PREVALENCE OF MOUTH PIPETTING OF PETROL AND KNOWLEDGE OF ASSOCIATED HEALTH HAZARDS AMONG AUTOMOBILE MECHANICS IN LOKOJA LOCAL GOVERNMENT AREA OF KOGI STATE

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DEDICATION

This research work is dedicated to the Almighty God for His sufficient grace and protection upon my life and for making me see the end of work He started, to my big sister, Mrs Helen Mathias, for her financial and spiritual support throughout the duration of this programme.

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ABSTRACT

Mouth pipetting of petrol has been associated with accidental aspiration of petrol in the mouth and subsequent accidental drinking especially among occupationally exposed workers. Few studies have reported cases of lead poisoning and deaths from ingestion and inhalation of petrol among automobile mechanics in Nigeria. This study, therefore, investigated the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja local government area, Kogi State.

The study was descriptive cross-sectional study that used three – stage sampling techniques to select 422 automobile mechanics in Lokoja local government, Kogi State. A validated semi-structured questionnaire which comprises a 20-point knowledge scale, 9-point practice scale, questions relating to prevalence of practice of mouth pipetting of petrol, knowledge of associated hazards, factors contributing to mouth pipetting and preventive practices for avoiding petrol inhalation and accidental drinking was used to collect quantitative data. Knowledge scores ≤5, >6-10 and >11 were classified as poor, fair and good respectively. Practice scores ≤2, >3-5, >6 were arranged as poor, average and high respectively. Descriptive statistics and chi-square test were used for data analysis with p=0.05.

Respondents' mean age was 35.9±11.1 years. 53.3% were Christians and 74.2% were married. All respondents were males 100% and 44.2% completed primary education. Most of the respondents 26.3% were Yoruba. Most, 97.4% said they have mouth pipetted petrol before. Mean knowledge score was 1.3±0.5; respondents with poor, fair and good knowledge of health hazards were 75.6%, 20.6% and 3.8% respectively. Most respondents 57.8% mentioned eye irritation as a health hazard associated with petrol ingestion. 58.6% believed sucking of petrol is not dangerous to their health. Only 11.2% agreed that lead poisoning is associated with drinking and inhalation of petrol. Though, 37.1% reported that death due to circulatory failure is associated with ingestion of petrol and 87.8% reported personal observation of the reaction of petrol when ingested as source of information. Majority 89.4% considered lack of knowledge of associated health hazards as the major factor promoting the practice of mouth pipetting of petrol. But, 94% and 92.6% believed that conducting training on work safety and awareness creation on health hazard associated with petrol inhalation

and drinking respectively can help them stop mouth pipetting of petrol. Mean practice score was 1.3±0.5; respondents with poor, average and high preventive practice were 67.3%, 28.4% and 3.3%. Few 11.1% have ever reported any incidence of accidental drinking of petrol to a health provider. Most 95.5%, 97.1% and 73.4% believed that the use of nose cover, goggle and apron are not meant for them. Only 17% always go for regular medical check-ups. Overall, 92.1% said they always wash their hands before eating and 62.4% always wear safety boot during working periods.

The study shows knowledge of health hazards associated with mouth pipetting of petrol and preventive practices for avoiding petrol inhalation and drinking were poor. Therefore, awareness creation and training programmes should be organized for automobile mechanics to help increase their knowledge and to acquire new skills that can improve their total wellbeing.

Keywords: Mouth pipetting of petrol, automobile mechanics, health hazards, prevalence, practice, knowledge, petrol inhalation and drinking

Word counts: 500

CERTIFICATION

I certify that this work was carried out by me, AMEH, Stephen Audu in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.

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ACRONYMS AND MEANING

ACRONYMS	MEANING
ATSDR:	Agency for Toxic Substances and Disease Registry
CDC:	Centre for Disease Control
CNS:	Central Nervous System
CVD:	Cardiovascular Diseases
GID:	Gastrointestinal Disease
ISEE:	International Society for Environmental Epidemiology
MCH:	Mean Cell Haemoglobin
NATA:	Nigeria Automobile Technicians Association
NCD:	Non-communicable Diseases
NIOSH:	National Institute for Occupational Safety and Health
NNPC:	Nigerian National Petroleum Corporation
NTP:	National Toxicology Program
PCV:	Parked Cell Volume
PPE:	Personal Protective Equipment
PEP:	Post Exposure Prophylasis
RBC:	Red Blood Cell
UN:	United Nation
WHO:	World Health Organisation

DEFINITION OF TERMS

Mouth Pipetting

Mouth pipetting is define according to the author of Dark Daily (Michel, 2013) as a process of using one's mouth to suck a desired volume of a medical laboratory specimen–blood, urine, cell cultures and other microbial stews–into an open-ended tube, using the reduced air pressure created by sucking to hold the specimen in place while moving it to another vessel (Kreston, 2013)

Automobile Mechanics

An automobile mechanic is a mechanic with a variety of car makes or in a specific make of car. In repairing cars, their main role is to diagnose the problem accurately and quickly; they often have to quote price for their customers before commencing work or after partial disassembly for inspection. The mechanic uses both electronic means of gathering data as well as their senses. Their job may involve the repair of a specific part or the replacement of one or more parts as assembly.

Petrol

Petrol (gasoline, premium motor spirit, leaded petrol, fuel etc) is a complex manufactured mixture that does not exist naturally in the environment. Chemicals that are in petrol are generally present in several physical states (gaseous, liquid or others) in human settlements (Ajugwo, 2014). Petrol is produced from petroleum in the refining process. Other synonyms for petrol include; gasoline, leaded petrol, motor spirit, gas etc)

Heavy Metals

A heavy metal is defined as any metallic chemical element that has a high density and is toxic, or poisonous at lower concentrations. One of the toxic metallic chemical elements is lead.

Leaded Petrol

Leaded petrol is gasoline (petrol) treated with a lead compound to reduce motor engine knocks. Upon the combustion of the leaded petrol in the engine, the organic lead is oxidized to lead oxide i.e. $2Pb\ (C_2H_5)4 + 27O_2 \rightarrow 2PbO + 16CO_2 + 20H_2O$ (1)

The lead oxide formed reacts with the halogen carriers to form lead halides like PbCl2, PbBr2, or PbClBr, which escape in to the air through vehicles exhaust pipes. Lead damages the kidneys, brain, blood (it enters the red blood cells), muscles and

bones. Symptoms of Lead toxicity may include chronic kidney disease, hypertension, encephalopathy, anaemia, gout, sterility, abortion, fatigue, irritability, hyperactivity, memory loss, decreased sensory and motor reaction times, and abdominal pain (Orisakwe, 2009; Udonwa, 2009).

Lead Poisoning

Lead poisoning, or plumbism, is defined as a toxic condition caused by the ingestion or inhalation of the metallic element lead, which is found in many places, including the air, soil, water, houses, ceramic cookware, leaded petrol and solder used in metal cans and pipes. Lead poisoning occurs when blood lead levels are equal to or greater than 10 μg/dl (*micrograms per deciliter*).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Mouth pipetting is a practice of using one's mouth to suck a desired volume of a medical laboratory specimen such as blood, urine, cell cultures and other microbial stews–into an open-ended tube, using the reduced air pressure created by sucking to hold the specimen in place while moving it to another vessel (Kreston, 2013). This practice has its origin from the early chemistry, biological and medical scientists who were involved in the laboratory experiments (Michel, 2013). It is a process in which a desired volume of specimen is transferred from one container (laboratory equipment such as a conical flask) to another e.g beaker in the science laboratory. The idea of mouth pipetting had soon been transferred to other liquid substances like water, kerosene and petrol. Mouth pipetting has been associated with accidental aspiration of fluid in the mouth and subsequent accidental drinking.

Mouth pipetting is common among automobile-mechanics (Udonwa et al., 2009) who are considered at risk of heavy metal poisoning, particularly by lead (Pb) which is a common additive in fuel (Chilcott, 2011). Lead in petrol ingested as a result of accidental aspiration of petrol into the mouth during mouth pipetting gets absorbed into the bloodstream and the harmful effects of lead poisoning have severally been reported to result in fatalities based on acute exposures while chronic overexposure causes severe damage to the haematopoietic, nervous, cardiovascular, urinary, and reproductive systems (Needleman, 1999).

Lead (Pb) is a highly toxic metal with no known physiological benefits and is a ubiquitous pollutant in the ecosystem as a result of its natural occurrence and its industrial use. Mankind has used lead for over 6,000 years. Lead's toxicity was recognized and recorded as early as 2000 BC and the widespread use of lead has been a cause of endemic chronic plumbism in several societies throughout history.

Lead is a toxic metal whose widespread use has caused extensive health problems in many parts of the world. It is a cumulative toxicant that affects multiple body systems, including the neurological, haematological, gastrointestinal, cardiovascular and renal systems. Lead exposure is estimated to account for 0.6% of the global burden of disease, with the highest burden in developing regions (World Health Organisation, 2004). Recent reductions in the use of lead in petrol (gasoline) in the developed countries have resulted

in substantial reductions in lead levels in the blood in those countries. However, significant sources of exposure to lead still remain, particularly in developing countries. It has been estimated that lead exposure was responsible, in 2004, for 143 000 deaths (WHO, 2010)

Lead in the body is distributed to the brain, liver, kidney and bones. It is stored in the teeth and bones, where it accumulates over time. Human exposure can be accessed directly through measurement of lead in blood, teeth or bones (bone and tooth lead reflect cumulative exposure).

Lead poisoning has been described as pandemic by International Society for Environmental Epidemiology (ISEE). Globally, there are an estimated 674,000 deaths annually attributed to lead exposure, including many from cardiovascular diseases (Lim, 2012, World Health Organization, 2013a). Lead is an established risk factor for hypertension and chronic renal failure, and a potential risk factor for cognitive decline in adults (National Toxicology Program, 2012; Ekong, 2006, Bellinger, 2011). Lead is also a risk factor for spontaneous abortion, fetal death and reduced birth weight (Borja-Aburto et al, 1999 Edwards, 2014; Zhu, 2010). As reported in a study conducted in Kenya, Lead has also been found to be dangerous to the health of occupationally exposed workers such as automobile mechanics which are involved in car services and repairs (Ashraph, 2013).

Apart from lead, petrol also contains several chemical components that are toxic which include; benzene, xylene, toluene, butadiene etc. Toxicity of each of this individual chemical components vary depending on their vapour concentrations, and as toxic substances they are poisonous to health. For example, xylene causes health effects from both acute (<14 days) and also chronic (>365 days) exposure. The type and severity of health effects depends on several factors, including the amount of chemical you are exposed to and the length of time you exposed for. Individuals also react differently to different levels of exposure (ATSDR, 1993).

In a survey conducted to investigate the potential risk of exposure to premium motor spirit (petrol) fumes in Calabar, Nigeria, among automobile mechanics, petrol station attendants and the general population, in which venous blood was taken for methaemoglobin (MetHb) and packed cells volume (PCV), Udonwa, et al, (2009) reported that mean MetHb value was higher in automobile mechanics (7.3%) than in the subjects from the general population (2.7%) and the increase was attributed to benzene exposure. They opined that few studies have reported haematological disorders associated

with the exposure to benzene in the environment in less developed countries. However, there is evidence about health effects linked with low dose exposures to volatile organics including benzene in petrol.

Benzene is acutely toxic by inhalation, causing mucous membrane irritation, neurological and other symptoms due to respiratory failure. Chronic exposure has been reported to result in bone marrow depression, aplasia and leukaemia, cardiac abnormalities, heart attack, and other cancers of the lung, brain and stomach. Following inhalation, benzene vapour is rapidly absorbed into the blood and distributed throughout the body. The study suggested increased exposure to petrol fumes among automobile mechanics, and methaemoglobin MetHb taken as a useful biomarker in determining the level of exposure to benzene in petrol vapour.

Automobile mechanics constitute a significant part of the Nigerian informal workforce with majority of them lacking access to credit, proper equipments, education, training and good working conditions. In an attempt to be resourceful they improvise primitive work processes like mouth pipetting of petrol oblivious of the consequential detrimental health effects. In spite of the high occupational risk of automobile mechanics in Nigeria, there is paucity of data regarding practice of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics. The goal of this study is to investigate the prevalence of practice of mouth pipetting of petrol and the knowledge of associated health hazards among automobile mechanics in Lokoja local government of Kogi State, Nigeria.

1.2 Statement of the Problem

Occupational exposure to lead is common among automobile mechanics and constitutes 0.9% of global health burden with a majority of cases in developing countries (Abdulsalam, et al, 2015), and automobile mechanics are commonly found in Nigeria. The automobile mechanic does routine maintenance and repair of motor vehicles. The automobile mechanics are commonly exposed to petrol by sucking with their mouth through a tube in an attempt to siphon petrol from the vehicle tank. In the process automobile mechanics inhale and have skin/eye contact with petrol and also they are at risk of ingesting the petrol (Udonwa, 2009).

Automobile mechanics were also reported to suck petrol and use it to wash hands and this leads to absorption of tetraethyl lead through mucosa, and this, with inorganic lead from

exhaust fumes, may lead to elevated blood levels (Oluwagbemi, 2007). In certain areas where the habit of feeding with bare hands and poor personal hygiene exists, the contaminated hands and mouths of automobile mechanics are also important sources of occupational lead poisoning. It is also known that some of these workers who consume their meals in the workshops are greatly exposed to lead (Karita, Nakao, & Ohwaki, 2005). Exposure among workers can also occur through the habit of chewing of lead containing connective wires. Lead poisoning of high magnitude arises from occupational exposures probably due to high gasoline lead (Ayoola, 1979). Thus, the lead absorbed in the course of occupational exposure is superimposed on lead absorbed from other means.

