.23\%$ ,  $q= 97.77\%$

$$n_0 = \frac{(1.96)^2(0.0223)(0.977)}{(0.020)^2}$$

$$\cong 209$$

A minimum sample size of 209 participants was desired.

### **3.6 Sampling Technique**

Due to the nature of study participants, the snowballing technique was employed. The snowball or chain-referral technique is a non-probabilistic method of sampling for hidden populations, where initially observed participants are asked to nominate other participants with the same trait (Explorable.com, 2009).

Initial recruits identified at smoking hotspots (cafes, lounges, bars, hotels, beaches) were asked to suggest other potential participants, until the desired sample size was realized. To reduce the effect of biases, a diverse initial set of respondents were selected based on nationality, gender, age, employment status and smoking location.

#### **3.6.1 Inclusion Criteria**

Men and women aged 18 to 59, found to be shisha smokers in the study area.

#### **3.6.2 Exclusion Criteria**

Persons who had smoked shisha within a period exceeding 30 days and minors (aged below 18).

### **3.7 Data capture and statistical analysis**

Data obtained from the interviews were entered into the STATA software package, Version 13 (Stata Corp LP, U.S.A) and analyzed using descriptive and inferential statistics. The relationships existing between the socio-demographic characteristics of participants, their health perceptions and their smoking behaviour were described using frequencies, percentages, chi-square, logistic regression and Kruskal-Wallis' test.

Demographic variables included age, gender, nationality, religion, where participants lived, their educational level, marital status and employment status.

Regression analysis was also conducted to determine the predictors of shisha smoking behaviour, at a 95% Confidence Interval. A p-value less than 0.05 was considered significant

### **3.8 Quality Control**

The questionnaire was pre-tested in a shisha smoking hotspot in Tema before administration. This allowed for restructuring of the questionnaire and a test of the coherence of questions. Four (4) Research Assistants were trained and provided Standard Operation Procedures (SOPs) to follow during data collection and handling of filled questions. To avoid duplication of interviews, participants were asked to confirm if questionnaires had not already been administered to them. Completed forms were manually checked for correctness. During the data collection, the Researcher monitored activities of the Research Assistants to ensure compliance with SOPs.

Incomplete or inconsistent questionnaires were excluded from analysis, but kept for discussion in the final report.

### **3.9 Ethical Consideration**

The proposal for the study was first submitted for ethical clearance at the Ghana Health Service Ethical Review Board. Corrections were made after the first review was received. Data collection began only after final approval was given by the Ethical Review Board.

#### **3.9.1 Risks and Benefits**

It was ensured that the procedure did not cause any risk to participants. Prior to interviews, the risks and benefits of the study were explained to participants. The results of the study will provide evidence and guidelines for future policy interventions.

### **3.9.2 Compensation/ Payment**

No incentives or payment was given for participating in this study.

### **3.9.3 Right to refuse**

Participation in this study was voluntary. Participants were given the option not to answer any individual question or all questions and were at liberty to withdraw from the study at any time. Full participation was however encouraged.

### **3.9.4 Anonymity and confidentiality**

Information provided by participants was taken in strict confidence and utilized purely for research purposes. Participants were identified by ID numbers only. Responses were not shared with anybody who was not part of the study team.

### **3.9.5 Consent**

A consent form was attached to the questionnaire. The form included information on the Title, Institutional affiliation, Background information and the study procedure. These were further explained to respondents when clarification was demanded. Participants were required to sign a statement of declaration, indicating they had understood the purpose, procedures, risks and benefits of the study and their free will to participate.

For participants who could not read, the procedure was explained in a language they understood. A witness was required to sign the consent form on behalf of the said participant as confirmation of the latter's willingness to participate.

### **3.9.6 Data storage/ Security and Usage**

Completed questionnaires have been stored in a locked file cabinet. Electronic data files have also be stored in password protected folder. Access will be limited to only the Principal Investigator and Supervisor.

### **3.9.7 Conflict of Interest**

The PI had no conflict of interest in this study.



## CHAPTER 4

### 4.0 RESULTS

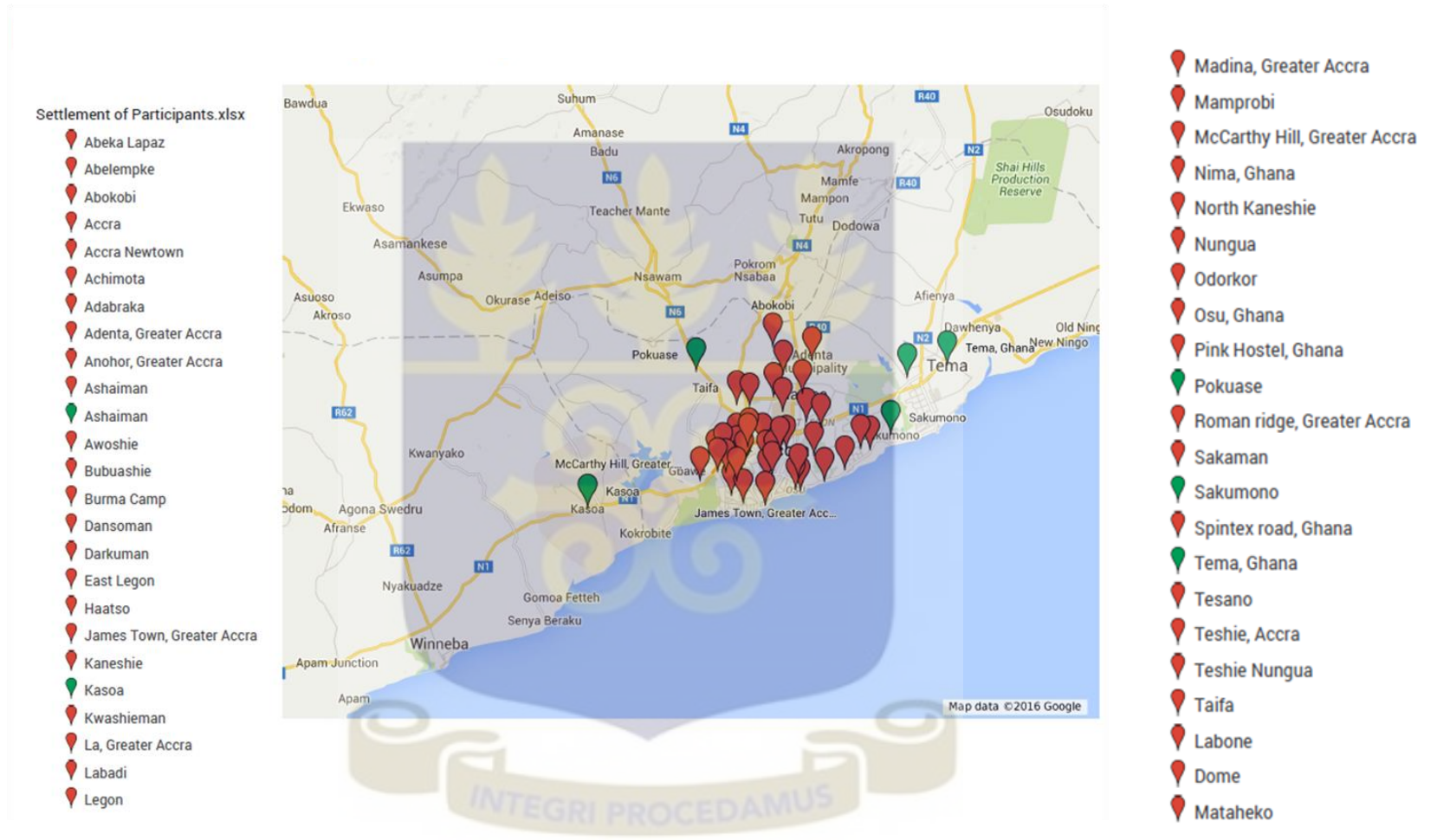
A total of 210 persons who lived or had smoked shisha in the Accra Metropolis in the last 30 days, participated in the study. The results have been categorized under 7 main headings, namely Distribution of Participants, Demographic Characteristics, Smoking Behaviour of Participants, Factors that Influence Shisha Smoking, Health Perceptions of Participants, Health Knowledge of Participants and Relationship between Mean Number of Days Smoked and Selected Variables.

#### 4.1 Distribution of Participants

Among those interviewed, 91.5% reported they lived in the Accra Metropolis, compared to 8.5% who lived outside (Figure 3). About 23% lived in Osu, 10% lived at Labadi and 4.5% lived at Abeka Lapaz. Approximately 4% lived at Dansoman and Kwashieman. The rest were scattered in about 40 different residential areas in the Accra Metropolis. Two respondents however reported they lived in another country (Nigeria and New York).



**Figure 3: Distribution of Study Participants by Residence**



\*Distribution map does not show participants living in New York and Nigeria

**Legend:** Residential area is within Accra Metropolis ♥ Residential area is outside Accra Metropolis ♥

## 4.2 Demographic Characteristics

**Table 1: Demographic Characteristics of Participants**

Characteristic	n (%)	Total (N=210)
<b>Mean Age in years <math>\pm</math> SD</b>	26.7 $\pm$ 5.3	
<b>Sex of respondent</b>		
Male	139 (66.19)	
Female	71 (33.81)	
<b>Nationality of respondent</b>		
Ghanaian	185 (88.10)	
Nigerian	10 (4.86)	
Ivorian	2 (0.85)	
Lebanese	3 (1.43)	
Togolese	3 (1.43)	
British	2 (0.95)	
Jamaican	1 (0.48)	
Indian	1 (0.48)	
Chinese	1 (0.48)	
Liberian	1 (0.48)	
French	1 (0.48)	
<b>Employment status*</b>		
Employed	134 (65.05)	
Unemployed	31 (14.90)	
Student	6 (2.91)	
<b>Marital status*</b>		
Single	173 (83.17)	
Married	31 (14.90)	
Divorced	4 (1.92)	
<b>Educational Level</b>		
None	15 (7.14)	
Primary	4 (1.90)	
Secondary	107 (50.95)	
Undergraduate	69 (32.86)	
Postgraduate	15 (7.14)	
<b>Religion</b>		
Christian	171 (81.43)	
Moslem	22 (10.48)	
None	12 (5.71)	
Rastafarian	3 (1.43)	
Hindu	1 (0.48)	
Buddhist	1 (0.48)	

\* Total may not add up to 210 due to missing values

Out of the 210 persons who were interviewed, 139 (66.19%) were males and 71 (33.81%) were females. The mean observed age was  $26.7 \pm 5.3$ ; the youngest participant was 18 years while the oldest was 45. Majority of the participants were Ghanaian (88.1%); the others were Nigerian, Ivorian, Lebanese, Togolese, British, Jamaican, Indian, Chinese, Liberian or French. About two-thirds were employed, while a small minority was students (2.91%) and the rest, unemployed. Almost 93% had received some formal education, compared to approximately 7%, who had received none. The study participants were Christian (81.43%), Moslem (10.48%), Rastafarian (1.43%), Hindu (0.48%), Buddhist (0.48%) or non-religious (5.71%).

### **4.3 Smoking Behaviour of Participants**

#### **4.3.1 Smoking status**

Fifteen of the participants representing 7.14% were first time shisha smokers, compared to 92.86%, who were regular smokers. Seventy-seven participants (36.67%) currently smoked cigarettes as well as shisha, while 9 (4.29%) used to smoke cigarettes, but had quit. Majority of the participants (59.05%) were exclusive shisha smokers.

#### **4.3.2 Type of shisha smoked**

The predominant type of shisha smoked by the participants was moassel (56.25%); 24.52% smoked herbal shisha, 16.35% smoked jurak and 1.92% smoked tumpak.

#### **4.3.3 Liquid used in “water bowl”**

Water was found as the preferred choice of liquid in the “water bowl” of the shisha pipe. Approximately 7 out of 10 people used water during their last smoke, about 2 out of 10,

used alcohol, whereas a tenth did not know what liquid had been used in the “water bowl”.

#### **4.3.4 Where shisha was last smoked**

The most common place for smoking shisha among the participants encountered was the bar or club (51.67%). The second most popular location was the beach (31.58%), with the minority smoking in the restaurant (3.35%) or coffee shop (0.96%). Please refer to Table 2 on next page.



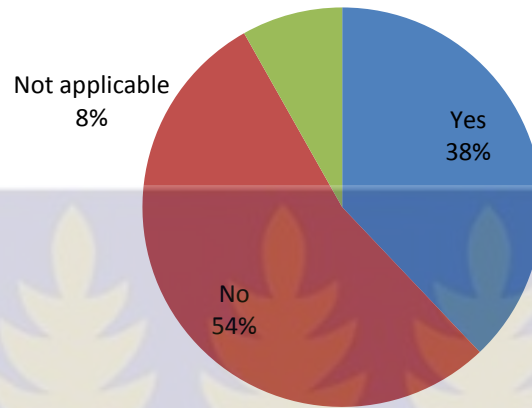
**Table 2: Smoking Behaviour of Participants**

<b>Characteristic</b>	<b>Total (N=210) n (%)</b>
<b>First time smoker</b>	
Yes	15 (7.14)
No	195 (92.86)
<b>Smokes cigarettes as well</b>	
Yes	77 (36.67)
No	124 (59.05)
Used to but quit	9 (4.29)
<b>Type of shisha smoked</b>	
Moassel	117 (56.25)
Jurak	34 (16.35)
Tumpak	4 (2.40)
Herbal shisha	51 (2.50)
<b>Liquid used in shisha bowl*</b>	
Water	143 (68.42)
Alcohol	38 (18.8)
Don't know	23 (11.0)
Other	5 (2.39)
<b>Number of days smoked*</b>	
1 day	44 (22.11)
2-5 days	75 (37.69)
6-10 days	42 (21.11)
11-20 days	25 (12.56)
21-30 days	13 (6.53)
<b>Where shisha was last smoked</b>	
Home	14 (6.7)
Coffee shop	2 (0.96)
Restaurant	7 (3.35)
Bar/club	108(51.67)
Beach	66 (31.58)
Other (Party, studio, etc.)	12 (5.74)

\* Total may not add up to 210 due to missing values

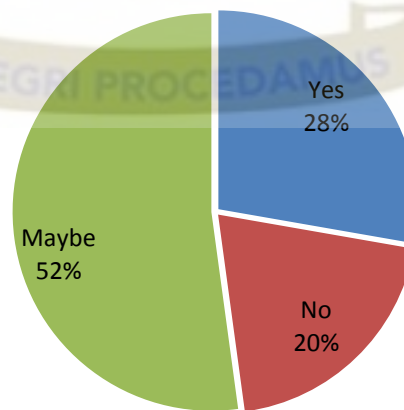
#### 4.3.5 Attempts at quitting shisha

Fifty-four percent of participants did not make quit attempts at smoking shisha in the past year compared to 38% who attempted quitting (Figure 4).



**Figure 4: Participants who made quit attempt in past year**

About 80% of respondents also stated they would consider quitting in future. The remaining 20% declined they would quit smoking shisha (Figure 5). A logistic regression showed a significant difference between males and females, with respect to whether they would quit smoking in future or not; females were 3.1 times more likely to consider quitting smoking in future, compared to males [OR (95% CI) = 3.1 (1.3, 7.4),  $p < 0.011$ ].



**Figure 5: Participants who would consider quitting in future**

#### 4.3.6 Smoking initiation age

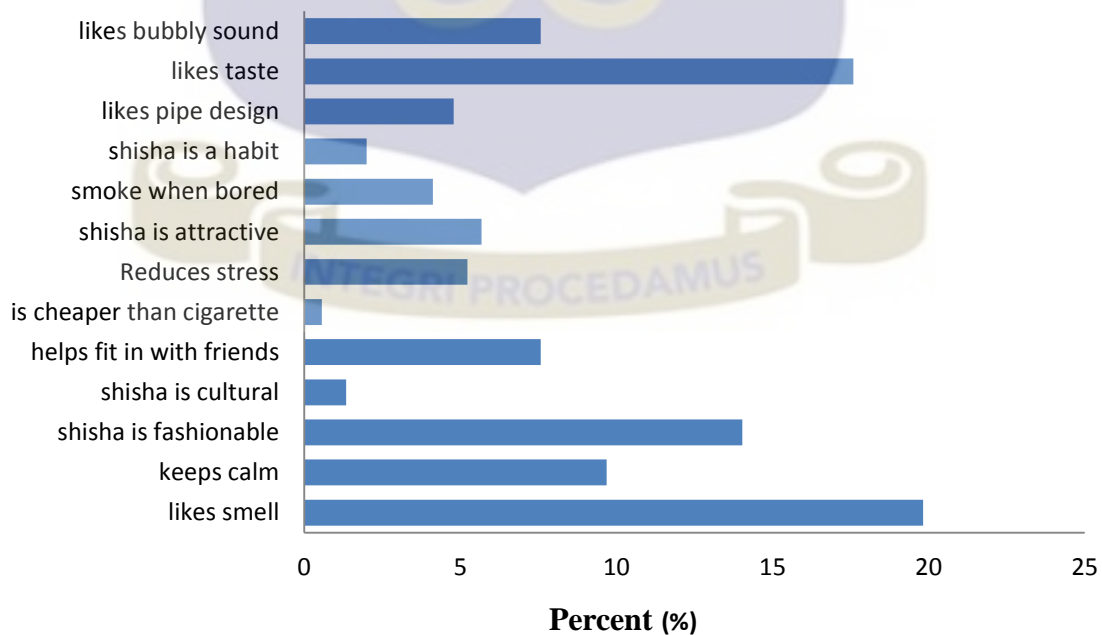
The smoking initiation age also varied between males and females. A significant difference ( $z=3.5$ ,  $p<0.0005$ ) was observed with females recording a lower initiation age of  $21.5 \pm 3.5$  compared to males  $24.0 \pm 4.9$ . The combined mean initiation age for participants was  $23.2 \pm 4.6$ . The minimum age of initiation was 15 whereas the maximum was 45.

#### 4.3.7 Number of days smoked

Majority of participants (58.8%) had smoked shisha for between 2 and 10 days in the past 30 days while 22.1% had smoked only once in the past 30 days. The more regular smokers, who had smoked continuously between 11 and 30 days, constituted 20% of the participants.

### 4.4 Factors that Influence Shisha Smoking

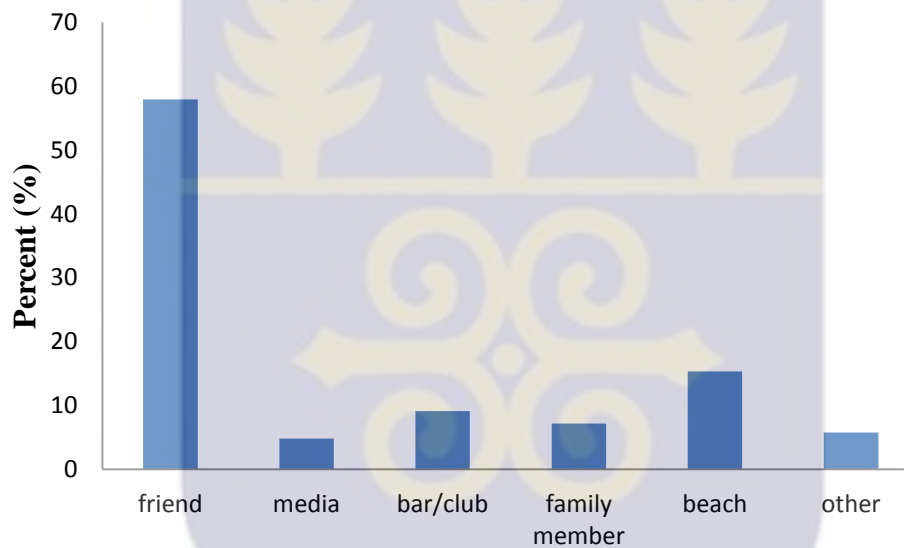
#### 4.4.1 Reasons for smoking shisha



**Figure 6: Reasons why participants smoked shisha**

The three major reasons why participants reported smoking shisha were because they liked the sweet smell (19.8%), they liked the taste (17.6%) and that smoking shisha was fashionable. The next three favoured reasons were that smoking shisha made them calm (9.7%), it helped them fit in with friends (7.6%) and also because of the bubbly sound the shisha pipe made during smoking (7.6%). The least two favoured reasons were that shisha was cultural (1.3%) and that shisha was cheaper than cigarettes (0.6%).