Automobile re-fueling and repairs are reasonable sources of lead exposure among automobile mechanics in Nigeria. This raises serious public health concern. These classes of workers are seldom subjected to pre-employment medical examination or provided with regular medical checkups to detect potential serious risk the exposure may have (Udonwa, 2009).

Abdulsalam, et al (2015) also found that lead intoxication or poisoning occurs when people are exposed to lead or chemicals that contain lead. Occupational exposures to lead usually occur through breathing in air that contains lead particles and sometimes by direct ingestion. There have been reported cases of lead poisoning and deaths from ingestion and inhalation of gasoline among mechanics (Oluwagbemi, 2007).

The findings of few studies in Nigeria showed a strong association between exposure to lead and the prevalence of adverse health effects (Ayoola, 1979). Also, few studies have reported haematological disorders associated with the exposure to benzene in the environment in less developed countries. However, there is evidence about health effects linked with low dose exposures to volatile organics including benzene in petrol. Udonwa, et al (2009), explained that benzene is acutely toxic by inhalation, causing mucous membrane irritation, neurological and other symptoms due to respiratory failure. Chronic exposure has been reported to result in bone marrow depression, aplasia and leukaemia, cardiac abnormalities, heart attack, and other cancers of the lung, brain and stomach. Following inhalation, benzene vapour is rapidly absorbed into the blood and distributed throughout the body. The study suggested increased exposure to petrol fumes among

automobile mechanics. Therefore, exposure to any of the components of petrol could be dangerous to their health.

Consistent observations have also shown that occupational hazards associated with lead processing including long term inhalation of lead fumes from smelter, emissions, inhalation, or oral ingestion of lead dust and dermal absorption of dissolved organic lead could cause elevated blood lead levels (Abdulsalam, et al, 2015).

Generally, lead poisoning manifests as elevated blood lead levels and is particularly a problem among the socially and economically deprived persons. The magnitude of the problem is not known especially in developing countries. In adults, occupational exposure is the main cause of lead poisoning (International Labour Organization, 2012). These occupational exposures have adverse effects on their health and that of their families. Families of workers may also be exposed to higher levels of lead when workers bring home lead dust on their work cloths.

The effects of lead are the same irrespective of the route of entry. Lead intoxication is a slowly progressive condition which is difficult to detect but could manifest with nonspecific symptoms such as irritability, stomach ache, diarrhea, colic, distractibility, and lethargy according to Needleman (1999). The factors that determine the toxicity of lead to an individual include age, sex, dose, duration of exposure, mode of contact, diet, lifestyle, state of health, and other chemicals that one is exposed to. The frequency and severity of symptoms increase with the concentration of lead in the blood.

Anetor (2001) reported that in developing countries, there is dearth of information on lead poisoning, and this may perhaps be true of Nigeria as there are presently no national surveys of blood lead levels in the general population. However, there is overwhelming evidence that lead pollution is on the rise in Nigeria and the exposure routes are as varied as its toxicity (Anetor, 2001). Even though many African countries have outlawed leaded petrol, there is no assurance that leaded petrol is not still being sold in Nigeria. Leaded petrol and petroleum products may still be utilized by automobile technicians in their occupation. Therefore, exposures to lead in their workplace continue to be a significant public health problem.

Although several studies have been carried out on the effects of lead exposure and poisoning among children, adults (Getso, 2013), and other occupationally exposed

workers in many African countries according Ashraph et al, (2012), yet there have not been a well documented study on the population-based prevalence of mouth pipetting of petrol and knowledge of associated health hazards among this target group in Nigeria. This is why this study is aimed at investigating the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja, Kogi State, Nigeria.

1.3 Justification

There have been reported cases of lead poisoning and deaths from ingestion and inhalation of gasoline among mechanics (Oluwagbemi, 2007), yet evidence-based study on the prevalence of mouth pipetting of petrol and knowledge of associated health hazards has not been properly investigated, hence the need for this study.

More so, this study became very imperative at this stage of our national development because of the urgent need for intervention in the area. Several interventions have been carried out on prevention of some of the communicable and non-communicable diseases, but little or none in the area of lead poisoning prevention. This study shall provide the needed baseline data on the prevalence of practice of mouth pipetting of petrol and knowledge of its associated health hazards which will serve as an eye opener for project planners and development partners on the appropriate approach to employ in providing occupational preventive health programmes or intervention for automobile mechanics and other occupationally exposed workers. This study will also provide information that will help to facilitate the Phasing – out of leaded petrol programme in the country.

This study will be carried out to determine the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja local government area of Kogi State.

1.4 Research Questions

1. What is the prevalence of risk practice of mouth pipetting of petrol among automobile mechanics in Lokoja local government of Kogi State?
2. What is the level of knowledge of associated health hazards in mouth pipetting of Petrol among automobile mechanics?
3. What are the factors contributing to mouth pipetting of petrol by the respondents?
4. What are preventive practices for avoiding petrol inhalation and accidental drinking

1.5 Broad Objective

To investigate the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja Local Government Area, Kogi State

1.6 The Specific Objectives

1 To determine the prevalence of practice of mouth pipetting of petrol among automobile mechanics

2 To assess respondents' knowledge of associated health hazards of mouth pipetting of petrol

3 To identify the factors contributing to mouth pipetting of petrol among the target population

4 To identify preventive practices for avoiding petrol inhalation and accidental drinking

1.7 Hypotheses

Hypothesis 1: There is no significant association between the respondents' age, level of education, area of specialization and marital status and the knowledge of health hazards associated with petrol inhalation and drinking.

Hypothesis 2: There is no significant association between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the prevalence of mouth pipetting of petrol.

Hypothesis 3: There is no significant association between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the preventive practices for avoiding hazards associated with mouth pipetting.

1.8 Variables

The dependent variables include the prevalence of practice of mouth pipetting of petrol and knowledge of health-related hazards among automobile mechanics in Lokoja Local Government Area, Kogi State. The independent variables include the socio demographic variables: age, sex, religion, occupation, educational qualification, socioeconomic status.

CHAPTER TWO

LITERATURE REVIEW

Chapter two of this project presented the literature review on this study. It defined some of the basic concepts used in the work that provided us with the insight of the entire work. The chapter is presented under the following sections namely; Prevalence of Practice of mouth pipetting of petrol among automobile mechanics, Health hazards associated with petrol inhalation and drinking, Knowledge of associated hazards and prevention of mouth pipetting of petrol among automobile mechanics, Factors contributing to mouth pipetting of petrol among automobile mechanics and preventive practices for avoiding petrol inhalation and accidental drinking.

2.1. Prevalence of Practice of mouth pipetting of petrol among automobile mechanics

Although the prevalence of practice of mouth pipetting of petrol among automobile mechanics and the nature of the problem of petrol inhalation and accidental drinking will be dealt with later, a few general comments at this time might be worthwhile. For better understanding of the issue at hand, it is imperative to look at it from two different perspectives. From literature, it was discovered that there are intentional inhalers of petrol in the western countries abused (Waraich, Chavan, & Raj, 2003), hence the reason for the prevalence of practice is discussed based on; the intentional inhalation and unintentional inhalation.

Intentional Inhalation

Intentional inhalation of petrol or gasoline is prevalent in the western world because of the recreational purposes attached to it by the inhalers. Intentional inhalation of volatile solvents for recreational purpose is not a new phenomenon worldwide. Abuse of household and other commercially available products containing volatile organic solvents has been recognized since the early 1900s in Western countries. Products containing aliphatic and aromatic hydrocarbons (including glues, gasoline, paints, adhesives, varnishes, paint removers) and halogenated hydrocarbons (such as dry cleaning agents, spray paints, nail polish removers, typewriter correction fluids, aerosolized foods and propellants) are among common sources of volatile substances that are abused (Waraich et al, 2003). Experimentation with these agents among younger adolescents is a common practice seen globally in last decades.

Although the first case series of petrol inhalation dependence from India was published more than 25 years ago, (Mahal & Nair, 1978) there have been sporadic case reports (Das, Sharan, & Saxena, 1995; Pahwa, Baweja, Gupta, & Jiloha, 1998) and occasional case series (Waraich, et al, 2003) in recent years that suggest, in addition to other substances, the abuse of inhalant substances, particularly typewriter correction fluids, gasoline and other volatile hydrocarbons was reported to be increasing among adolescents and young adults attending de-addiction clinics in India. Also, it was discovered that, inhalant users coming to these clinics are predominantly socioeconomically deprived young males aged 10-18 years (the mean age of the nine gasoline inhalers reported from Baroda was 13.6 years, and that of other solvent abusers from Chandigarh was 11.4 years) These products are popular in adolescents in India because of peer influences, easily availability, legality, and rapid mood elevating effects (Waraich, et al, 2003).

Inhalant abuse has been widely reported in Western countries. Studies on the general population have yielded prevalence rates of 5–15% for young people as having used inhalants in the United States, 3–6% in Canada and 6–7% in the United Kingdom. Waraich, et al (2003) reported that in India, there is a comparative lack of data pertaining to inhalant abuse but now only a single case series and a few case reports have been reported (Das, et al, 1995; Mahal & Nair, 1978; Pahwa, et al, 1998).

The reason for the relative paucity of literature from India according to Waraich et al (2003) was attributed to a lack of awareness among mental health professionals. He said they fail to elicit information pertaining to solvent abuse/dependence in epidemiologic and clinic-based studies.

Apart from the United States, Canada, India and United Kingdom, other countries that have expressed special concerns include Mexico, a number of Central and South American nations, and many European and African countries. Reports from Japan and Sweden have described "thinner" problems among juveniles. Even the Australian aborigines (Norcombe, 1970) are not exempted from the practice.

Inhalants are widely available everywhere, and their abuse has become a significant public health problem, more so due to the lack of knowledge among the general population and even the medical fraternity regarding their abuse potential of which programme interventions such as appropriate school and training opportunities, education about petrol sniffing and effects, increased used of unleaded petrol, community and

family counseling program, legal sanctions against petrol sniffer, chelation therapy and residential treatment and rehabilitation were employed. These intervention programmes are divided into primary, secondary and tertiary interventions (d' Abbs, P and MacLean S, 2000).

Unintentional Inhalation

Unintentional inhalation just as the name implies is the petrol inhalation or drinking that is not deliberate. This type of inhalation happens by chance meaning that it is not done on purpose unlike the intentional inhalation that is prevalent and has been recognized as a significant public health issue in the western world. The unintentional inhalation is the most common petrol inhalation practice in Nigeria. However, there is paucity of data to ascertain the magnitude of the problem among automobile workers in the country.

According to Oluwagbemi (2007) automobile mechanics were reported to suck petrol and use it to wash hands and this leads to absorption of tetraethyl lead through mucosa, and this, with inorganic lead from exhaust fumes, may lead to elevated blood levels.

But before now, occupational lead poisoning has been a recognized health hazard for more than 2,000 years. Pliny the Elder (as far back as A.D. 23–79) wrote that workers painting ships with native ceruse (white lead) wore loose bags over their faces to avoid breathing of noxious dust (Oluwagbemi, 2007). Hippocrates in 370 B.C. attributed a severe case of colic in a worker who extracted metals to lead exposure. The characteristic features of lead toxicity, including anemia, colic, neuropathy, nephropathy, sterility, and coma, were also noted by Hippocrates.

The credit for the first undoubted account of clinical manifestations of lead poisoning is to Nikander who in the second century B.C. gave descriptions of pallor, colic, paralysis, and drooping limbs. George Baker established the link between abdominal colic (due to lead poisoning) and the "Devonshire colic" a symptom suffered by people of Devon (an area of Britain at that time) who drank cider made in presses that were lined with lead in the 18th century (Asuzu, 2001). Ramazzini described the dangers of poisoning from lead used by potters in their glaze (Mark & James, 2010). Hamilton investigated white lead employing careful and extensive use of hospital records to demonstrate the connection between specific illnesses and occupations and through investigation of factories to learn which industrial process used dangerous chemicals (Makokha, Mghweno, Magoha, Nakajugo, & Wekesa, 2008). The prevalence of lead poisoning in ancient times has been

adequately reported and it has been suggested that Rome actually fell because of the prevalence of lead poisoning in her citizens (NIOSH, 1997; CDC, 2014)). As far back as 1800s, there was an increasing recognition of hazards to health associated with lead. Historically, there was an epidemic of lead poisoning in an automobile industry in the United States of America as far back as 1924 (United States Department of Health and Human Services , 2007).

Generally, lead poisoning manifests as elevated blood lead levels and is particularly a problem among the socially and economically deprived persons (Abdulsalam, et al, 2015). The magnitude of the problem is not known especially in developing countries. In adults, occupational exposure is the main cause of lead poisoning (ILO, 2012). These occupational exposures have adverse effects on their health and the health of their families. Families of workers may also be exposed to higher levels of lead when workers bring home lead dust on their work cloths. There have been reported cases of lead poisoning and deaths from ingestion and inhalation of gasoline among mechanics (Oluwagbemi, 2007; Hareell, 2010; Fewtrell, Kaufmann, & Pruss-Ustun, 2003).