#### 4.4.2 Mode of first introduction to shisha



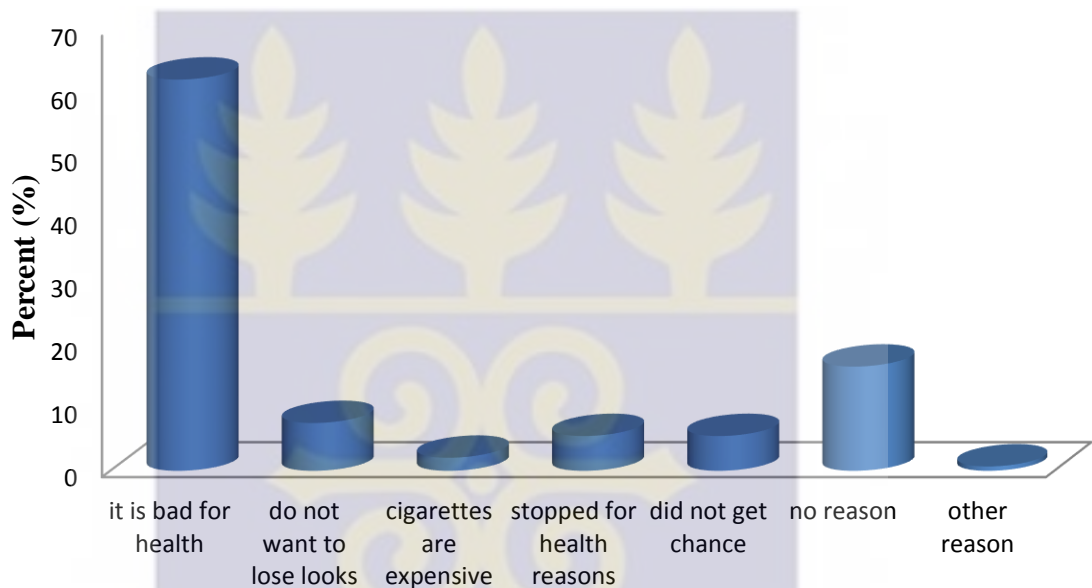
**Figure 7: Mode by which participants were first introduced to shisha**

A large proportion (57.9%) of participants reported they were first introduced to shisha through friends. The second most dominant exposure medium was the beach (15.3%), followed by a bar/club and a family member (7.2%). The media was the least reported avenue (4.8%) of first exposure.

#### 4.4.3 Flavour preferences

The flavours the participants mentioned they liked were strawberry (29.1%), mint (24.8%), apple (16.5%), coconut (4.3%), chocolate (0.4%) and vanilla (0.4%). About twenty-two percent did not have any specific flavour preference.

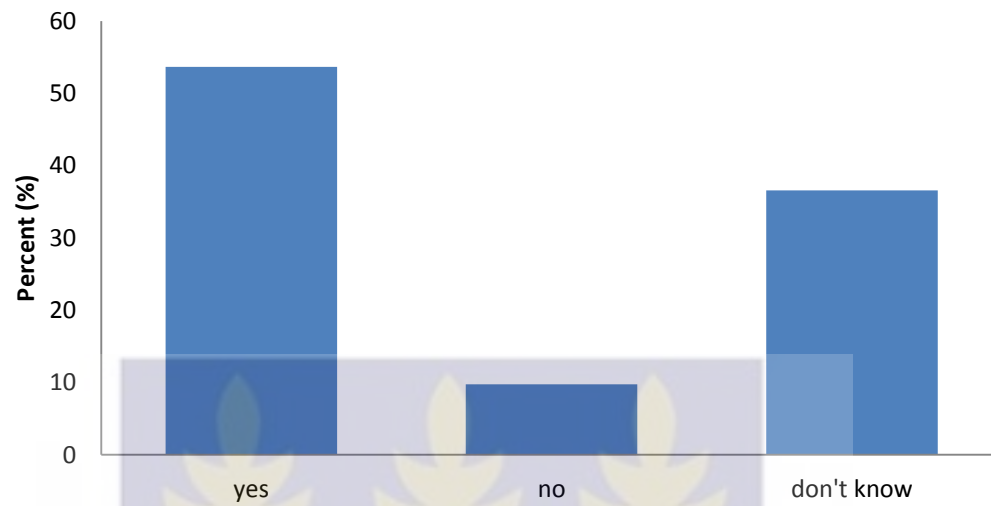
#### 4.4.4 Why participants did not smoke cigarettes



**Figure 8: Reasons why exclusive shisha smokers did not smoke cigarettes**

The major reason given by exclusive shisha smokers for not smoking cigarettes was that cigarette was bad for health (62.1%). On the other hand, 16.6% did not have any reason, while 7.6% reported they did not want to lose their looks. About 5.5% also stated they did not smoke cigarettes because they never had the chance to.

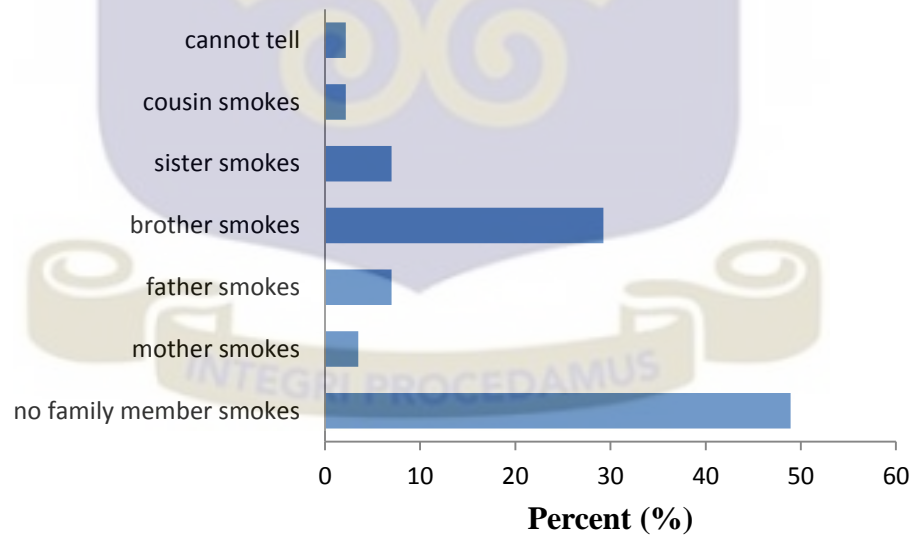
#### 4.4.5 Willingness to recommend shisha to a friend



**Figure 9: Participants who would recommend shisha to a friend**

More than half of the participants stated they would recommend shisha to a friend. About 37% were unsure, while 9.8% said they would not.

#### 4.4.6 Participants with smokers in family



**Figure 10: Participants who had family members who smoked shisha**

The proportion of participants who had family members who smoked shisha (48.9%) was same as the proportion whose family members did not smoke shisha. About 7% of respondents' fathers smoked as well, compared to approximately 3.5% of respondents' mothers. About 2.2% of respondents could not tell if any family member smoked.

Most females (94.1%) were of the opinion that females were more comfortable smoking shisha compared to cigarettes; significant differences ( $\chi^2 = 9.2$ ,  $p < 0.002$ ) were observed between males and females regarding that opinion. Majority of participants of both sexes (81.1%) generally agreed smoking shisha was more socially acceptable compared to cigarettes.

#### 4.5 Health Perceptions of Participants

**Table 3: Health Perceptions of Participants**

<b>Health Perceptions</b>	<b>Yes n (%)</b>	<b>No n (%)</b>	<b>Don't know n (%)</b>
Second hand shisha smoke is harmful	41(20)	61(29.76)	103 (50.24)
Health warnings seen on package	31(14.98)	132 (63.77)	44 (21.26)
Smoking shisha will be difficult to quit once started	26 (12.56)	140 (67.63)	41 (19.81)
Shisha is safer than cigarettes	148(71.84)	37 (17.96)	21 (10.19)
Smoking shisha will present future health risks	64 (32.37)	51 (24.64)	89 (43.00)
The bowl's liquid removes toxic products in shisha	68 (33.01)	28 (13.59)	110 (53.40)
Any health changes observed since smoking shisha	10 (4.95)	151 (74.75)	41 (20.30)

\* Total may not add up to 210 due to missing values

Only 20% of participants were certain that second hand smoke from shisha was harmful.

When asked if they had seen health warnings on a package, majority (63.8%) said "No" and another 19.8% were unsure if they had. About 64% believed smoking shisha would not be difficult to quit once somebody started smoking, while 19.8% did not know.

A large percentage (71.8%) wrongly felt shisha was safer than cigarettes, and only 13.6% were able to answer correctly that the shisha bowl's liquid did not remove toxic products in shisha. Finally, only about 5% of participants reported observing any health changes since smoking shisha; 41 participants representing 20.3% did not know if they had witnessed any health changes or not.

Examples of health changes cited included weight loss, coughs, black lips, weakness, tiredness, fast heartbeat and breathing difficulty.

#### 4.6 Health Knowledge of Participants

**Table 4: Health Knowledge of Hazards linked with Shisha**

<b>Health Knowledge</b>	<b>Yes n (%)</b>	<b>No n (%)</b>	<b>Don't know n (%)</b>
Shisha contains tobacco?	120 (57.42)	23(11.00)	66 (31.58)
Shisha smoke contains carbon monoxide?	146(21.9)	38 (18.1)	126 (60.00)
Shisha smoking linked with high BP?	28(13.33)	47 (22.38)	135 (64.29)
Shisha smoking linked with lung disease?	77(36.67)	33 (15.71)	100 (47.62)
Shisha smoking linked with cancer?	75(35.71)	37 (17.62)	98 (46.67)
Shisha smoking linked with mouth disease?	54 (25.71)	48 (22.86)	108 (51.43)
Shisha smoking linked with heart disease?	66 (31.43)	38 (18.10)	106 (50.48)

\* Total may not add up to 210 due to missing values

About 43% of participants wrongly assumed or did not know that shisha contained tobacco. Significant differences ( $\chi^2=18.7$ ,  $p<0.0001$ ) existed between the answers given by first time smokers and regular smokers, regarding the latter question. Only one (1) first time smoker knew that shisha contained tobacco. When asked if shisha smoke contained carbon monoxide, only 21.9% answered "Yes". A small proportion (13.33%) knew there was a link between smoking shisha and high blood pressure.

Only a third of participants were sure shisha smoking had been linked with cancer. Similar trends of poor knowledge were observed in the cases of mouth disease and heart disease. Seventy-four percent of participants either did not know or wrongly answered that shisha smoking had no link with mouth disease.

About 31.4% correctly answered “Yes” that shisha smoking had been linked with heart disease.