Automobile mechanics were also reported to suck petrol and use it to wash hands and this leads to absorption of tetraethyl lead through mucosa, and this, with inorganic lead from exhaust fumes, may lead to elevated blood levels (Oluwagbemi, 2007). In certain areas where the habit of feeding with bare hands and poor personal hygiene exists, the contaminated hands and mouths of automobile technicians are also important sources of occupational lead poisoning. It is also known that some of these workers who consume their meals in the workshops are greatly exposed to lead (Karita, Nakao, & Ohwaki, 2005). Exposure among workers can also occur through the habit of chewing of lead containing connective wires (Franco, Cottica, & Minoia, 1994). Lead poisoning of high magnitude arises from occupational exposures probably due to high gasoline lead (Ayoola, 1979). Thus, the lead absorbed in the course of occupational exposure is superimposed on lead absorbed from other means (Franco, Cottica, & Minoia, 1994).

According to Kreston (2013), mouth pipetting is seen as the practice of using one's mouth to suck a desired volume of a medical laboratory specimen–blood, urine, cell cultures and other microbial stews–into an open-ended tube, using the reduced air pressure created by sucking to hold the specimen in place while moving it to another vessel. She said that the

practice of mouth pipetting “was more than a common sight, it was a way of the lab,” as noted in her blog post.

However, while pipettes were designed originally for scientific experiments, the idea of mouth pipetting had soon been transferred to other liquid substances like water, kerosene and petrol. Therefore, in view of the fact that it has been confirmed that there are incidences of accidental aspiration in the laboratory due to mouth pipetting, we can also say here that same is applicable to pipetting of other chemical substances like petrol.

Mouth pipetting of petrol among automobile mechanics is usually done with the use of hose (plastic tube) to manually suck petrol from a gallon or jerry can to car tank or automobile machine and vice versa. Their basic principle is that the donor jerry can or gallon has to be higher than the recipient container. The higher, the better! It is also imperative to establish the fact that pipetting of petrol among automobile mechanic is carried out mostly at their automobile workshops during the car or machine repairing processes.

Although they seem be to dearth of information as regards to the prevalence of practice of mouth pipetting of petrol in Kogi State, and by extension Nigeria, the practice seems be at the high side during both festive seasons such as Christmas, Easter and Sallah periods when their customers would need services on the whole or some parts of their vehicles so as to put the vehicle in good condition in preparation for the journey during the festive period.

2.2. Route of Exposure to Petrol

1. Inhalation of Petrol

Inhalation is a common route of exposure to gasoline. Generally, gasoline's odour provides adequate warning of hazardous concentrations. The odour threshold is 0.025 ppm. Its vapours are heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas (Agency for Toxic Substances and Disease Registry (ATSDR), 2014).

2. Eye / Skin Contact

Gasoline vapours are mildly irritating to mucous membranes; however, gasoline splashed in the eyes can result in transient corneal injury. Repeated or prolonged skin contact with liquid gasoline can degrease the skin, causing irritation and dermatitis. First- and second-

degree skin burns can occur from continuous contact with liquid gasoline for several hours.

3. Ingestion of Petrol

Gasoline is not as readily absorbed from the gastrointestinal tract as from the respiratory tract. In adults, about 20 to 50 g can cause severe intoxication and 350g can result in death for a 70 kg individual (ATSDR, 2014). Symptoms of intoxication by accidental drinking of petrol can range from vomiting, vertigo, drowsiness and confusion to loss of consciousness, convulsions, haemorrhaging of the lungs and internal organs, and death due to circulatory failure (Oluwagbemi, 2007). Drinking of petrol can cause irritation to the gastrointestinal mucosa and can be complicated by pulmonary aspiration, resulting in chemical pneumonitis.

2.3 Health Effects of Gasoline Exposure

Exposure to petrol through unintentional inhalation and accidental drinking has several of its associated health hazards depending on the route of exposure and the degree of exposure (i.e. be it acute or chronic). Below are health hazards associated with petrol inhalation and drinking (ingestion) as published by the (ATSDR, 2014).

- Petrol is a mild skin, eye, and respiratory tract irritant. Drinking of petrol causes mild to severe irritation to the gastrointestinal mucosa; chemical pneumonitis is often severe. Systemic effects of petrol exposure are mainly a result of central nervous system (CNS) depression.
- Systemic effects can occur from all routes of exposure. Exposure to low concentrations may produce flushing of the face, staggering gait, slurred speech, and mental confusion. Higher concentrations may result in unconsciousness, coma, and possible death due to respiratory failure (Oluwagbemi, 2007).
- Petrol vapours can sensitize the myocardium which may result in ventricular fibrillation. Delayed effects may include hemorrhage of the pancreas and fatty degeneration of the liver and of the proximal convoluted tubules and glomeruli of the kidneys.

Acute Exposure

Most adverse health effects from acute exposure to gasoline are caused by the hydrocarbon component. However, persons who have repeated or massive exposure (e.g., inhalation abuse, prolonged skin contact) to leaded gasoline may develop lead poisoning.

Immediate effects of exposure to gasoline are primarily due to pulmonary injury and CNS depression. Other systemic effects may develop over several hours.

Central Nervous System (CNS)

Acute gasoline exposure can cause transient CNS excitation followed by CNS depression. Confusion, giddiness, nausea, headache, blurred vision, dizziness, and weakness can occur. In massive exposures, rapid CNS depression, respiratory depression, seizures, loss of consciousness, coma, and death has been reported (ATSDR, 2014).

Respiratory

Gasoline can irritate the mucous membranes of the respiratory tract. Pulmonary congestion, oedema, acute exudative tracheobronchitis, and intrapulmonary haemorrhage have been reported in severe exposures. Pulmonary aspiration of ingested gasoline may cause pneumonitis. Exposure to certain chemicals can lead to Reactive Airway Dysfunction Syndrome (RADS), a chemically- or irritant-induced type of asthma.

Cardiovascular

Petrol vapours can sensitize the myocardium to circulating epinephrine which may cause potentially fatal ventricular fibrillation.

Renal

Inhalation of massive amounts of gasoline may result in fatty degeneration of the proximal convoluted tubules and glomeruli and renal failure. Ingestion of gasoline has been reported to cause oliguria, tubular necrosis, interstitial oedema, hematuria, reduced creatinine clearance and elevated serum creatinine, elevated urinary protein, glucose, and haemoglobin.

Gastrointestinal

Damage to the digestive tract following ingestion of gasoline may include severe esophagitis, gastritis, degeneration of the epithelium, and mucositis of the oral cavity.

Dermal

Petrol vapours can cause inflammation of the skin. Prolonged contact with liquid gasoline causes significant irritation (i.e., irritant contact dermatitis), degreasing, and burns. Redness and swelling may arise.

Ocular

Eye irritation from gasoline vapours begins at about 200 ppm (Chilcott, 2011). Inflammation is generally slight. When speckled in the eye, perol may cause burning pain

and transient corneal injury. Chronic exposure to petrol may possibly cause damage to the cornea, retina, and ciliary body.

Chronic Exposure

No health effects are expected from normal use of gasoline as a fuel. Chronic, excessive exposure such as occurs in intentional gasoline abuse (sniffing) can cause irritability, tremor, nausea, insomnia, loss of memory, drowsiness, mental dullness, confusion, seizures, muscle spasms, altered vision, hallucinations, impaired gait, inflammation of the optic nerve, dizziness, and involuntary eye movements. Some of these effects may be due to lead or other additives in gasoline (Chilcott, 2011). Sudden deaths have been reported (Oluwagbemi, 2007; ATSDR, 2014).

Chronic abuse of gasoline may cause kidney disease (i.e., renal tubular dysfunction). Nerve disorders, causing motor weakness and muscular degeneration, can also occur in gasoline abusers. Abuse of leaded gasoline has been reported to cause brain disease (Udonwa, 2009). (i.e., lead encephalopathy) Behavioural and intellectual changes, including immediate and delayed visual memory and perception, psychomotor disturbances, and visuomotor learning ability, have been reported (probably involving leaded gasoline). Chronic exposure may be more serious for children because of their potential longer latency period. Degreasing dermatitis with skin cracking and peeling results when skin has repeated or prolonged contact with petrol.

Reproductive and Development Effects

The hydrocarbons found in gasoline can cross the placenta. There is no direct evidence that maternal exposure to gasoline causes fetotoxic or teratogenic effects. Gasoline is not included in *Reproductive and Developmental Toxicants*, a 1991 report published by the U.S. General Accounting Office (GAO) that lists 30 chemicals of concern because of widely acknowledged reproductive and developmental consequences (ATSDR, 2014).

2.4. Knowledge of associated hazards and prevention of mouth pipetting of petrol among automobile mechanics

Some practices are done by people because they might be ignorant about the risk involved, so one might not entirely blame them. The practice of mouth pipetting of petrol among automobile mechanics may probably be due to their lack of knowledge of health hazards associated with the practice. In a study conducted among automobile technicians in Lagos, Abdulsalam et al, (2015) reported higher awareness of lead hazards in the profession. However, this cannot be said of their counterparts in Kogi State as the group

is entirely neglected by health professionals and planner. More so, a good number of them who barely complete primary education level, do not have such opportunity of being studied like their colleagues in the south west, Nigeria. Another area that was not clear is the source of information. With the higher awareness level recorded by the study, it is essential to state their source of information. In contrast, the source of their information about associated health hazards of mouth pipetting of petrol will be stated in this study.

2.5. Factors contributing to mouth pipetting of petrol among automobile mechanics

In the western countries where intentional inhalation of petrol is being practice, it is difficult for non-consumers of solvents to understand why petrol would be deliberately inhaled for purposes of intoxication.

But in order to try to understand why the volatile inhalants are attractive to those who indulge in them, inquiries were made (Basu, Jhirwal, Singh, Kumar, & Mattoo, 2004) and their justifications for petrol sniffing include peer influence, easy accessibility, cheap price, their faster onset of action and the regular 'high' that it provided.

However, there are no established or documented empirical studies which describe factors contributing to mouth pipetting of petrol among the automobile mechanics in Nigeria. Personal interaction with some of the automobile mechanics revealed that the practice may be attributed to inaccessibility of funnel and where is it accessible; they tend to look at the cost of buying a funnel. Others said that funnel delays their work most of the time and as well does waste fuel as a result of spillage, whereas hose is easier to use than a funnel.

On other hand, ignorance could be a major factor. Some of the automobile mechanics perform this act out of ignorance. Besides, it is a general knowledge that young people learn faster by observation. Young persons who are apprentices under their masters tend to learn the practice by observing their master doing it without asking questions. Other factors can be attributed to low level of educational attainment of these automobile mechanics. A good number of them barely complete primary school education making them vulnerable to influence by their senior. Nevertheless, factors contributing to mouth pipetting of petrol among automobile mechanics will be stated in this study.

2.6. Preventive practices for avoiding petrol inhalation and accidental drinking

Petrol is considered dangerous for one's health because it is poisonous. Exposure to petrol—either through physical contact or inhalation—can cause health problems. The effects of petrol poisoning can harm every part of the body. It is important to practice and enforce safe petrol handling to prevent poisoning.

The best preventive practice for avoiding hazards associated with mouth pipetting of petrol by automobile mechanics is to never intentionally drink gasoline for any reason.
The use of funnel can be employed by automobile mechanics in order to avoid hazards associated with mouth pipetting of petrol. Also, the use of latest technology can be adopted. This involves the use technologically developed hand pump used in siphoning of petrol. With that petrol exposure will reduce exponentially. Observing workplace safety measures can also help to avoid accidental swallowing or ingestion of petrol.
But accidental swallowing or drinking of petrol or excessive exposure to fumes warrants a visit to the emergency room at the hospital. Person providing help should make sure the exposed persons sits up and drinks water, unless instructed not to do so. Ensure the patient is also in an area with fresh air. Be sure to observe the following precautions:

- Don't force vomiting.
- Don't give the victim milk.
- Don't give liquids to an unconscious victim.
- Don't leave the victim and yourself exposed to gasoline fumes.
- Don't attempt to remedy the situation yourself—always call for help first (Moore, 2012).

Figure 2.1: Flo n' Go Hand Pump/Siphon **(Source**: Northern Tool + Equipment)

2.7. Theoretical Model

PRECEDE-PROCEED model is the theoretical model adopted for this study. This model is a very comprehensive model which will assist this study to critically look into the predisposing factors, Enabling factors and Reinforcing factors contributing to the practice of mouth pipetting of petrol among automobile mechanics.

This model is a planning model which was developed by Green, Kreuter and associates. It provides a guide to identifying a mix of strategies to identify desired outcomes. It views that health behaviour is influenced by both individual and environmental factors. It has two distinct parts, the educational diagnosis (PRECEDE) and the ecological diagnosis (PROCEED). The PRECEDE part of this model will be used to identify the factors contributing to the prevalence of practice of mouth pipetting of petrol among automobile mechanics.

The full meaning of PRECEDE is Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosing and Evaluation.

Predisposing factors are antecedents to behaviour that provide rationale or motivation for that behaviour. They include a person's knowledge, attitudes, beliefs, skills, self-efficacy. The Reinforcing factors are factors that following behaviour provide continued reward or incentive for repetition of that behaviour –social support, peer influence, family influence, i.e. influence of significant others. The Enabling factors are those antecedents to behavioural or environmental change that allow a motivation or environmental policy to be realized. i.e. programs services and resources or development of new skills.

2.8 Application of the Model to current Study

For the purpose of this research, the PRECEDE model will be used to explore the relationship between predisposing factors (knowledge, beliefs, skills, self-efficacy, readiness to change, Socio-economic status, place of residence), Enabling factors (Availability of resources such as money, availability of the necessary materials including personal protective equipment like gloves, face mask etc, skills, time, convenience, and accessibility of facilities and Reinforcing factors (Social support such as care, reminders and assistance from boss, peers, work colleagues, media, health care providers and friends)

2.9 Conceptual Framework

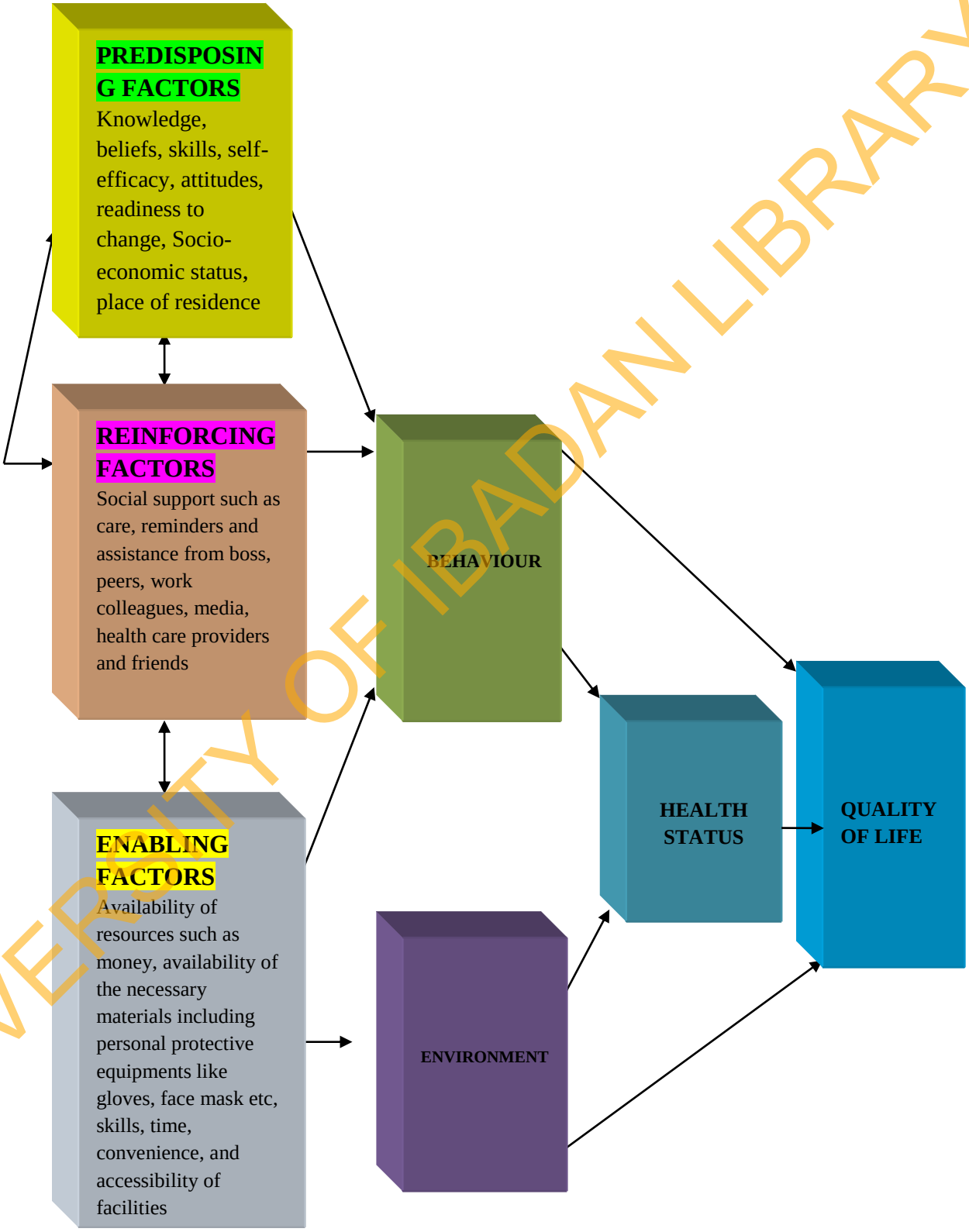

FIGURE2.2 APPLICATION OF PRECEDE MODEL

CHAPTER THREE

METHODOLOGY

This chapter presents the research methodology of the study. It described the methods and processes that the researcher used in order to collect data to be used in answering the research questions. The chapter is presented under the following sections namely: study design, scope of the study, description of study area, study population, inclusion and exclusion criteria, sample size determination, sampling procedures, instrument for data collection, method of data collection, validity and reliability of the instrument, and ethical consideration, study limitation, and data management and analysis.

3.1 Study Design

Because this study is quantitative in nature, a descriptive cross-sectional study was adopted for use in the collection of information on the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja Local Government Area, Kogi State.

3.2 Scope of the Study

The scope of the research was limited to gathering data from the automobile mechanics in their workplaces and meeting days on the prevalence of practice of mouth pipetting of petrol, knowledge of associated hazards, identification of contributing factors and preventive practices for avoiding petrol inhalation and accidental drinking

3.3 Description of Study Area

This study was carried out in Lokoja Local Government Area of Kogi state. Kogi State is found in central region of Nigeria. It was carved from Kwara and Benue States in 1991 and occupies 29,833 square kilometres. It has twenty one (21) local government areas (thirteen local government areas from the former Kwara and eight from Benue States) and comprises the Igala, Ebira, Kabba, Yoruba and Kogi divisions of the former Kabba province. It shares common boundaries with Niger, Kwara, Nassarawa and the Federal Capital Territory to the north. To the east, the state is bounded by Benue State, to the south by Enugu and Anambra States, and to the west by Ondo, Ekiti and Edo States. Lokoja, which houses the confluence of River Niger and River Benue, is the state capital. Ethnically, Okun/Yoruba, Igala, Ebira, Nupe and Bassa form the main ethnic groups. The main religions in the state are Christianity and Islam but a fair amount of traditional

religion is being practiced. The majority of the people are farmers. The State is abundantly blessed with fertile lands and good climatic conditions. Some of the agricultural produce from Kogi State includes yam, cassava, soya bean, cocoyam, maize, millet, rice, guinea corn, palm produce and cowpea. Iron ore, mica, marble, limestone and coal as some of the mineral deposits in the State.

Basically, the automobile mechanics in Kogi State exist in two distinct groups, either as organized in formal environment or informal as in roadside garages. For the purpose of this study, the roadside automobile mechanics constitute a large group, especially in Nigeria, that work in all types of makeshift outdoor locations, usually in undeveloped plots scattered along and close to major roads and streets in the towns and cities. In contrast, the organized group exist in workshops owned by private and corporate organizations and are viewed to be protected by Nigerian labour and factory laws. In view of the increasing number of automobile mechanics and multitude of mechanic garages springing up in various towns and cities in Nigeria, this study was of public health importance.

According to the 2006 population census, Kogi State has a total population of 3,278,487. Based on information gathered from the Lokoja LG Chairman of Nigerian Automobile Technicians Association (NATA), there are over one thousand (1000) automobile mechanics in Lokoja local government area, but not all are registered. According to the chairman, automobile mechanics are found almost every street of Lokoja, and that there are different sections of the association which include; Automobile sections, Panel beater sections, electrical sections and motorcycle sections. But the focus of this study is automobile mechanic sections which are further divided into two zones in to which members are registered. These work zones include; Zone A and Zone B. Zone A comprises Town, Ganaja village, Lokongoma Phase I and II, Army Barracks, Zongo Daji and Obajana and its environs with a total population of 264 registered NATA members while Zone B spans from Old market, New Market, Felele, Sarkin Noma and Nataco along Abuja express way and with a total population of 300 registered NATA members. The activities of the zonal association are being coordinated by the central body in the local government area.

Automobile mechanics in Lokoja are blessed with several sources of petrol they use in their work. Firstly, Lokoja is a junction town connecting about 17 states which comprise

the south-south, south east and south west to the northern parts of the Nigeria, thereby making it a veritable center for petrol business. NNPC Mega stations, private filling stations and other smaller petrol business outlets on the roadside are places where automobile mechanics get fuel they use in their work. Surprisingly, there are no measures put in place to prevent petrol inhalation and accidental drinking among automobile mechanics in Lokoja local government.

3.4 Study Population

This study was conducted to determine the prevalence of practice of mouth pipetting among automobile mechanics, access their knowledge of health hazards associated with mouth pipetting of petrol, identify the factors contributing to mouth pipetting among the automobile mechanics and ascertain preventive practices for avoiding hazards associated with mouth pipetting.

3.4.1 Inclusion and Exclusion Criteria

Inclusion

- The study participants that were included in the study are those in Lokoja local government area of the state.
- The participants are either the owner or worker in an automobile mechanic workshop including adult apprentices.
- The study participants are the registered members of Nigerian Automobile Technicians Association (NATA) under Automobile mechanic section

Exclusion

Participants who engage in welding, radiator repair, car battery charging, motorcycle mechanics, panel beaters, electrical technicians etc are excluded from this study. Non members of NATA are also excluded from the study.

3.5 Sample Size Determination

The study sample for this research was calculated using Atchely's formula which is given as;

$$N = \frac{z^2pq}{d^2}$$

N- Sample size collected

d- Degree of accuracy, 5% (level of significance)

z- Constant variable with critical value of 1.96 at 5 % (95% confidence interval)

p- The proportion of the target population estimated to have a particular phenomenon of interest in the study. The significant value for p as used by Daniel (1998), and Kibikiwa (2008), will be assumed to be 50%. (0.05)

q = 1- P

1-0.5

d = precision limit (limit of error) for the purpose of this study, 'd' was considered at 95% confidence interval, therefore precision limit was 100-95= 5%

Hence d= 5%= 0.05

Therefore;

$$N = \frac{z^2 pq}{d^2}$$

$$N = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2} = 384$$

10% of 384=38.4 was added to address non response, making the total sample size to be 422.

3.6 Sampling Procedure

A three – stage sampling technique was used to recruit study participants into the study. These stages are stated below;

- **Step1:** The automobile association was stratified into zone A and B using stratified sampling method to select the study participants that was studied

Population of Automobile mechanics in each zone

Work Zone	Population of Registered members
Zone A	264
Zone B	300
TOTAL	**564**

- **Step 2:** The proportion of the respondents to be studied in each selected zone was calculated using the formula below

Proportion of zone X = $\frac{\text{total number of automobile mechanics in zone X}}{\text{Total population of registered automobile mechanics in the two zones}} \times N$

Where N is the sample size.

- **Step 3:** All automobile artisans willing to participate in the study were enrolled into the study.

3.7 Instrument for Data Collection

Data for this study was collected using a quantitative tool. A semi structured interviewer-administered questionnaire was developed for data collection. Each section of the questionnaire focused on five major areas:

A.) Socio-demographic characteristics

B.) The participant's prevalence of practice of mouth-pipetting of petrol

C.) The participant's knowledge of associated health hazards of mouth pipetting of petrol

D.) The factors contributing to mouth pipetting among the target population

E.) Preventive practices for avoiding petrol inhalation and accidental drinking

Section B, C, D and E had an aspect on '**evidence**'; that was used to validate the responses given by the respondents to the questions asked.

3.8 Validity

Relevant literatures were reviewed, the formulated objectives guided in the modification of the instrument. The instrument was reviewed by my research supervisor, other lecturers in the department and senior colleagues. The supervisor's annotations and correction was then used to further improve the quality of the instrument.

To further validate the instrument, it was tested among similar group with the same characteristics in Kogi local government area of Kogi State. Kogi local government with its headquarters in Kotonkarfe, is a neighbouring town with automobile mechanics there having similar characteristics to the actual study population. This ascertained the effectiveness of the instrument in collecting appropriate data relevant to the research objectives.

3.9. Reliability

In order to ensure the reliability of the semi-structured questionnaire, a pre-test was conducted on a sample size of 10% of the sample population (422) to obtain a pre-test sample of 38. The pre-test was conducted among automobile mechanics in Kogi Local Government Area, Kogi State. Analysis of the pre-tested instrument was done using Cronbach's Alpha Coefficient Technique of the Statistical Package for Social Sciences (SPSS) version 20. Cronbach's alpha test used to test for the consistency of an instrument.

The analysis of the data obtained from the pre-test gave a Cronbach's Alpha of 0.7. This showed that the instrument is very reliable. The questionnaire was revised such that some of the questions were edited; some other variables were added while some questions and options were completely removed, in order to ascertain the validity of the instrument.

3.10. Training of Research Assistants and Data Collection Process

Five (5) research assistants were recruited and trained for data collection using a quantitative tool. The five (5) research assistants trained were all males within the age range of 23 – 35 years. During the training session, the goal and objectives of the study were carefully explained to the research assistants, so that they understood the goal of the study and their own roles and responsibilities as research assistants. The training, which lasted for two hours, was conducted by the researcher himself. The duration for data collection took two months which spanned from 14th August, 2015 and 15th October, 2015, and it was done using a semi-structured interviewer-administered questionnaires. The data was collected mainly by one-on-one interview by the interviewers which included the trained research assistants and the researcher. But at some point during the data collection, the Chairman of NATA instructed the secretary to help in interviewing his colleagues which he did. Also, some of the automobile mechanics who are educated requested to fill out the questionnaire themselves. But before then, the researcher had explained to the secretary and those filling it themselves the purpose of the research and what is expected of them.