#### **4.7 Relationship between Mean Number of Days Smoked and Selected Variables**

The table on page 40 shows the output of a Kruskal-Wallis test, conducted to determine if “Mean days smoked” by participants had any differences by Age, Sex, Nationality, Religion, Employment status and Level of education.

Significant differences ( $\chi^2=9.6$ ,  $p<0.0223$ ) were found between participants by age. Participants older than 39 years averagely smoked for more days (9.8), compared to the lower age groups. Those less than 20 years smoked for a mean of 5.4 days, the 20 - 29 age group smoked for a mean of approximately 6.0 days, while the 30 – 39 age group smoked for a mean of 8.6 days. The mean days smoked therefore increased with age.

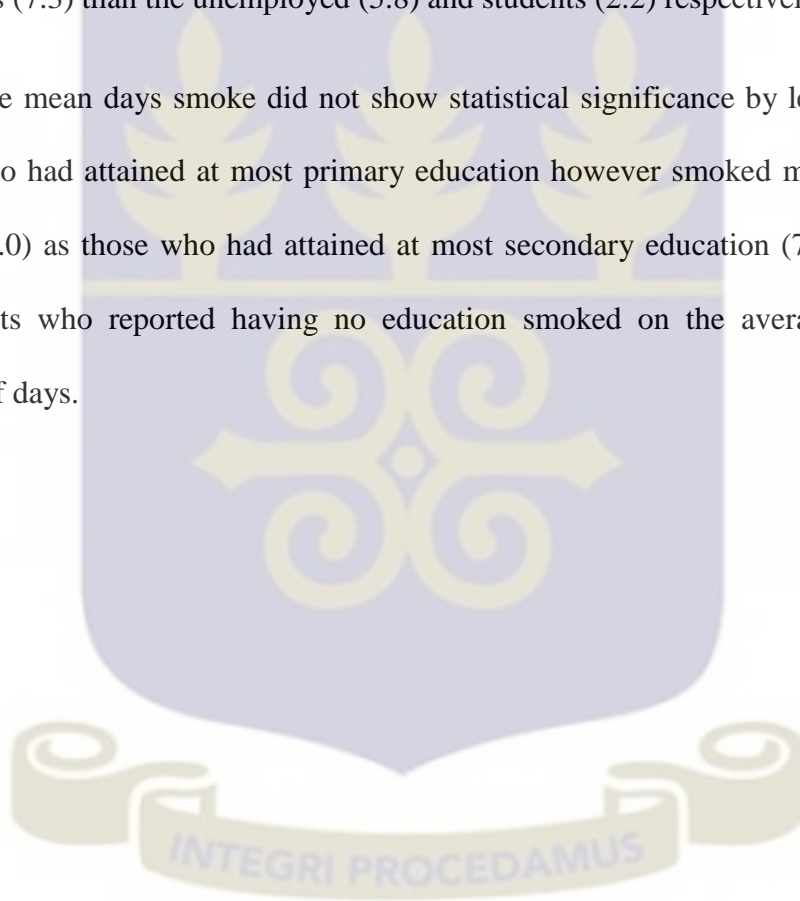
Males also smoked for significantly ( $\chi^2=4.1$ ,  $p<0.0427$ ) more days than females. The average number of days smoked by males was 7.2, while that for females was 5.7.

Nationality was further grouped into Ghanaians and Foreigners. Foreigners had smoked for an average of 8 days in the past 30 days, compared to approximately 6.5 days compared to Ghanaians. This difference was however not statistically significant.

Significant differences in mean days smoked ( $\chi^2=12.5$ ,  $p<0.0289$ ) were also found among participants of different religions. Moslems (12.0), those without religion (11.8) and Rastafarians (10.7) averagely smoked for more days than Christians.

Likewise, significant differences ( $\chi^2=6.5$ ,  $p<0.0387$ ) were found in the mean days smoked by the employed, unemployed and students. Employed participants averagely smoked for more days (7.3) than the unemployed (5.8) and students (2.2) respectively.

Finally the mean days smoke did not show statistical significance by level of education. Those who had attained at most primary education however smoked more than twice as much (17.0) as those who had attained at most secondary education (7.2). Interestingly, participants who reported having no education smoked on the average, for the least number of days.



**Table 5: Comparison of the Mean Days Smoked in the past month across Demographic Groups**

Characteristics	N	Mean days	P – value
<b>Age</b>			
> 20 years	11	5.4	<b>0.0223</b>
20 – 29 years	140	6.0	
30 – 39 years	38	8.6	
<39 years	8	9.8	
<b>Sex</b>			
Male	130	7.2	<b>0.0427</b>
Female	169	5.7	
<b>Nationality</b>			
Ghanaian	176	6.5	0.9721
Foreigner	23	8.0	
<b>Religion</b>			
Christian	163	5.7	<b>0.0289</b>
Moslem	19	12.0	
None	12	11.8	
Rastafarian	3	10.7	
Hindu	1	1.0	
Buddhist	1	3.0	
<b>Employment Status</b>			
Employed	132	7.3	<b>0.0387</b>
Unemployed	58	5.8	
Student	6	2.2	
<b>Level of Education</b>			
None	9	3.8	0.0508
Primary	4	17.0	
Secondary	103	7.2	
Undergraduate	68	6.3	
Postgraduate	15	4.7	

\*Cells may not add up to 210 due to missing values

\*P-value was calculated using Kruskal-Wallis test; P< 0.05 is statistically significant

It was further deduced from the Kruskal-Wallis test that participants who wrongly assumed that shisha was safer than cigarettes, had smoked averagely for more days (7.2) than those who were not sure (5.1). Those who rightly answered that shisha was not safer

than cigarettes smoked for comparatively, the least mean number of days (4.9) over the 30 day period. These differences were statistically significant ( $\chi^2=9.7$ ,  $p<0.0078$ ).

Finally, significant differences occurred between the mean number of days smoked by mixed smokers, exclusive smokers and those who had quit smoking cigarettes ( $\chi^2=8.8$ ,  $p<0.0123$ ). Former cigarette smokers smoked on more days (9.7) than current mixed smokers (8.3) and exclusive shisha smokers (5.5) respectively.



## CHAPTER 5

### 5.0 DISCUSSION

This chapter discusses the findings of the study based on the set objectives.

#### 5.1 Characteristics and distribution of participants

More males were encountered in the study compared to females, which suggested that shisha smoking would probably be more associated with males. A cross-sectional study in the UK found that males were three times more likely than females to smoke water pipes, but also indicated that the gender gap is smaller than that observed for cigarette smoking in many countries (ASH, 2013).

This study also found out that mostly the youth were engaged in smoking shisha in the Accra Metropolis. In Lebanon for instance, six out of ten youth were found to smoke shisha between 1999 and 2007 according to studies by Martinasek, McDermott, & Martini, (2011). Research suggests that, shisha smoking is common among the youth because they find it as trendy (Kakodkar & Bansal, 2013; Maziak, 2014; CDC, 2012; Fielder, Carey, & Carey, 2012).

Respondents who were older than 30 years were found to smoke for a higher mean number of days, compared to those who were younger than 30 years. Linked to this revelation was the fact that those who were employed, were also found to smoke for a higher mean number of days compared to the unemployed and students. Studies in Egypt showed an increase in smoking in the 21 to 30 age group compared to younger adults;

employment and independent housing were explained as a contributory factor to this observation (World Health Organization, 2006).

A survey of sales points in the Accra Metropolis revealed the price for a session of shisha costs anywhere between 20 to 35 GHC ( 5 to 9 USD), depending on the location, flavour desired and size of the shisha pipe (and in effect amount of tobacco). This would mean one would have to be economically comfortable to afford multiple sessions. The Osu residential area which was home to about one out of five respondents; incidentally had more shisha sales points than all other locations sampled in the Accra Metropolis.

### **5.2 Smoking Behaviour of Participants:**

The fact that some of the participants encountered were smoking shisha for the first time, and that more than half of participants smoked shisha exclusively, suggested that curiosity about shisha is existent in the Accra Metropolis perhaps due to its appeal, which could drive many more to try shisha in the future.

This finding is worthy of concern because, it becomes apparent shisha smoking had introduced more individuals to smoking tobacco, many of whom did not even suspect it was tobacco they were smoking. In a related study on shisha by Maziak (2014), half of the participants were also found to be non-cigarette smokers. Another 4.29% of the participants in Maziak's study used to smoke cigarettes but had quit, only to settle for another means of smoking tobacco in the form of shisha. Maziak (2014), from his research argued that water pipes may serve as a bridge to cigarettes, confirming this with studies in Jordan where water pipe smokers at baseline were found to be twice as likely to become current cigarette smokers after 2 years, compared to people who had not smoked

before. Fromme & Schober, (2014) also found water pipe use as a strong predictor of cigarette smoking.

The findings of this study also confirmed moassel as the most popular type of shisha used by modern day shisha smokers, in line with publications by Chaouachi, (2011), Khater et al., (2008) and World Health Organization, (2006). Moassel has been found culpable for the increased use of shisha globally in the past two decades since it has a sweeter fragrance compared to other forms of tobacco and gives multiple flavour options (WHO, 2015). While herbal shisha was the least smoked among respondents, about eleven out of the twenty-five respondents who had smoked herbal shisha, mentioned weed (marijuana) as a constituent. Originally, herbal shisha contains a mixture of herbs including sugar cane fiber and tea leaves mixed with honey, molasses and flavour (Hookah Company, 2014). While herbal shisha is aimed at providing a tobacco and nicotine free alternative to using water pipes, the findings of this study suggested it was being as used a medium for smoking weed. Some respondents who consumed moassel, tumpak and jurak, also reported adding weed. Even more striking was the fact that shisha “spiked” with weed was openly available at sales points in the study area. Other studies have confirmed the use of marijuana in water pipes by 15% of respondents (Martinasek et al., 2011).

The study also revealed bars/clubs and the beach as the most common locations to smoke shisha in the Accra Metropolis. Shisha bars have been reported in other studies as fashionable places to smoke shisha (Daniels & Roman, 2013; World Health Organization, 2006). At the beach, smoking was more prevalent on Saturday and Sunday evenings, but less common on rainy or cloudy days (given that the study was done in the rainy season). People could go to the bar any day, independent of bad weather to get a smoke.