3.11. Ethical Consideration

The following ethical procedures were strictly followed for this study:

Research protocol was submitted to, and approved by the Kogi State Ministry of Health Ethics Review Committee for the study to be conducted.

Permission was obtained from the Department of Health Promotion and Education, University of Ibadan, to carry out the research in the study location, and Informed consent was obtained from each of the respondents after explaining to them the purpose of the study and their liberty to choose to participate or not in the research work.

- **Confidentiality**: Confidentiality of each participant was maximally maintained during and after the collection of data. The researcher ensured that no any forms of identification of the participants were obtained.

- **Beneficence to participants:** Results of this study shall be published in journals and bulletins. Recommendations shall be made to the school authorities, Automobile Mechanics Association and the State Ministry of Health. This will inform effective policy formulation and health programme intervention on health hazards associated with mouth pipetting of petrol among automobile mechanics
- **Non-maleficence to participants:** No harm or whatsoever befalls any participants, during the course of data collection apart from the time they used in filling the questionnaires
- **Voluntariness:** Participation in this research was absolutely voluntary. Participants were given liberty to withdraw their participation from the study at any time they want to do so

3.12. Study Limitation

Some of the respondents were unwilling to participate in the research due to their busy schedule and some believe it is of no use to participate since there is no immediate monetary gain. Also, the instrument was interviewer-administer but some of the respondents who could read, write and comprehend filled it themselves. Time and resources available were also limited.

3.13 Data Management and Analysis

Data collected were collated, edited, serially numbered and coded by the principal investigator using approved coding guide by the supervisor. The data were then analyzed using Statistical Package for Social Sciences (SPSS, version 20.0). Descriptive Statistics and Chi-Square test were used for data analysis with the level of significance set at p=0.05. Results obtained were summarized using frequency distribution tables, and charts as shown in chapter 4 of this work.

CHAPTER FOUR

RESULTS

The results of the analysis of the quantitative data from the study instruments are presented in this chapter. The results are presented and organized into the following sections

A.) Socio-demographic characteristics of the participants

B.) The prevalence of practice of mouth pipetting of petrol among respondents

C.) The knowledge of associated hazards involved in mouth pipetting of petrol among the respondents

D.) The factors contributing to mouth pipetting among the target population

E.) Preventive practices for avoiding petrol inhalation and accidental drinking

4.1 Socio – Demographic Characteristics of the Respondents

The ages of the respondents ranged from 18 to 65 years. The mean age is 35.93±10.7. The age distributions of the respondents were further grouped into six categories or age groups which are: 16 – 20, 21 – 25, 26 – 30, 31 – 35, 36 – 40, 41 – 45, 46 – 50, 51 – 55, 56 – 60, 61 – 65. Thirty two 32(7.6%) were in the 16 – 20 category; forty five 45(10.7%) were in the 21 – 25 category; the category 26 – 30 has the highest number of participants with seventy seven 77(18.2%). Closely followed in the age group is the category of 31 – 35 with seventy two 72(17.1%). Seventy one 71(16.8%) were in the 36 – 40 category. Also, in the 41 – 45 category there are forty two 42(10.0%) of the respondents who took part in the study; while thirty six 36 (8.5%) were in the 46 – 50 category; twenty seven 27 (6.4%) participants occupy 51 – 55 category and fifteen 15 (3.6%) were in the 56 – 60 category.. Four 4 (0.9%) were in the last category with one non response participants. Majority of the respondents 225 (53.1%) were Christians; one hundred and ninety two 192 (45.5%) were Muslims, while 5 (1.2%) were African Traditional worshipers. The respondents were culturally diverse and ethnic wise. Most of the respondents were Yoruba 111 (26.3%); they are closely followed by Okun/Kabba 98 (23.3%); seventy two of the respondents were Ebira 72 (17.1%) whereas Igala ethnic group accounted for 58 (13.7%) of the respondents. Nupe 26 (6.2%), Oworo 21 (5.0%), Igbo 7 (1.7%), Hausa 2(0.5%) and Kakanda 18 (4.3%) were parts of the respondents. Others are (Edo and Delta) 9(2.1%).

Also, majority of the respondents specialized on car 293(69.8%) while 44 (10.4%) and 83(19.8%) specialized on truck/trailer and bus repairs respectively. The respondents who

are all males 422(100%), have different years of experience as automobile mechanics as shown in (Table 4.4) below. It is expedient to mention that the majority of the respondents 147(34.8%) earn between N6,000 – N10,999 per week but the highest weekly earners 2(0.5%) fall between N46,000 – N50,999, and the lowest earners 95 (22.5%) fall into the range of N1,000 – N5,999 every week. The mean income is 11,622±7987.3.(Table 4.3)

In the same vein, one hundred and eighty six 186(44.2%) completed their primary education, one hundred and seventy four 174(41.2%) agreed to have completed their secondary education. While 18(4.2%) completed tertiary education, thirty six 36(8.5%) had no formal education. Five 5(1.2%) acquired Islamic education and three 3(0.7%) had other forms of education. Over three-quarter of the respondents 313(74.2%) are married while 89(21.1%) are still single. Other marital status like cohabiting 6(1.4%); divorced 8(1.9%); separated 2(0.5%) and widower 4(0.9%) were all represented. All respondents 422(100%) are resident in Lokoja local government area as shown in (Table 4.4)

Distribution of Respondents Socio Demographic Characteristics (N=422)

Table 4.1: Age Distribution of the Respondents

Age group	Frequency (%)
16 – 20 years	32 (7.6)
21 – 25 years	45(10.7)
26 – 30 years	77(18.2)
31 – 35 years	72(17.1)
36 – 40 years	71(16.8)
41 – 45 years	42(10.0)
46 – 50 years	36 (8.5)
51 – 55 years	27(6.4)
56 – 60 years	15(3.6)
61 – 65 years	4(0.9)

*Mean Age =35.93±10.7; Median =35. Note: Non responses are excluded**

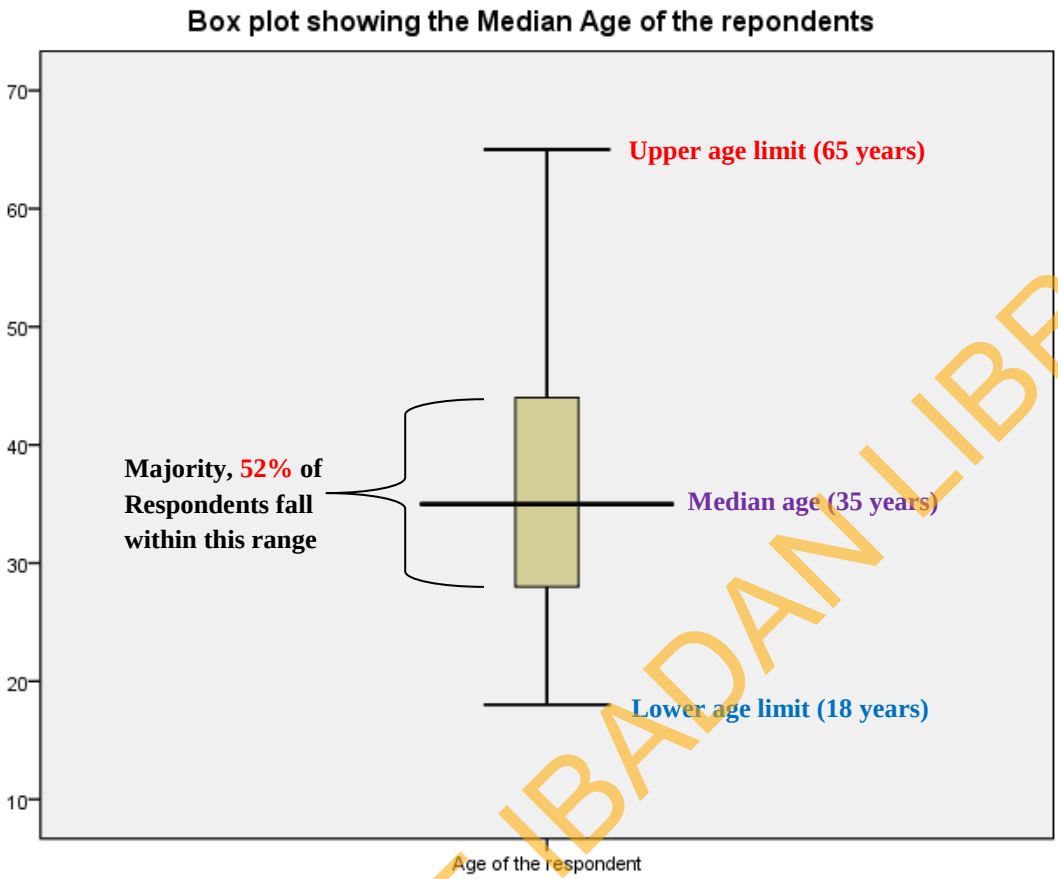

FIGURE 4.1: BOX PLOT SHOWING MEDIAN AGE OF THE RESPONDENTS

Table 4.2: Level of Education of the respondents *(n=422)*

Categories	Frequency (%)
Primary	186 (44.2)
Secondary	174 (41.2)
Tertiary	18 (4.2)
Quoranic Education	5 (1.2)
No Formal education	36 (8.5)
Others	3 (0.7)

Table 4.3: Respondents' weekly income

Income group	Frequency (%)
N1000 – 5999	95 (22.5)
N6000 – 10999	147(34.8)
N11000 – 15999	57(13.8)
N16000 – 20999	65(15.4)
N21000 – 25999	21(5.0)
N26000 – 30999	13(3.1)
N31000 – 35999	2(0.5)
N36000 – 40999	2(0.5)
N46000 – 50999	2(0.5)

*Mean Income =N11,622±7987.3; Median =10,000. Note: Non responses are excluded**

Table 4.4: Distribution of Other Respondents Socio Demographic Characteristics (N=422)

Variables	Categories	Frequency (%)
Sex	Female	0(0)
n=422	Male	422 (100)
Area of Specialization	Truck / trailer	44 (10.4)
	Car	293 (69.8)
n=420	Bus	83 (19.8)
	Less than 5 years	8 (1.9)
Years of Experience	5 – 10 years	96 (22.9)
n=418	11 – 20 years	198 (47.4)
	21 – 30 years and above	116 (27.8)
Work Zone n=422	Zone A	198 (46.9)
	Zone B	224 (53.1)
Religion n=422	Christianity	225 (53.3)
	Islam	192 (45.5)
	African Traditional Religion	5 (1.2)
	Single	89 (21.1)
	Married	313 (74.2)
Marital Status n=422	Cohabiting	6 (1.4)
	Divorced	8 (1.9)
	Separated	2 (0.5)
	Widower	4 (0.9
	Igala	58 (13.7)
	Yoruba	111 (26.3)
	Okun/kabba	98 (23.3)
	Ebira	72 (17.1)
	Igbo	7 (1.7)
Ethnicity n=422	Hausa	2 (0.5)
	Oworo	21(5.0)
	Kakanda	18 (4.2)
	Nupe	26 (6.2)
	Others (Edo and Delta)	9 (2.0)
Local government of residence	Lokoja	422(100)

4.2: Prevalence of Mouth Pipetting of Petrol among respondents

To determine the prevalence of practice of mouth pipetting of petrol, some questions were asked; chief among the questions on this domain was 'have you ever siphon petrol with mouth? Most of the respondents 411(97.4%) agreed to have "ever siphoned petrol by mouth" while 11(2.6%) said they have "never mouthipetted petrol". In order to identify ways in which the respondents have ever transferred fuel, question was asked; in which way did you transfer fuel (petrol) to or from a vehicle, almost all of the respondents 383(91.0) said they "used hose" while 37(8.8%) and 1(0.2%) said that they "used a funnel" and "others" such as rubber or hand pump respectively are ways in which the respondents have transferred liquid substances from a vehicle tank or vice versa. Similarly question was asked, on how frequent respondents mouth pipette petrol, more than half of the respondents 248(59.0%) said "sometimes", 114(27.0%) said "always", but 11(2.6%) said "never" while 48(11.4%) agreed it is "Every day". Question was also asked; Situations during which respondents always mouth pipette petrol, a large number of them agreed it is during "vehicle repairs and services 355(84.5%), 42(10.0%) went for "fuel scarcity" while 12(2.9%) and 11(2.6%) said it is during "festive seasons" and "weekends" respectively.

Likewise, the frequency in which this practice is done in a week varies. Question was asked; how frequent do you draw petrol with mouth using a hose in a week, 107(25.4%) confirmed it is "five times", while 101(23.9%) agreed it is "ten times and above". Other frequencies of mouth pipetting are shown in Table 4.5a below. In addition, when last the respondents mouth pipette petrol and their reasons for doing so on that last time are also represented in Table 4.5b.

Table 4.5a: Distribution of Prevalence of Practice of Mouth Pipetting of Petrol among Respondents

Variables	Categories	Frequency (%)
Ever siphoned petrol with mouth ***n=422***	Yes	411(97.4)
	No	11(2.6)
Ways in which fuel (petrol) is transferred ***n=421***	Use of hose	383(91.0)
	Use of funnel	37(8.8)
	Others	1(0.2)
Frequency of mouth pipetting of petrol ***n=421***	Always	114 (27.0)
	Sometimes	248(59.0)
	Never	11(2.6)
	Everyday	48(11.4)
Situations during which mouth pipetting of petrol is always done ***n=420***	Fuel scarcity	42(10.0)
	Vehicle repairs and services	355(84.5)
	Festive seasons	12(2.9)
	Weekends	11(2.6)
Frequency of use of hose per week ***n=419***	Once	18(4.3)
	Two times	63(15.0)
	Three times	81(19.3)
	Four times	49(11.6)
	Five times	107(25.5)
	Ten times and above	101(24.3)
Preference for the use of hose to funnel? ***n=416***	Always	224(53.8)
	Sometimes	182(43.8)
	Never	10(2.4)

Table 4.5b: Distribution of Prevalence of Practice of Mouth Pipetting of Petrol among Respondents'

Variables	Responses	Frequency (%)
Last time mouth pipetting was done ***n=389***	Today	134(34.6)
	Yesterday	100(25.8)
	Last month	17(4.3)
	A week ago	8(2.0)
	Over a month	8(2.0)
	Up to two months	8(2.0)
	Three days ago	21(5.4)
	Last week	43(11.1)
	Last two days	17(4.3)
	<= over a year ago	9(2.3)
	<= 5 years	6(1.6)
	This week	16(4.1)
	I have never mouth pipetted petrol	2(0.5)
Reasons for mouth pipetting the last time?	To wash my hands	83(23.9)
	To wash engine parts	100(29.0)
	Used it to start a vehicle	15(4.3)
n=347	Used it on a carburetor	26(7.5)
	Used it for car services and repairs	91(26.2)
	It is a tradition of the mechanics	22(6.3)
	It is because i am in a rush	1(0.2)
	It is the fastest way available to siphon petrol	5(1.4)
	Due to fuel scarcity	2(0.6)
	It is because fuel in the car got finished while driving	2(0.6)

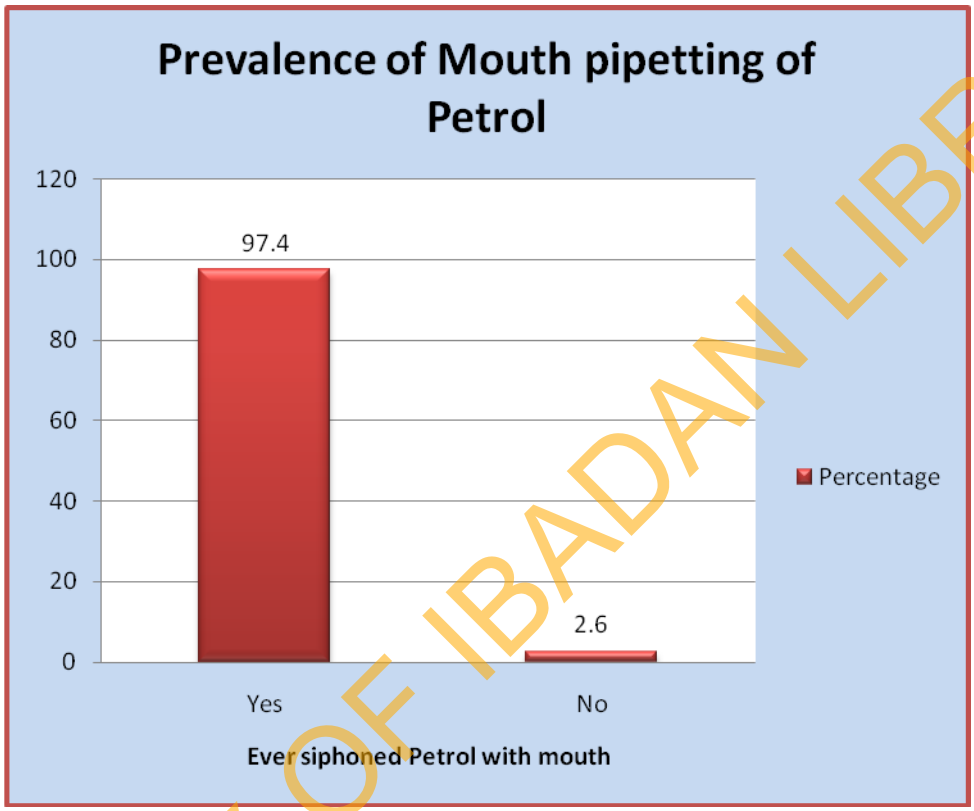

FIGURE 4.3: PREVALENCE OF PRACTICE OF MOUTH PIPETTING OF PETROL AMONG RESPONDENTS

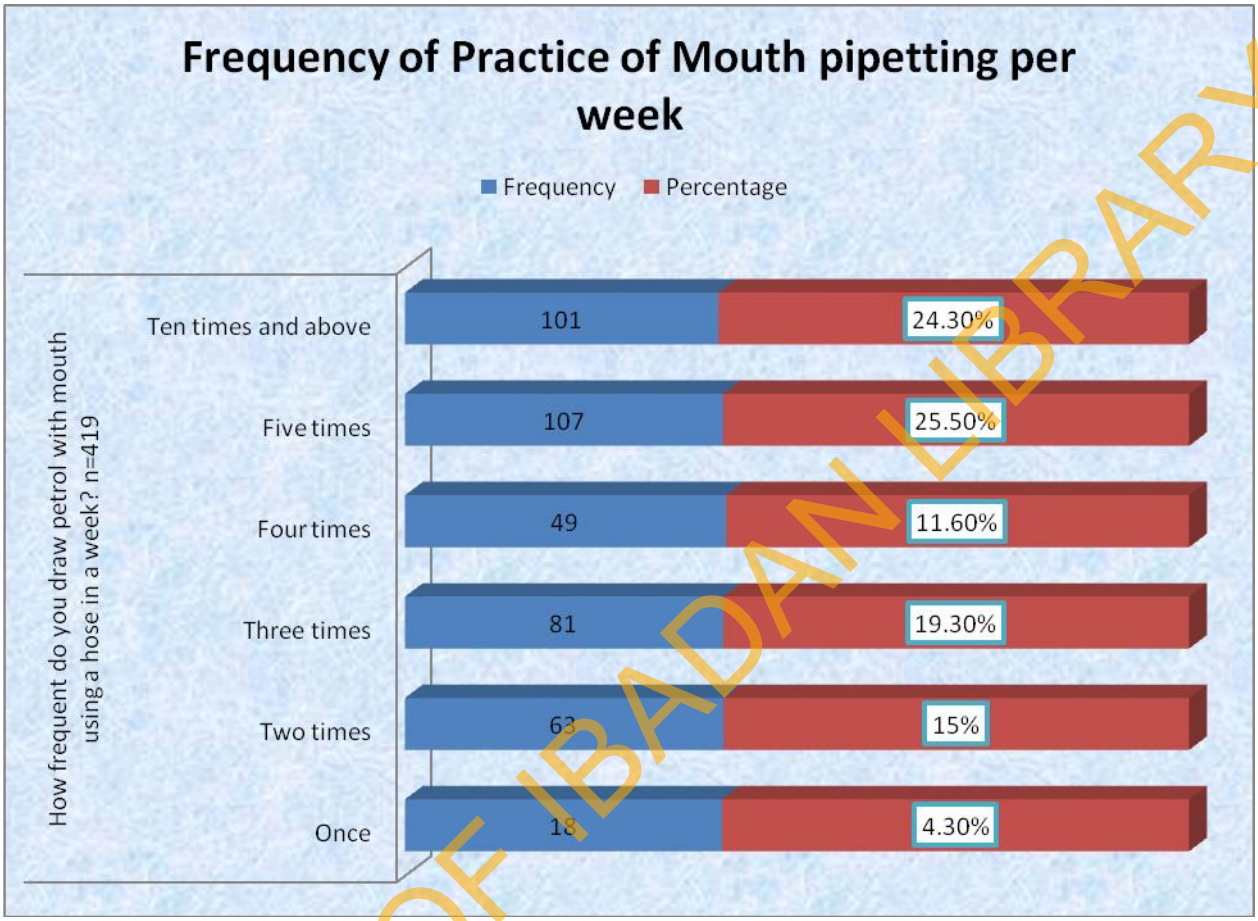

FIGURE 4.4: NUMBER OF TIMES RESPONDENTS PRACTICED MOUTH PIPETTING OF PETROL PER WEEK

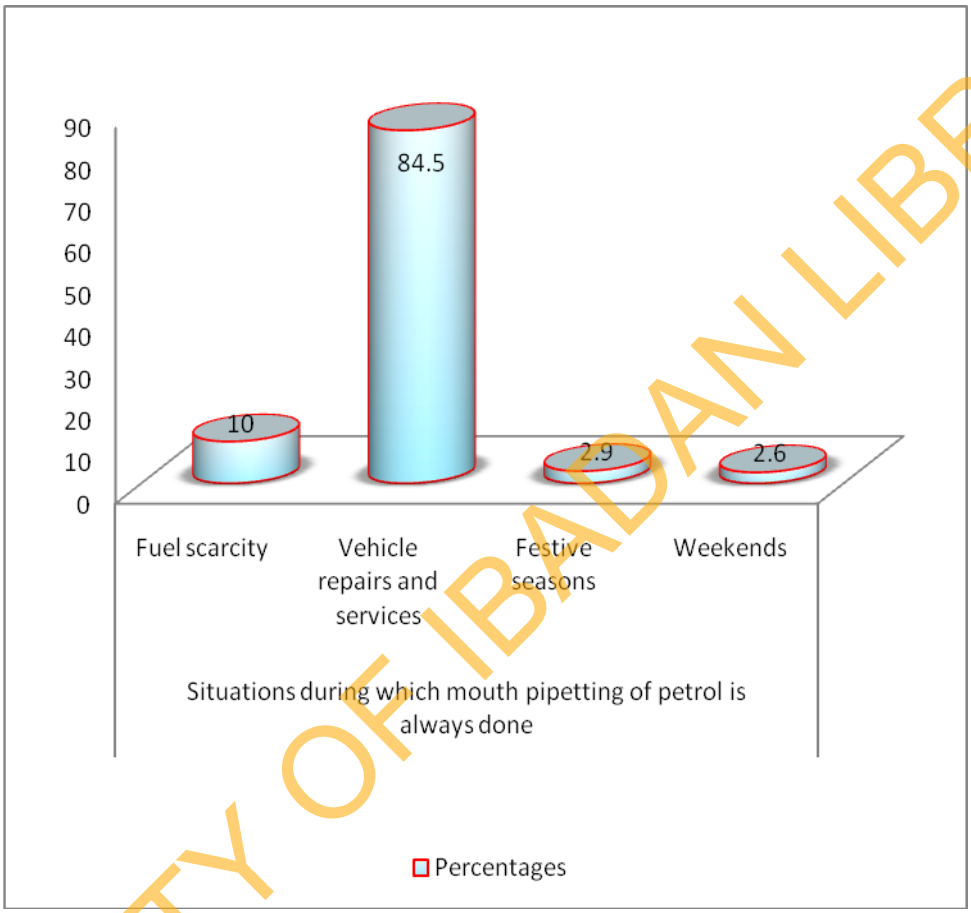

FIGURE 4.5: SITUATIONS IN WHICH RESPONDENTS ALWAYS MOUTH PIPETTED PETROL

4.3: Knowledge of Health Hazards Associated with Petrol Inhalation and Drinking among respondents

Table 4.6 presents the results of the respondents' knowledge of health hazards associated with petrol inhalation and drinking indicated that most 319(75.6%) had poor knowledge, 87(20.6%) had fair knowledge whereas only 16(3.8%) had good knowledge of the health hazards associated with mouth pipetting of petrol (Table 4.7). The respondents were asked to mention any disease one can get from inhalation and drinking of petrol of which options that can be prompted were provided. These options include; central nervous system (CNS) depression, respiratory problems, cardiovascular disease (CVD), kidney failure, gastrointestinal disease, skin irritation, eye irritation and lung dysfunction. The results showed that there is knowledge gap or disparity among the respondents. **See Table 4.6a**. Apart from 170(41.3%) and 240 (57.8%) who mentioned central nervous system (CNS) depression and eye irritation respectively as disease respondents can get from petrol inhalation and ingestion, only 78(18.9%) and 49(11.9%) mentioned respiratory problem and skin irritation as diseases respectively. Most of the respondents neither do not know nor mentioned any of the diseases being considered. However, while 245(58.6%) agreed that mouth pipetting or sucking of petrol is not dangerous to their health, majority 155(37.1%) believed that death due to circulatory failure is associated with ingestion of petrol **Table 4.6b**. Moreover, 273(87.8%) and 67(25.5%) said their major sources of information of the health hazard are through personal observation of its reaction in my body and awareness campaign respectively **Table 4.8**

Table 4.6a: Distribution of Respondents' Knowledge of Health Hazards Associated with Petrol Inhalation and Drinking

Knowledge of health hazards on various parts of the body	Frequency/Percentage		
	Yes (%)	No (%)	Don't Know
CNS depression	170(41.3)	65(15.8)	177(42.9)
Respiratory problem	78(18.9)	128(31.0)	207(50.1)
Cardiovascular Disease	10(2.4)	172(42.3)	225(55.3)
Kidney failure	11(2.7)	169(41.0)	232(56.3)
Gastrointestinal disease	13(3.1)	161(39.4)	235(57.5)
Skin irritation	49(11.9)	147(35.9)	214(52.2)
Eye irritation	240(57.8)	39(9.4)	136(32.8)
Lung dysfunction	21(5.1)	156(38.1)	233(56.8)