A window of opportunity for smoking cessation was revealed, as eight out of ten respondents indicated they would consider quitting smoking in future. A logistic regression by sex also showed females were 3.1 times more likely than men to consider quitting shisha [OR (95% CI)= 3.1(1.3,7.4),  $p < 0.011$ ]. Tailoring the right message to specific audiences based on gender and age could be helpful in addressing the spread of shisha use.

A comparison between the mean initiation age and mean current age showed that most participants had started smoking about four years ago. This signalled that perhaps shisha use in the Accra Metropolis started becoming widespread half a decade ago. It was also realized for both males and females that the youngest age at which shisha smoking began was fifteen. This suggests that adolescents in the Accra Metropolis are also prone to smoking shisha. In studies elsewhere, adolescence was found to be a prime period for introduction into shisha smoking initiation, with ages as low as twelve having been recorded; another study in South Africa found initiation ages ranging between thirteen and fifteen years (Martinasek et al., 2011). According to studies on shisha smoking in Egypt, initiation of water pipe smoking peaks in adults in their twenties (World Health Organization, 2006). In all the beaches, lounges, and bars visited, there seemed to be no strict restrictions against the consumption of shisha by minors. Indeed, minors were spotted selling shisha to older guests at the beach, against provisions of the Ghana Public Health Act, 2012 (Public Health Act, 2012 Act 851).

### **5.3 Factors that Influence Shisha smoking:**

A liking for the sweet smell of shisha, its taste, and the fashion sense it provided, were the three predominant reasons why respondents reported smoking shisha. These same

reasons, were given by other shisha smokers in studies conducted by (Smith-simone, Maziak, Ward, & Eissenberg, 2008) and (Maziak, 2014). To this effect, some researchers have suggested a ban on the flavour component of shisha to make it less appealing to consumers, leading to cessation (Maziak, 2014). The other popular reasons given were that smoking shisha had helped to keep one calm and had helped to fit in with friends; an indication that socialization was a push factor for smoking shisha.

The study also provides further evidence of how peer influence drives shisha use among the youth. About six out of ten respondents reported being introduced to shisha for the first time by a friend. Another half again mentioned they would also recommend shisha to a friend. Fromme & Schober (2014), in their research found that having a friend or a sibling who smokes were significant predictors of water pipe use. Interestingly, almost half of respondents in this study also had another family member who smoked shisha. In Lebanon, water pipe smoking was said to reinforce bonding at family gatherings (Martinasek et al., 2011). Virtually all females also reported they were more comfortable smoking shisha compared to cigarettes. This confirmed studies by (Daniels & Roman, 2013; Fakhreddine et al., 2014)

#### **5.4 Health Perceptions of Participants**

A large proportion of respondents wrongly felt shisha was safer than cigarettes; a misconception which probably contributed to its increasing usage worldwide (Anjum, Ahmed, & Ashfaq, 2008; World Health Organization, 2006; Al-Naggar & Bobryshev, 2012; Smith-simone et al., 2008). Underlying this misconception is the belief that the liquid in the “water bowl” filters toxic products which may exist in shisha (ASH, 2013;

Fakhreddine et al., 2014; WHO, 2015). In this study, the same belief was shared by three out of ten respondents while half were unaware about the filtering effect of the water.

The study also found that, respondents who stated shisha was safer than cigarettes had averagely smoked for significantly more days in the past month compared to those who felt shisha was not safer. Surprisingly, more than three-fifths of exclusive shisha smokers claimed they did not smoke cigarettes because cigarettes were bad for health. This further highlighted the wrong health perceptions participants had about shisha, stressing the need to create more awareness on the harm shisha could pose.

Perhaps, seeing health warnings on shisha packages could have done some good to erase some of these misconceptions. Unfortunately, less than a fifth of respondents had seen any health warnings in the past month. According to Martinasek et al., (2011), shisha promotion strategies hide the potential dangers associated with water pipes. During data collection it was discovered that many shisha packages indeed did have health warnings which were only visible to an individual who directly purchased the tobacco pack but not to a consumer at the beach, bar, club, restaurant or coffee shop since it was decanted into the head of the water pipe before serving. This calls for action by relevant authorities on the manner in which shisha is advertised.

The health changes mentioned by the 10 respondents who had observed them included weight loss, coughing, black lips, fast heartbeat and breathing difficulty. Though this was not significantly associated with the number of days smoked, other studies have documented similar observations in shisha smokers (Fakhreddine et al., 2014; Kumar, Davies, Weitzman, & Sherman, 2015).

### **5.5 Health Knowledge of Participants**

Though shisha or water pipes present an alternative to smoking tobacco, two-fifths of respondents appeared unknowledgeable about this fact. This observation was even more telling with first time smokers; only one person correctly predicted shisha contained tobacco.

In spite of the fact that the main hazard that distinguishes shisha smoking from cigarettes is CO from charcoal, only one-fifth of respondents was able to tell that shisha smoke contained CO (CDC, 2012; Daher et al., 2009; Fakhreddine et al., 2014). In all circumstances, less than two-fifths of respondents were able to correctly predict a link with health hazards (cancer, high blood pressure, heart disease, mouth disease) enumerated in the questionnaire. This knowledge void could contribute to uninformed patronage of tobacco-containing shisha, thereby increasing the prevalence of tobacco consumption in the country at large.



## CHAPTER 6

### 6.0 CONCLUSION

The study revealed that, shisha smoking is becoming common in the Accra Metropolis and despite this most respondents were not aware of the health hazards associated with smoking shisha.

A mean smoking initiation age of  $23.2 \pm 4.6$  years was also discovered, indicating patronage by a mostly youthful population. Shisha use was considered more socially acceptable by women and a safer alternative to cigarettes by first time smokers and former cigarette users though the contrary is true. The sweet smell, taste, and fashionable nature were identified as the chief reasons why shisha was smoked by respondents.

About two-thirds of participants were first introduced to shisha by a friend, and almost half had another family member who smoked shisha as well. Males and the employed, smoked for a significantly higher mean number of days than females and the unemployed respectively. Females were also found to be 3.1 times more likely to quit smoking compared to males.

Efforts directed at reducing tobacco smoking prevalence and narcotics use in Ghana could under-achieve its results if the emerging trend of shisha smoking is not addressed. This is in light of strong evidence suggesting a doubling of smoking prevalence rates and a reintroduction of cigarette use among exclusive shisha smokers and former cigarette smokers alike, 2 years after follow-up (Fromme & Schober, 2014; Maziak, 2014; WHO, 2015).

## 6.1 Recommendations

Based on the findings of this study, the following are recommended:

1. More research should be conducted on the emerging trend of shisha smoking in Ghana. Specifically, new research should focus on calculating the prevalence of shisha smoking in the country and shisha use among vulnerable groups such as adolescents. Qualitative studies employing in-depth interviews and focused group discussions are also recommended.
2. There should be mass education campaigns by relevant Government agencies and Civic society to erase the erroneous misconception that shisha is a safer alternative to cigarettes. According to this study's findings, a window of opportunity exists to encourage cessation in exclusive shisha smokers, who reported they did not smoke cigarettes because of health reasons.  
As it was seen that females are more comfortable smoking shisha compared to cigarettes, but are more likely to consider quitting than men, females should purposely be targeted in educational interventions.
3. The display of health warnings about the dangers of shisha should go beyond packages and be extended to the surface of shisha pipes or boldly displayed at locations where shisha is smoked. This will provide a platform for better informed choices for current and prospective shisha smokers.
4. The sale of shisha to minors as well as the use of minors to sell shisha should be prohibited in like manner as has been enforced for cigarettes.

## **6.2 Limitation Of Study:**

This study had the following limitation:

Though a better quantification of the amount of shisha smoked by participants could have been obtained from deriving the actual number of sessions they smoked per day, the Principal Investigator was limited to the use of “Number of Days Smoked” since many participants did not recollect how many sessions they had engaged in.



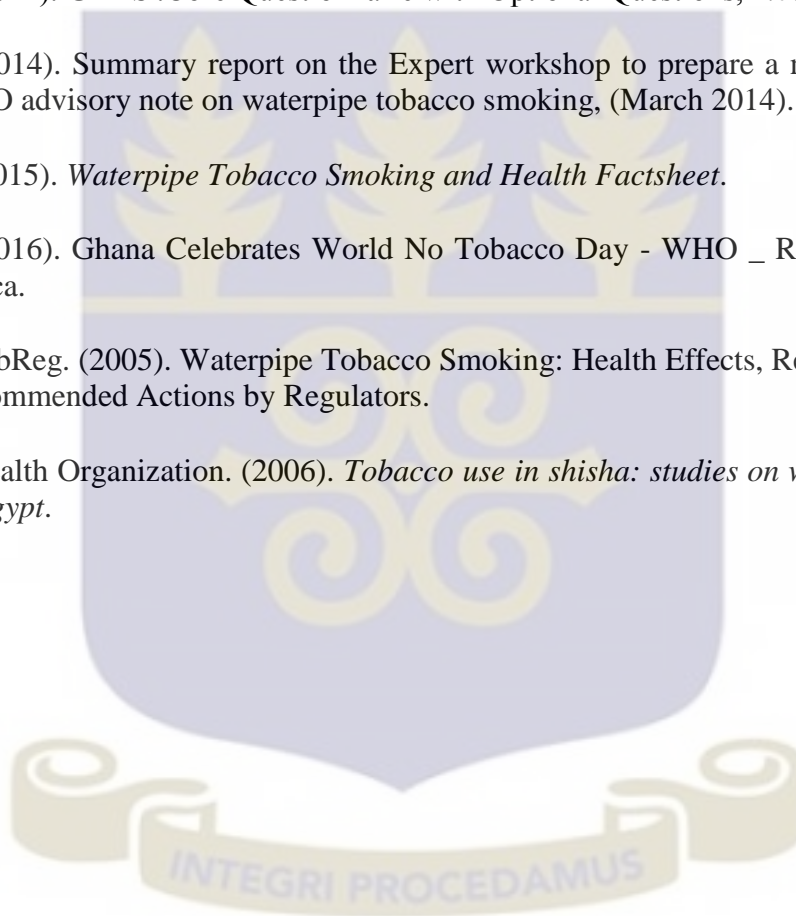
## REFERENCES

- Aljarrah, K., Ababneh, Z. Q., & Al-Delaimy, W. K. (2009). Perceptions of hookah smoking harmfulness: predictors and characteristics among current hookah users. *Tobacco Induced Diseases*, 5(1), 16. <http://doi.org/10.1186/1617-9625-5-16>
- Al-Naggar, R. a., & Bobryshev, Y. V. (2012). Shisha smoking and associated factors among medical students in Malaysia. *Asian Pacific Journal of Cancer Prevention*, 13(11), 5627–5632. <http://doi.org/10.7314/APJCP.2012.13.11.5627>
- AMA. (2011). Ghana Government e-services Portal. Retrieved May 20, 2016, from <http://www.eservices.gov.gh/AMA/SitePages/AMA-Home.aspx>
- Anjum, Q., Ahmed, F., & Ashfaq, T. (2008). Knowledge, attitude and perception of water pipe smoking (Shisha) among adolescents aged 14-19 years. *Journal of the Pakistan Medical Association*, 58, 312–317.
- ASH. (2013). ASH Fact Sheet on Waterpipes (Shisha), (October 2013), 1–5. Retrieved from [www.ash.org.uk](http://www.ash.org.uk)
- Badu, A. (2015). Alarm: Minors openly engaged in tobacco trade and use. Retrieved from <http://citifmonline.com/2015/09/15/alarm-minors-openly-engaged-in-tobacco-trade-and-use/>
- CDC. (2012). CDC - Fact Sheet - Hookahs - Smoking & Tobacco Use. *Centers for Disease Control*. Retrieved from [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/tobacco\\_industry/hookahs/](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/hookahs/)
- Chaouachi, K. (2009). Hookah (Shisha, Narghile) smoking and environmental tobacco smoke (ETS). A critical review of the relevant literature and the public health consequences. *International Journal of Environmental Research and Public Health*, 6(2), 798–843. <http://doi.org/10.3390/ijerph6020798>
- Chaouachi, K. (2011). More Rigor Needed in Systematic Reviews on “ Waterpipe ” ( Hookah , Narghile , Shisha ) Smoking, 12, 1250–1251. <http://doi.org/10.1378/chest.10-3237>
- Chaouachi, K., & Sajid, K. M. (2010). A critique of recent hypotheses on oral (and lung) cancer induced by water pipe (hookah, shisha, narghile) tobacco smoking. *Medical Hypotheses*, 74(5), 843–846. <http://doi.org/10.1016/j.mehy.2009.11.036>
- Daher, N., Saleh, R., Jaroudi, E., Sheheitli, H., Badr, T., Sepetdjian, E., ... Shihadeh, A. (2009). Comparison of carcinogen, carbon monoxide, and ultrafine particle emissions from narghile waterpipe and cigarette smoking: Sidestream smoke

- measurements and assessment of second-hand smoke emission factors. *Atmospheric Environment*, 44(1), 8–14. <http://doi.org/10.1016/j.atmosenv.2009.10.004>
- Daniels, K. E., & Roman, N. V. (2013). A descriptive study of the perceptions and behaviors of waterpipe use by university students in the Western Cape , South Africa, 1–5.
- Diab, O. Al., Abdelrahim, E. M. &, & Esmail, M. (2014). Effect of water pipe tobacco smoking on plasma high sensitivity C reactive protein level and endothelial function compared to cigarette smoking. *The Egyptian Heart Journal*, 67(3), 233–241. <http://doi.org/10.1016/j.ehj.2014.07.004>
- Explorable.com. (2009). Snowball Sampling - Chain Referral Sampling. *Sampling*. Retrieved from <https://explorable.com/snowball-sampling>
- Fakhreddine, H. M. B., Kanj, A. N., & Kanj, N. A. . (2014). The growing epidemic of water pipe smoking: Health effects and future needs. *Respiratory Medicine*, 108(9), 1241–1253. <http://doi.org/10.1016/j.rmed.2014.07.014>
- Fielder, R. L., Carey, K. B., & Carey, M. P. (2012). Prevalence, frequency, and initiation of hookah tobacco smoking among first-year female college students: A one-year longitudinal study. *Addictive Behaviors*, 37(2), 221–224. <http://doi.org/10.1016/j.addbeh.2011.10.001>
- Fromme, H., & Schober, W. (2014). Waterpipes and e-cigarettes: Impact of alternative smoking techniques on indoor air quality and health. *Atmospheric Environment*, 106, 429–441. <http://doi.org/10.1016/j.atmosenv.2014.08.030>
- GDHS. (2009). *Ghana Demographich and Health Survey 2008*. Accra.
- GDHS. (2014). *Ghana Demographic and Health Survey 2014*.
- Global Adult Tobacco Survey. (2011). Tobacco questions for surveys: A subset of key questions from the Global Adult Tobacco Survey (GATS), *2nd Editio*, 1–50.
- Hookah Company. (2014). All About Herbal Shisha - Hookah Company.
- Jawad, M., Abass, J., Hariri, A., Rajasooriar, K. G., Salmasi, H., Millett, C., & Hamilton, F. L. (2013). Waterpipe smoking : prevalence and attitudes among medical students in London, *17*(March 2012), 137–140.
- Jawad, M., Lee, J. T., & Millett, C. (2014). The Relationship between Waterpipe and Cigarette Smoking in Low and Middle Income Countries: Cross-Sectional Analysis of the Global Adult Tobacco Survey. *PLoS ONE*, 9(3), e93097. <http://doi.org/10.1371/journal.pone.0093097>

- Kakodkar, P. V., & Bansal, S. S. (2013). Hookah Smoking: Characteristics, behavior and perceptions of youth smokers in Pune, India. *Asian Pacific Journal of Cancer Prevention*, 14(7), 4319–4323. <http://doi.org/10.7314/APJCP.2013.14.7.4319>
- Kalsbeek, W. D., Bowling, J. M., Hsia, J., Mirza, S., Palipudi, K. M., & Asma, S. (2010). The Global Adult Tobacco Survey (GATS): Sample Design and Related Methods, 1–15. Retrieved from [papers://c0f50874-1acc-4627-879e-caecd2247efe/Paper/p711](http://papers://c0f50874-1acc-4627-879e-caecd2247efe/Paper/p711)
- Khater, a. E. M., Abd El-Aziz, N. S., Al-Sewaidan, H. a., & Chaouachi, K. (2008). Radiological hazards of Narghile (hookah, shisha, goza) smoking: activity concentrations and dose assessment. *Journal of Environmental Radioactivity*, 99(12), 1808–1814. <http://doi.org/10.1016/j.jenvrad.2008.07.005>
- Kumar, S. R., Davies, S., Weitzman, M., & Sherman, S. (2015). A review of air quality , biological indicators and health effects of second-hand waterpipe smoke exposure. <http://doi.org/10.1136/tobaccocontrol-2014-052038>
- Maps of World. (2015). Capital of Ghana, Accra Map \_ Capital City of Ghana. Retrieved July 12, 2016, from <http://www.mapsofworld.com/ghana/accra.html>
- Martinasek, M. P., McDermott, R. J., & Martini, L. (2011). Waterpipe (Hookah) Tobacco Smoking among Youth. *Current Problems in Pediatric and Adolescent Health Care*, 41(2), 34–57. <http://doi.org/10.1016/j.cppeds.2010.10.001>
- Maziak, W. (2014). The Waterpipe : A New Way of Hooking Youth on Tobacco, 103–107. <http://doi.org/10.1111/j.1521-0391.2013.12073.x>
- Mbashiru, K. (2016). Tanzania Prime Minister Bans Shisha Smoking, Tells Off Dealers - allAfrica.
- Roditis, M. L., & Halpern-Felsher, B. (2015). Adolescents' Perceptions of Risks and Benefits of Conventional Cigarettes, E-cigarettes, and Marijuana: A Qualitative Analysis. *Journal of Adolescent Health*, 57(2), 179–185. <http://doi.org/10.1016/j.jadohealth.2015.04.002>
- Schubert, J., Hahn, J., Dettbarn, G., Seidel, A., Luch, A., & Schulz, T. G. (2011). Mainstream smoke of the waterpipe: Does this environmental matrix reveal as significant source of toxic compounds? *Toxicology Letters*, 205(3), 279–284. <http://doi.org/10.1016/j.toxlet.2011.06.017>
- Schubert, J., Luch, A., & Schulz, T. G. (2013). Waterpipe smoking: Analysis of the aroma profile of flavored waterpipe tobaccos. *Talanta*, 115, 665–674. <http://doi.org/10.1016/j.talanta.2013.06.022>

- Smith-simone, S., Maziak, W., Ward, K. D., & Eissenberg, T. (2008). Waterpipe tobacco smoking : Knowledge , attitudes , beliefs , and behavior in two U . S . samples, *10*(2), 393–398. <http://doi.org/10.1080/14622200701825023>
- Sugathan, S., Dagher, O. and Swaysi, M. (2010). Socio-Economic Correlates Of Shisha Or Waterpipe Smoking In Misurata , Libya . *The Internet Journal of Epidemiology*, *9*(2), 1–5.
- Tobacco Reporter. (2013). Shisha smoking forbidden for Muslims.
- WHO. (2012). GYTS :Core Questionnaire with Optional Questions, *1.0*.
- WHO. (2014). Summary report on the Expert workshop to prepare a new edition of the WHO advisory note on waterpipe tobacco smoking, (March 2014).
- WHO. (2015). *Waterpipe Tobacco Smoking and Health Factsheet*.
- WHO. (2016). Ghana Celebrates World No Tobacco Day - WHO \_ Regional Office for Africa.
- WHO-TobReg. (2005). Waterpipe Tobacco Smoking: Health Effects, Research Needs and Recommended Actions by Regulators.
- World Health Organization. (2006). *Tobacco use in shisha: studies on waterpipe smoking in Egypt*.



## APPENDICES

### APPENDIX I

#### INFORMED CONSENT FORM

Assessment of the Emerging Trend of Shisha Smoking in Accra Metropolis

##### **Institution affiliation**

Department Of Biological, Environmental and Occupational Health: School of Public Health, College of Health Sciences, University of Ghana, Legon.

##### **Background**

Dear participant, my name is Jeffrey Martin Ashiamah. I am a student from the School of Public Health, University of Ghana. I am conducting a study on the Emerging Trend of Shisha Smoking in Accra. The purpose of this study is to assess the characteristics of the shisha smoking population in selected areas in Accra. This study would be conducted from May to July 2016 and study participants would include both male and female shisha smokers in the Accra Metropolis.

##### **Procedure**

Study participants will be asked to answer questions from a questionnaire about their demographic characteristics, smoking behaviour, their perceptions and knowledge on health risks of shisha smoking. This will take about 15 minutes. Your participation in this study will be appreciated. This is purely an academic research which forms part of my work for the award of a Master's degree.