Table 4.6b: Distribution of Respondents' Knowledge of Health Hazards Associated with Petrol Inhalation and Drinking

Knowledge of health hazards among the respondents	Frequency/Percentage		
	Yes (%)	No (%)	Don't Know
Mouth pipetting or sucking of petrol is not dangerous to my health	245(58.6)	139(33.3)	34(8.1)
Even if someone drinks petrol, it does not last in the body	240(57.4)	113(27.0)	65(15.6)
Lead poisoning is associated with drinking and inhalation of petrol	47(11.2)	126(30.2)	245(58.6)
Any mechanic who has accidentally swallowed or inhaled petrol has a chance of becoming sick	60(14.6)	224(54.2)	129(31.2)
Some mechanics who allow petrol to enter their eyes or pour on their body do not know how to pipette petrol	112(26.9)	189(45.5)	115(27.6)
Petrol poisoning can cause problem of depression in the brain and spinal cord	59(14.1)	102(24.5)	256(61.4)
Heart disease has nothing to do with exposure to petrol	52(12.5)	94(22.5)	271(65.0)
Respiratory problem can never be as a result of exposure to petrol	119(28.4)	97(23.2)	203(48.4)
Symptoms of ingestion (drinking) of petrol can range from vomiting, drowsiness, convulsions and confusion to loss of consciousness	86(20.6)	163(39.0)	169 (40.4)
Delayed effects of petrol ingestion may include uncontrollable bleeding of blood, problems to the liver and kidneys	44(10.5)	167(40.0)	207(49.5)
Death due to circulatory failure is associated with ingestion of petrol	155(37.1)	144(34.4)	119(28.5)

Table 4.7: Levels of Knowledge of the Respondents

Scores (19pts)	***Frequency (%)***
Poor Knowledge (< 5)	319 (75.6)
Fair Knowledge (6 – 10)	87 (20.6)
Good knowledge (> 11)	16 (3.8)
TOTAL	**422(100)**

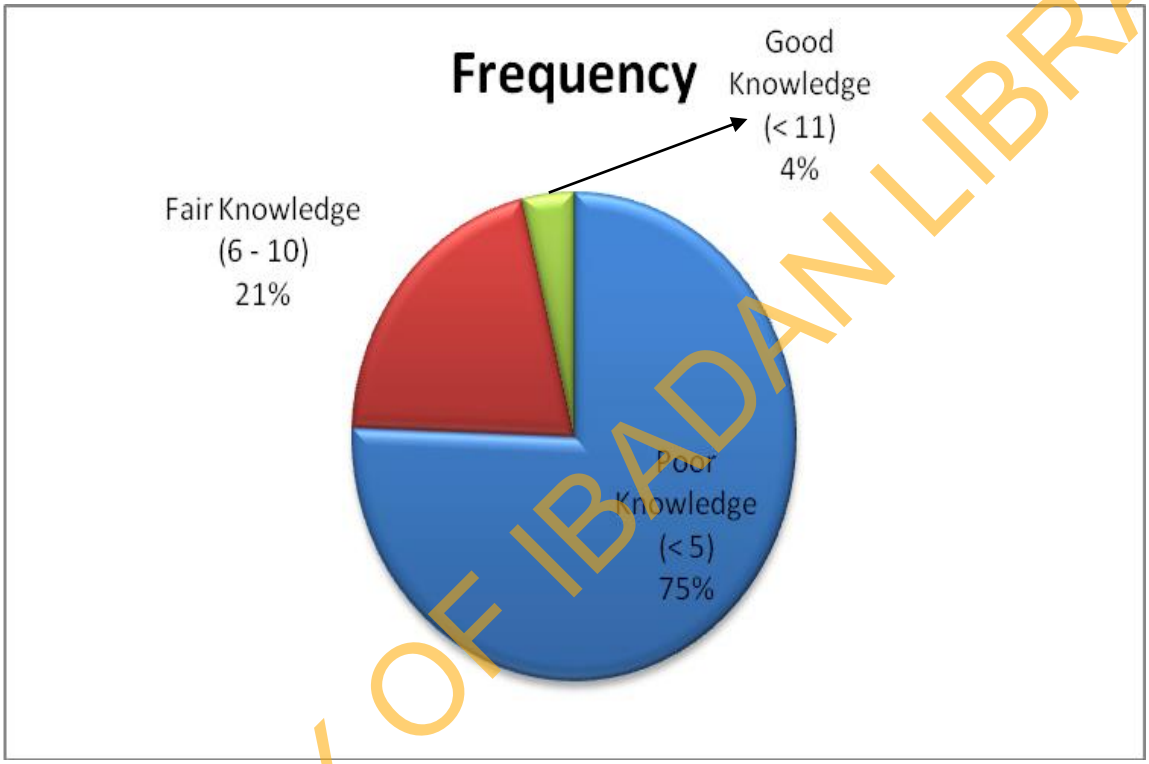

FIGURE 4.6: LEVEL OF KNOWLEDGE OF HEALTH HAZARDS AMONG RESPONDENTS

Table 4.8: Distribution of Sources of Information among Respondents

Variables	Frequency/Percentage		
	Yes (%)	No (%)	Don't Know (%)
Through awareness campaign *n=263*	67(25.5)	184(70.0)	12(4.5)
Boss at work *n=268*	39(14.5)	221(82.5)	8(3.0)
Media reports *n=265*	4(1.5)	248(93.6)	13(4.9)
Mass media *n=264*	9(3.4)	243(92.0)	12(4.6)
Friends *n=269*	52(19.3)	206(76.6)	11(4.1)
Postcards from health care provider *n=265*	10(3.8)	239(90.2)	16(6.0)
Warning labels *n=265*	15(5.7)	232(87.5)	18(6.8)
When someone died *n=264*	6(2.3)	235(89.0)	23(8.7)
School *n=297*	21(7.1)	253(85.2)	23(7.7)
Through personal observation of its reaction in my body *n=311*	273(87.8)	31(10.0)	7(2.2)

4.4: Factors contributing to mouth pipetting of petrol.

Tables 4.9a, 4.9b and 4.9c showed some factors identified by the respondents to enhance mouth pipetting, stop and sustain behaviour of not mouth pipetting of petrol.

Distribution of Respondents' identified factors contributing to mouth pipetting of petrol

4.9a: Factors that promote or enhance the practice of mouth pipetting of petrol

Variables	*Yes (%)*	*No (%)*
Fuel scarcity	258 (62.3)	156(37.7)
Festive seasons (e.g. Christmas, Sallah, Easter celebration)	229(55.3)	185(44.7)
High cost of funnel	94(22.8)	317(77.2)
Lack of knowledge of associated health hazards	373(89.4)	44(10.6)
Busy schedule at work	253(61.4)	159(38.6)
Perception of professionalism in the practice of mouth pipetting	280(67.6)	134(32.4)
Belief that it cannot harm you	272(66.0)	140(34.0)
Unavailability of funnel	122(29.7)	288(70.3)
Inaccessibility in the market	129(31.7)	277(68.3)
Perception that mouth pipetting makes work easier and faster	321(77.2)	95(22.8)
Belief that whether one mouth pipette or not, one thing must kill a man one day	209(50.7)	203(49.3)

4.9b: Factors that can help one stop mouth pipetting of petrol (Enabling factors)

Variables	*Yes (%)*	*No (%)*
Conducting training on work safety	393(94.0)	25(6.0)
Provision of personal protective equipments	353(85.2)	61(14.8)
Awareness creation on health hazard associated with petrol inhalation and drinking	388(92.6)	31(8.4)
Subsidize cost of funnel	115(27.8)	299(72.2)
Ban on mouth pipetting	192(46.2)	223(53.8)
Accessibility to the market	185(45.2)	224(54.8)
Provision of fuel by the customer	384(91.9)	34(8.1)
Use of hand pump or rubber pump	379(91.5)	35(8.5)

4.9c: Factors that can help sustain positive behaviour towards mouth pipetting (Reinforcing factors)

Variables	*Yes (%)*	*No (%)*
Monitoring by your boss/master at work	343(82.7)	72(17.3)
Encouragement from colleagues at work	323(78.2)	90(21.8)
Reminder messages on danger of mouth pipetting from a health provider	361(87.0)	54(13.0)
Encouragement from the family members to stay away from mouth pipetting	364(89.0)	45(11.0)
Awareness creation from the media	378(91.5)	35(8.5)
Accessibility to the market	202(49.3)	199(50.7)
Use of hand pump or rubber pump	391(94.2)	24(5.8)

4.5: Preventive Practices for Avoiding Hazards Associated with Mouth Pipetting

Table 4.10 shows the distribution of the respondents' preventive practices for avoiding hazards associated with mouth pipetting of petrol. The results indicated that almost all the respondents have never reported any incidence of accidental drinking of petrol to a health care provider. Only 46(11.1%) have agreed to have once a while reported such to a health care provider. On the post exposure prophylasis (PEP) contact person's number in case of an emergency at places of work or workshops. Again 384(92.5) has reported that they do not have any contact person's number in the hospital except for the few 31(7.5%) who does.

About 395 (95.5%) believed they are not supposed to use hand gloves when working with petrol. Similarly, most of the respondents do not use nose cover 405(97.1%); goggle/glasses 407(97.7%) and apron/jacket 307(73.4%) as against 12(2.9%); 9(2.3%) and 108(26.0) who claimed to use the aforementioned PEP. However, a good number of the respondents 384(92.1%) reported that they always wash their hands before eating during working hours while only 70(17.0%) go for medical checkups at the hospital/clinic regularly.

In contrast to the low level of use of other PPE presented above, about 260(62.4%) always use safety boot during working periods. Refer to table 5 below for details. Generally, two thirds of the respondents had poor practice level 319(76.3%), 87(20.7%) had average practice level while only 16(3.0%) of the respondents had high practice level.

Table 4.10: Distribution of Respondents' Preventive Practices for Avoiding Hazards Associated with Mouth Pipetting

Variables	*Yes (%)*	*No (%)*
Ever reported any incidence of accidental drinking of petrol to health care provider?	46(11.1)	367(88.9)
Have post exposure prophylasis (PEP) contact person's phone number in any hospital in case of an emergency	31(7.5)	384(92.5)
Used hand gloves when transferring petrol from one can to vehicle/motorcycle tank?	19(4.5)	395(95.5)
Used nose cover when transferring petrol?	12(2.9)	405(97.1)
Used goggle/glasses when transferring petrol?	9(2.3)	407(97.7)
Used apron/jacket when transferring petrol?	108(26.0)	307(73.4)
Always wash your hands before eating during work hours?	384(92.1)	33(7.9)
Went for regular medical check-ups at the hospital/clinic?	70(17.0)	342(83.0)
Always used safety boot during working periods?	260(62.4)	157(37.6)

Table 4.11: Levels of Preventive Practice of the Respondents

Scores (9pts)	*Frequency (%)*
Poor Practice (< 2)	319 (76.3)
Average Practice (3 – 5)	87 (20.7)
High practice (> 6)	16 (3.0)
TOTAL	**418(100)**

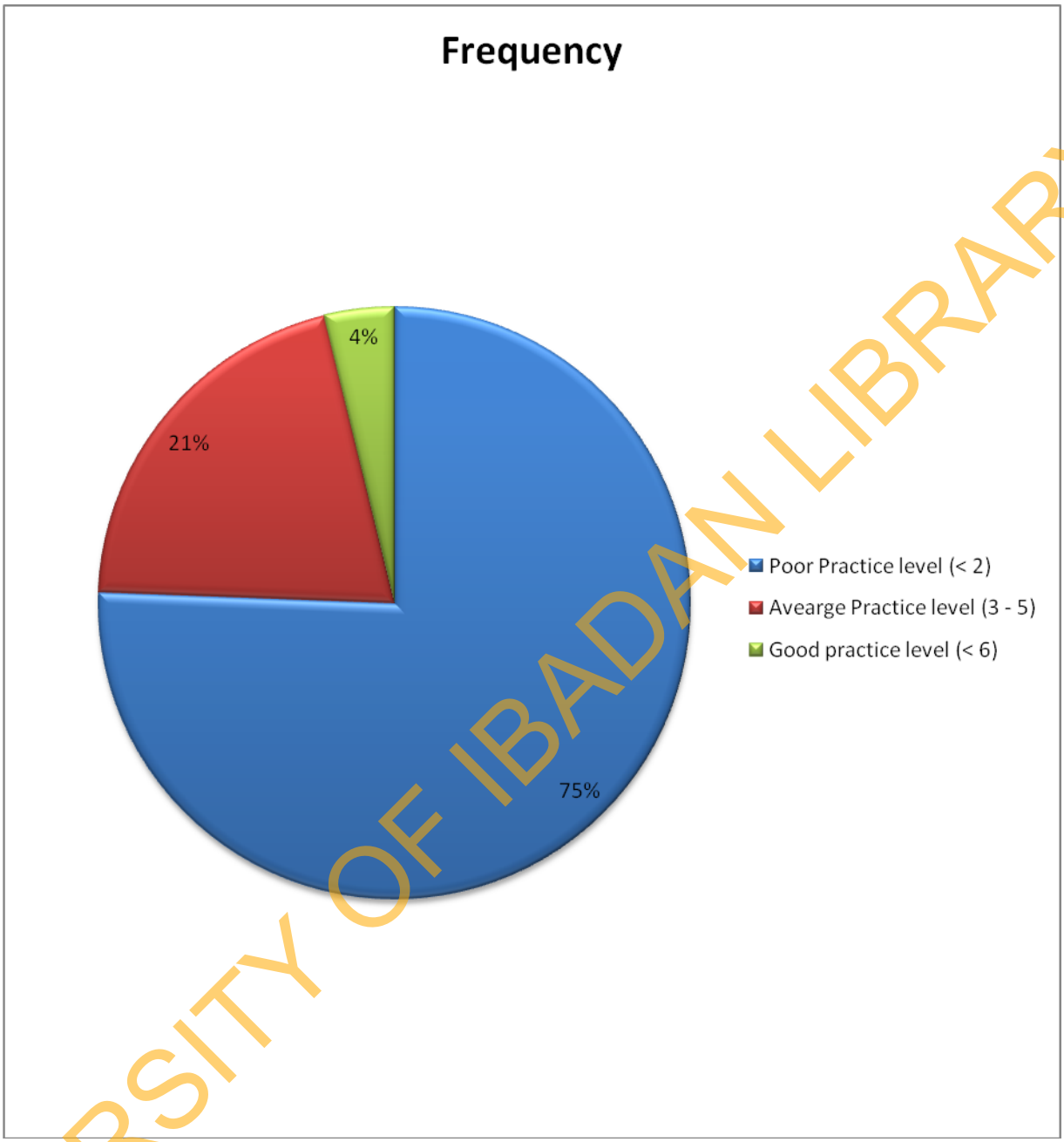

FIGURE 4.7: LEVELS OF PREVENTIVE PRACTICE AMONG RESPONDENTS

4.6 Results of Hypotheses Testing

The results of the hypotheses tested are shown below;