##### **Risks and Benefits**

The procedure will not cause any discomfort to participants. The results of the study will provide evidence and guidelines for future policy interventions.

**Compensation/ Payment**

There are no incentives/ payment for participating in this study.

**Right to refuse**

Participation in this study is voluntary and you can choose not to answer any individual question or all questions. You are at liberty to withdraw from the study at any time. However, I will encourage your full participation since your response is important.

**Anonymity and confidentiality**

I would like to assure you that whatever information you will provide will be taken in strict confidence and will be used purely for research purposes. Your responses will not be shared with anybody who is not part of the study team.

If you have questions you may contact The Principal Investigator; Jeffrey Martin Ashiamah on 0243 459 373 OR

The Administrator, Ghana Health Services Ethical Review Committee; Dr. Hannah Frimpong on 0302 681 109

**Consent**

I ....., declare that I have read the foregoing information, or it has been read to me. The purpose, procedures risks and benefits of the study have been thoroughly explained to me and I have understood. I have also had the opportunity to ask questions about it and any question I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand that I have the right to withdraw from the study at any time.

I hereby agree to answer the questionnaire

Signature of participant.....Date ...../...../.....

**If the respondent cannot read the form themselves a witness must sign here:**

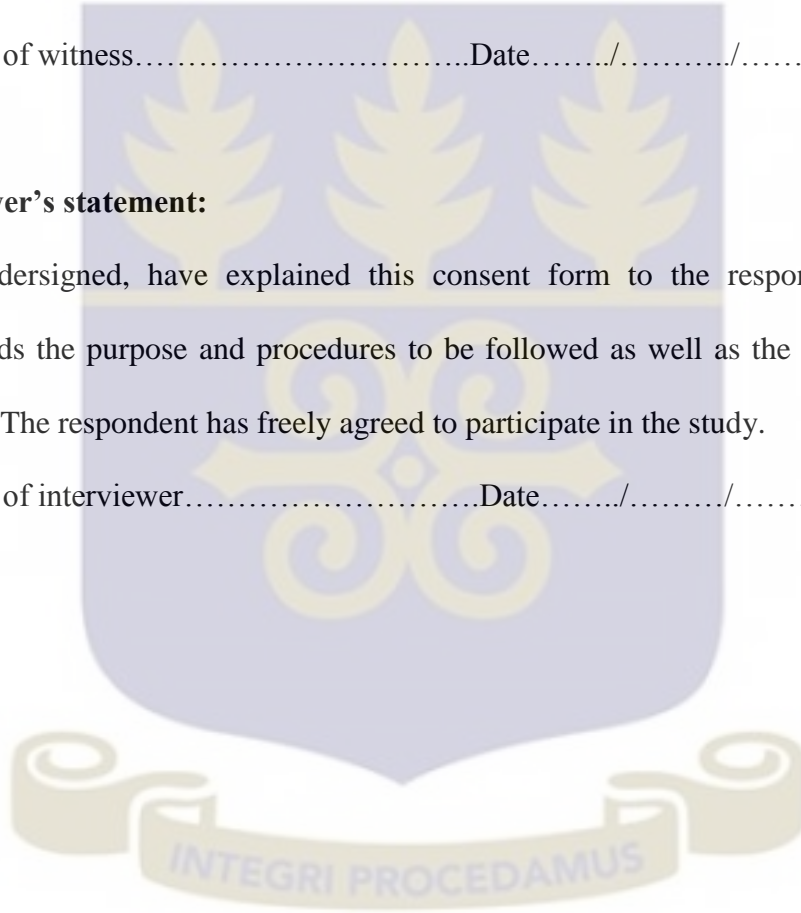
I was present while the benefits risks and procedures were read to the respondent. All questions were answered and the volunteer has agreed to take part in the research

Signature of witness.....Date...../...../.....

**Interviewer's statement:**

I, the undersigned, have explained this consent form to the respondent and he/she understands the purpose and procedures to be followed as well as the risks and benefits involved. The respondent has freely agreed to participate in the study.

Signature of interviewer.....Date...../...../.....



**APPENDIX II**

**QUESTIONNAIRE**

**ASSESSMENT OF THE EMERGING TREND OF SHISHA SMOKING IN ACCRA METROPOLIS**

**QUESTIONNAIRE ID:**

**Participant Characteristics**

1. Age .....
2. Sex: i. Male [  ] ii. Female [  ]
3. Nationality.....
4. Religion .....
5. Marital status? i. Single [  ] ii. Married [  ] iii. Divorced [  ] iv. Other (Please specify).....
6. Where do you live? .....
7. Employment Status: i. Employed [  ] ii. Unemployed [  ]
8. Level of education  
i. None [  ] ii Primary [  ] iii. Secondary [  ] iv. Undergraduate [  ] v. Post-graduate [  ]

**Smoking Behaviour**

9. Have you smoked shisha in the last 30 days?  
i. Yes [  ] ii. No [  ]
10. If yes, was this your first time?  
i. Yes [  ] ii. No [  ]
11. What type of shisha do you smoke?  
i. Moassel [  ] ii. Jurak [  ] iii. Tumpak (ajami) [  ] iv. Herbal shisha [  ]
12. Do you know the constituents of the shisha you smoke?  
i. Yes [  ] ii. No [  ]

13. If yes, please give examples .....

14. What type of liquid was used in the “bowl” of the shisha that you smoked?

i. Water [ ] ii. Alcohol [ ] iii. Other [ ] iv. Don't know [ ]

15. Do you smoke cigarettes?

i. Yes [ ] ii. No [ ] iii. I used to smoke cigarettes, but I quit [ ]

16. How old were you when you first tried smoking shisha? .....

17. During the past 30 days, on how many days did you smoke shisha?

.....

18. Please think about the days you smoked shisha during the past 30 days. How many smoking sessions did you usually participate in per day? .....

19. The last time you smoked shisha during the past 30 days, where did you smoke it?

i. Home [ ] ii. Coffee shop [ ] iii. Restaurant [ ] iv. Bar/club [ ] vi. Beach [ ] v.

Other [ ]

20. During the past 12 months, did you ever try to stop smoking shisha?

i. Yes [ ] ii. No [ ] iii. Not applicable [ ]

21. Would you consider quitting smoking shisha in the near future?

i. Yes [ ] ii. No [ ] iii. Maybe [ ]

### **Influencing Factors of shisha smoking**

22. Where did you first hear about or see shisha?

i. From a friend [ ] ii. From the news [ ] iii. At the bar/club iv. From a family member [ ] v. At the beach [ ] vi. Other [ ]

23. Why do you smoke shisha? (Please choose all that apply)

- i. I like the sweet smell [ ] ii. It helps keep me calm [ ] iii. It is fashionable to smoke shisha [ ] iv. It is a cultural thing to do [ ] v. It helps me fit in when with friends [ ] vi. It is cheaper than cigarettes [ ] vii. It helps deal with stress [ ] viii. It makes one more attractive [ ] ix. Boredom [ ] x. It is a habit [ ] xi. The design of the shisha pipe makes it attractive [ ] xii. I like the taste [ ] xiii. I like the bubbly sound [ ]

24. If your answer to question (15) above was no, why do you not smoke cigarettes?

- i. It is bad for health [ ] ii. I don't want to lose my looks [ ] iii. Cigarettes are expensive [ ] iv. I used to smoke but stopped because of health problems [ ] vi. Never got the chance to try it out [ ] v. No reason [ ]

25. What is your favorite shisha flavour?

- i. Any flavour [ ] ii. Apple [ ] iii. Coconut [ ] iv. Strawberry [ ] v. Mint [ ] vi. Other [ ]

26. Does anyone in your family smoke shisha?

- i. No [ ] ii. Yes, mother [ ] iii. Yes, father [ ] iv. Yes, brother [ ] v. Yes, sister [ ] vi. Other .....

27. How soon after you smoke shisha, do you start to feel a strong desire to smoke again that is hard to ignore? .....

28. Would you recommend shisha to a friend?

- i. Yes [ ] ii. No [ ] iii. Don't know [ ]

29. Do you think smoking shisha is more socially acceptable compared to cigarettes?

- i. Yes [ ] ii. No [ ] iii. Don't know [ ]

30. Do you think females are more comfortable smoking shisha compared to cigarettes?

- i. Yes [ ] ii. No [ ] iii. Don't know [ ]

31. Would you prefer smoking shisha alone or sharing it with someone?  
.....

32. Have you ever received help or advice to make you stop smoking?

- i. Yes, from a program/health professional [ ] ii. Yes, from a friend [ ] iii. Yes, from a family member [ ] v. Yes, from both programs or health professionals and from friends or family members [ ] vi. No [ ]

### **Health Perceptions of Shisha Smoking**

33. Do you think the smoke from other people's shisha smoking may be harmful to you?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

34. During the past 30 days, did you see any health warnings on shisha packages?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

35. Once someone has started smoking shisha, do you think it would be difficult for them to quit?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

36. Do you think shisha is safer than cigarettes?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

37. Do you think smoking shisha will present any future health risks?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

38. Do you think the liquid (e.g. water) in the "bowl" removes toxic products in shisha?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

39. Have you noticed any changes in your health since you started smoking shisha?

- i. Yes [ ] ii. No [ ] iii. Not sure [ ]

40. If yes, Please specify .....

**Knowledge about Shisha**

*Please respond “Yes”, “No” or “Don’t know” to the questions below:*

41. Shisha contains tobacco?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

42. Shisha smoke contains Carbon Monoxide?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

43. Shisha smoking has been linked with High blood pressure?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

44. Shisha smoking has been linked with Lung disease?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

45. Shisha smoking has been linked with Cancer?

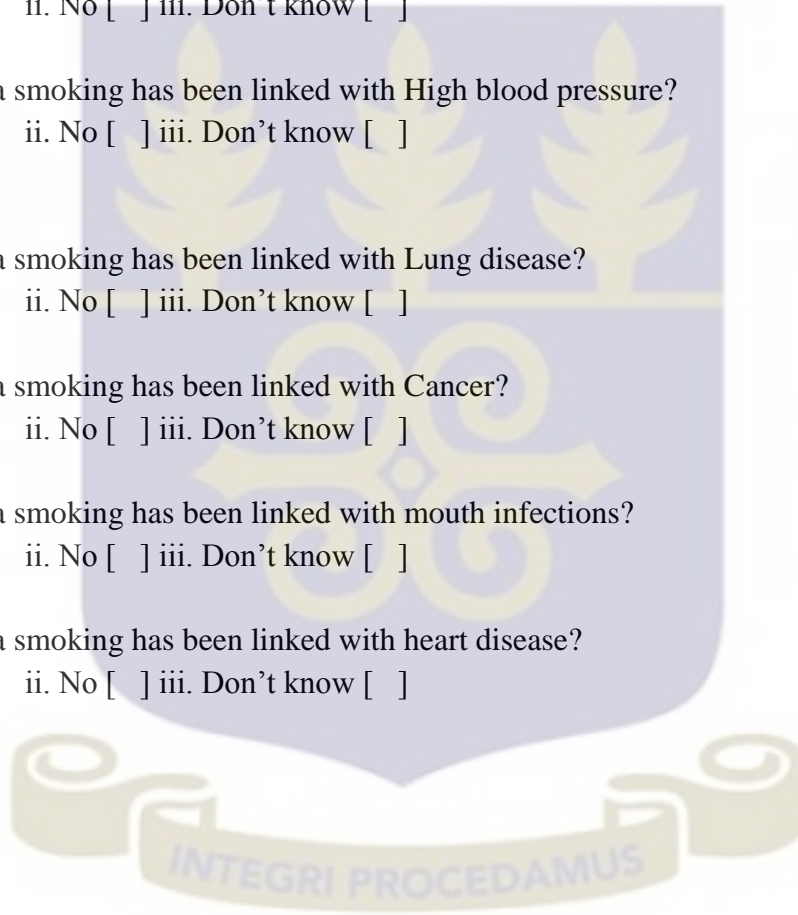
i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

46. Shisha smoking has been linked with mouth infections?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

47. Shisha smoking has been linked with heart disease?

i. Yes [ ] ii. No [ ] iii. Don’t know [ ]

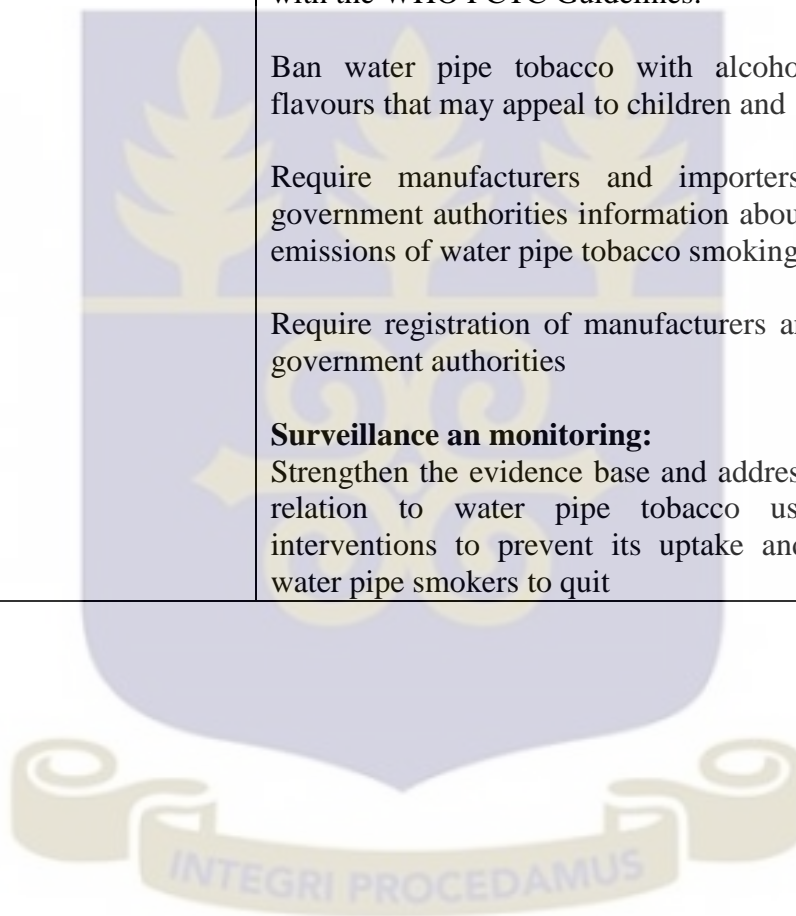


**APPENDIX III**

**SPECIFIC ACTIONS THE WHO RECOMMENDS ON WATER PIPE SMOKING**

<b>WHO FCTC Article</b>	<b>Specific Policy Recommendations for water pipes</b>
<b>Article 5</b>	<b>General Obligations:</b> Proactively incorporate all forms of tobacco use in tobacco control policies and ensure that water pipe specific stipulations are included in legislation in countries with a high or increasing prevalence
<b>Article 5.3</b>	<b>Protection from vested commercial interests:</b> Prohibit the tobacco industry, its allies and front groups to act as a legitimate public health partner or stakeholder while it continues to profit from tobacco and its products or to represent its interests, regardless of the role it plays in the production, distribution and sale of water pipes and water pipe products
<b>Article 6</b>	<b>Price and tax measures to reduce the demand for tobacco:</b> Use both tax and price measures to increase prices of water pipe tobacco and water pipe products
<b>Article 8</b>	<b>Protection from exposure to tobacco smoke:</b> Expand clean indoor air policies to incorporate the prevention of second hand smoke exposure from water pipes, including at water pipe cafes or lounges
<b>Articles 9 and 10</b>	<b>Regulation of the contents of tobacco products and tobacco product disclosures:</b> Require the testing and reporting of tobacco contents and emissions from water pipe
<b>Article 11</b>	<b>Health claims:</b> Prohibit any misleading health claims on water pipe tobacco packaging and all water pipe parts and accessories  <b>Health warnings:</b> Mandate health warning labels on water pipe tobacco, product packaging and water pipes themselves in line with Article 11 of the WHO FCTC.
<b>Article 12</b>	<b>Education, awareness and training:</b> Raise awareness regarding the health dangers of water pipe tobacco smoking, and include water pipe-specific education and training in wider tobacco education and public awareness programmes.
<b>Article 14</b>	<b>Demand reduction measures concerning tobacco dependence and cessation:</b> Address water pipe tobacco smoking in cessation and

	treatment programmes for tobacco dependence.
<b>Article 15</b>	<b>Illicit trade in tobacco products:</b> Include water pipe tobacco in legislation and measures prohibiting illicit trade in tobacco
<b>Article 16</b>	<b>Sales to and by minors:</b> Prohibit sales of all tobacco, including water pipe tobacco, to minors. Water pipe venues should not be an exception to this legislation
<b>Additionally</b>	<p><b>Product design and information:</b> Regulate water pipes and water pipe products consistent with the WHO FCTC Guidelines.</p> <p>Ban water pipe tobacco with alcohol and sweet-like flavours that may appeal to children and young people</p> <p>Require manufacturers and importers to disclose to government authorities information about the contents and emissions of water pipe tobacco smoking.</p> <p>Require registration of manufacturers and importers with government authorities</p> <p><b>Surveillance and monitoring:</b> Strengthen the evidence base and address the data gaps in relation to water pipe tobacco use and effective interventions to prevent its uptake and to help current water pipe smokers to quit</p>



**APPENDIX IV**

**ETHICAL APPROVAL**

**GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE**

*In case of reply the  
number and date of this  
Letter should be quoted.*

*My Ref. GHS/RDD/ERC/Admin/App  
Your Ref. No.*



Research & Development Division  
Ghana Health Service  
P. O. Box MB 190  
Accra  
Tel: +233-302-681109  
Fax + 233-302-685424  
Email: [Hannah.Frimpong@ghsmail.org](mailto:Hannah.Frimpong@ghsmail.org)

4<sup>th</sup> March, 2016

Jeffrey Martin Ashiamah  
University of Ghana  
School of Public Health  
Legon, Accra

**ETHICS APPROVAL - ID NO: GHS-ERC: 25/12/15**

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

**“Assessment of the Emerging Trend of Shisha Smoking in Accra Metropolis”**

This approval requires that you submit yearly review of the protocol to the Committee and a final full review to the Ethics Review Committee (ERC) on completion of the study. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.

You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

Please note that this approval is given for a period of 12 months, beginning 4<sup>th</sup> March, 2016 to 3<sup>rd</sup> March, 2017. However, you are required to request for renewal of your study if it lasts for more than 12 months.

Please always quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....

A handwritten signature in black ink, appearing to read 'Moses Aikins', is written over a dotted line.

PROFESSOR MOSES AIKINS  
(GHS-ERC VICE-CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

APPENDIX V

FDA COMMUNICATION LETTER



Food and Drugs  
Authority

Head Office  
P. O. Box CT 2783,  
Cantonments, Accra-Ghana  
Tel: (+233-302)233200, 235100  
Fax: (+233-302)229794, 225502  
Email: [fda@fdaghana.gov.gh](mailto:fda@fdaghana.gov.gh)

FDA/DRID/TSA/TOU/16/5041

20<sup>th</sup> July 2016

Jeffrey Martin Ashiamah  
School of Public Health  
University of Ghana

Dear Jeffrey Martin Ashiamah,

**RE: REQUEST FOR INFORMATION TO ASSIST PROJECT ON SHISHA SMOKING IN ACCRA**

This is to acknowledge receipt of your letter dated 22<sup>nd</sup> June, 2016 in which you requested for information on Shisha smoking.

Shisha is a tobacco product usually flavoured with molasses, honey, fruit pulp or dried fruit and is smoked in a hookah or waterpipe. Shisha smoking is an emerging trend of tobacco use in Ghana and the Food and Drugs Authority (FDA) regulates it as such using all provisions stated in Part six (6) of the Public Health Act 2012 (Act 851) and the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC).

The FDA regards shisha smoking as a threat to public health and safety because it has no safe form of use, just as any other tobacco and tobacco products and hence the Authority is committed to the performance of its mandate to regulate it as required by law.

Reports from nocturnal monitoring conducted by the FDA on tobacco and tobacco products non compliances in the Greater Accra Region, from November to December 2015, showed that twenty percent (20%) of facilities visited operate Shisha services on regular basis. This was found to be significant enough to intensify regulation on tobacco including shisha.

You may call at the FDA's Tobacco and Substances of Abuse Department (TSAD) at the Head Office, Shiashie, Accra, for further information or clarification.

Yours Sincerely,

  
for  
HUDU MOGTARI  
CHIEF EXECUTIVE OFFICER