The first null hypothesis stated that there is no significant association between demographic variables (age, level of education, area of specialization, marital status) and the knowledge of health hazards associated with petrol inhalation and drinking. The results of the findings are shown in the **Tables 4.12a, 4.12b, 4.12c** and **4.12d**. The tables 4.12a, 4.12c and 4.12d showed that there were no significant association between the age (P = 0.499), area of specialization (P=0.100), marital status (P = 0.720) and the respondents knowledge of associated health hazards of petrol inhalation and drinking. So, the null hypotheses were not rejected for the variable; age, area of specialization and marital status. However, table 4.12b shows a statistically significant association between the level of education of the respondents and knowledge of associated health hazards of petrol inhalation and drinking with P = 0.001, therefore, the null hypothesis was rejected for the variable. The implication is that the level of education has a significant influence on their knowledge of associated health hazards of petrol inhalation and drinking.

The second hypothesis stated that there is no significant association between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the prevalence of mouth pipetting of petrol. The result of the finding is shown in **Table 4.12e**. Pearson Chi square statistics was used to test if there is an association between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the prevalence of mouth pipetting of petrol and it was found that there is a statistically significant association with P = 0.000. This means that the respondents' poor knowledge of health hazards associated with petrol inhalation and drinking has a significant influence on their prevalence of mouth pipetting. Therefore, the null hypothesis was rejected.

The third hypothesis stated that there is no significant association between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the preventive practices for avoiding hazards associated with mouth pipetting. **Table 4.12f** shows the result of the finding. The relationship between the respondents' knowledge of health hazards associated with petrol inhalation and drinking and the preventive practices for avoiding hazard associated with mouth pipetting of petrol was

tested using Pearson Chi Square statistics. The association was found to be statistically significant with (P = 0.000). This indicates that the knowledge of associated health hazards of the respondents has a statistically significant influence in the preventive practices for avoiding hazards associated with mouth pipetting of petrol. Therefore, the null hypothesis was thus rejected.

Test of Hypothesis

4.12a: Association between Age and the respondents' level of knowledge of associated health hazards of petrol inhalation and drinking

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**Pval**	H0
Age	16-20	27	4	1	**32**				
	21-25	34	10	1	**45**				
	26-30	62	14	1	**77**	15.348	16	0.499	Accepted
	31-35	49	20	3	**72**				
	36-40	53	17	1	**71**				
	41-45	33	7	2	**42**				
	46-50	25	7	4	**36**				
	51-55	33	6	3	**42**				
	56-60	3	1	0	**4**				
	61-65	1	0	0	**1**				
Total		**320**	**86**	**16**	**422**				

*Note: Non responses were excluded; P>0.05 = Not significant***

4.12b: Association between Level of education and the respondents' knowledge of associated health hazards of petrol inhalation and drinking

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**Pval**	H0
Level of education	Primary	151	29	6	**186**				
	Secondary	131	33	10	**174**				
	Tertiary	7	11	0	**18**	28.551	10	0.001	Rejected
	Quoranic education	4	1	0	**5**				
	No formal education	24	12	0	**36**				
	Others	2	1	0	**3**				
Total		**319**	**87**	**16**	**422**				

*Others** Technical education and adult education; Note: Non responses were excluded; P<0.05 = Significant**

4.12c: Association between Area of Specialization and the respondents' knowledge of associated health hazards

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**P**	H0
Area of Specialization	Truck/Trailer	29	11	4	**44**				
	Car	227	60	6	**293**	10.647	6	0.100	Accepted
	Bus	62	15	6	**83**				
Total		**318**	**86**	**16**	**420**				

*Note: Non responses were excluded; P>0.05 = Not significant***

4.12d: Association between marital status and the respondents' knowledge of associated health hazards

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**Pval**	H0
Marital Status	Single	71	18	0	**89**				
	Married	231	66	16	**313**				
	Cohabiting	5	1	0	**6**	7.057	10	0.720	Accepted
	Divorced	7	1	0	**8**				
	Separated	2	0	0	**2**				
	Widow	3	1	0	**4**				
Total		**319**	**87**	**16**	**422**				

*P>0.05 = Not significant***

4.12e: Association between preventive practices for avoiding hazards and the respondents' knowledge of associated health hazards of petrol inhalation and drinking

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**Pval**	H0
Level of practice	Poor practice (<2)	236	46	2	**284**				
	Average Practice (3-5)	75	31	14	**120**	57.589	4	0.000	Rejected
	High Practice (>6)	4	10	0	**14**				
Total		**315**	**87**	**16**	**418**				

*P<0.05 = Significant**

4.12f: Association between prevalence of mouth pipetting and the respondents' knowledge of associated health hazards of petrol inhalation and drinking

		Overall level of knowledge of the respondents							
		Poor knowledge	Fair knowledge	Good knowledge	**Total**	**X2**	**Df**	**Pval**	H0
Ever siphon petrol with mouth	Yes	317	84	10	**411**				
	No	2	3	6	**11**	81.903	2	0.000	Rejected
Total		**319**	**87**	**16**	**422**				

*P<0.05 = Significant**

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This study examined the prevalence of mouth pipetting of petrol and knowledge of associated health hazards among automobile mechanics in Lokoja local government of Kogi state. This chapter explains the results given in chapter four. The socio-demographic characteristics of the respondents, their prevalence of practice of mouth pipetting of petrol, knowledge of health hazards associated with mouth pipetting, factors contributing to mouth pipetting of petrol and preventive practices for avoiding inhalation and accidental drinking of petrol were investigated. Implication of the findings of this study to health promotion and education was as well discussed and recommendations were made at the end of this report. Major findings are discussed below:

5.1 Socio – demographic characteristics

A total of four hundred and twenty two (422) respondents with mean age of 35.93±10.7 and the range of 18 – 65 years participated in the study. This was because apprentices were included in this study. The age range of this study is similar to other previous studies age ranges (13–72 years) which were reported in roadside automobile mechanics in Ibadan and (18–62) years in Ilorin, respectively in which apprentices were included as well. (Omokhodion, 1999; Awoyemi, 2002). The statistical test shows that there was no statistically significant association between the age of the respondents and their knowledge of health hazards associated with petrol inhalation and drinking.

As usual the number of females involved in the automobile mechanic is zero compared to their male counterparts in the study location. The respondents were all males (Table 4.4). This corroborate that automobile mechanic is still considered as a male profession. This might be as a result of the hard nature of the job automobile mechanics do rather than underrepresentation of women. This finding is consistent with the previous study in Elele, Rivers State, Nigeria (Ajugwo et al, 2014). However, there are few females undertaking the job in another previous study in Lagos State, Nigeria by Abdulsalam et al, (2015), where two female automobile mechanics were recorded. This is in conformity with the societal norms that predispose male folks to more difficult work than the females (predisposing factors).

Most of the participants were Christians and the major ethnic group represented is Yoruba. This is not unusual because Lokoja was part of the thirteen local government areas carved out from the former Kwara State, and it is as well bounded by Ondo, Ekiti and Edo States to the west. That is why Lokoja is in the Western senatorial district of Kogi State. The result of the finding in this current study is supported by the study done in Zaria, North Western Nigeria by Sambo, M.N, Idris, S.H and Shamang, A, (2012) who reported that Yoruba ethnic group was found to be the leading ethnic group in the profession. This trend can be attributed to the believe that in Yoruba land even if one has formal education there is need to have other skills that can be self-sustaining.

5.2 Prevalence of mouth pipetting of petrol

The results of this study have shown that the prevalence of mouth pipetting of petrol among automobile mechanics is very high (97.4%). This may perhaps be attributed to lack of knowledge of associated health hazards and probably the perception that mouth pipetting makes work easier and faster among the respondents. Other reason maybe be due to the anecdotal information that the practice is most prevalent during weekends and festive seasons (i.e Christmas, Easter and Sallah periods) when owners of vehicles will be putting their vehicles in good shape for the celebration of the festive season. Although this is inconsistent with what is obtainable in the developed countries where intentional inhalation of solvents such as gasoline is prevalent because of peer influences, easy availability, legality, and rapid mood elevating effects (Waraich, et al, 2003). In as much there is paucity of information to support this finding in this current study on the prevalence of practice of petrol; there are numbers of documented empirical trials that have dealt with the effects of lead exposure among the respondents. For example, according to a study, health effects of lead exposure among Jua Kali workers in Mombasa, Kenya by Ashraph et al, (2013), who looked at the haemoglobin levels by comparing two (2) groups of workers (lead-exposed and lead-unexposed as test and control group respectively). In the study, 17.6% of the test population had haemoglobin level less than 13g/dl as compared to the control group which had 2.4%. What this means is that lead had an effect on the haemoglobin levels. In other words, lead inhibits certain enzymes necessary for haem-synthesis.

Considering the high prevalence of practice of mouth pipetting of petrol recorded among the respondents of this study, it is suggestive that automobile mechanics would have been

overexposed to lead based on the fact that automobile mechanics work with petrol on daily basis and leaded petrol is still being use in the automobiles on the Nigerian roads. Also, in another study, comparative assessment of blood lead levels of automobile technicians in roadside and organized garages in Lagos, Nigeria, Abdulsalam et al, (2015) found that the organized group had statistically significant higher median blood lead levels of 66.0%µg/dl than the roadside 43.5% µg/dl with (P<0.05) of which blood lead level in excess of 40 µg/dl are taken as the absolute highest which should be permitted globally (WHO, 1980). The statistical test revealed significant difference in the blood lead levels of the respondents. The difference in their median was statistically significant in that study, which means that there was an increased level of exposure of the workers to lead. As well, the study found that automobile technicians in organized garages in Lagos had higher prevalence of elevated blood lead levels and higher median blood lead level than the roadside group. This was attributed to poor ventilation in most garages in the area. In this current study, there was a statistically significant association between the knowledge of health hazards associated with petrol inhalation and drinking and the prevalence of practice of mouth pipetting of petrol among the respondents. This shows that the respondents' knowledge of health hazards has a significant influence on the prevalence of practice of mouth pipetting of petrol with (P = 0.000).

5.3 Knowledge of Health Hazards Associated with Petrol Inhalation and Drinking

This study has revealed that 75.6% of the respondents had poor knowledge of health hazards associated with petrol inhalation and drinking while 20.6% had fair knowledge. Only 3.8% had good knowledge. This is surprising because the respondents' level of education indicated that majority (44.2%) completed their primary education and (41.2%) completed secondary education while (8.8%) had no formal education, it is expected that the knowledge should be higher than what it is, maybe the health hazards of petrol were not included in their curriculum. In all probability, it can also be linked with the lack of media campaign and information on the health hazards of petrol from the Nigerian National Petroleum Corporation (NNPC) who is the key player in the Nigerian oil sector. When asked whether mouth pipetting is not dangerous to their health, over a half of the respondents 58.6% said yes. Some of the respondents even went further to proof their lack of knowledge by saying that petrol is medicinal – that they used it to treat toothache. Older respondents believed that petrol has accustomed to their body system because they

have been siphoning fuel right from their apprentice days when they were much younger, therefore never considered themselves at risk of any harmful effect of exposure to petrol. The finding of this study is supported by Awoyemi, (2002). The study reported that the knowledge about the chemical and biological hazards of the occupation was low. He opined that some of the auto mechanics had a misconception about the extent of harm that such chemicals could cause. For example, Awoyemi reported that petrol was believed by some of the respondents not to be poisonous if taken in small quantities such as siphoning it into a gallon container, a practice which is quite common in Nigeria. Instead they believe that petrol could act as purgative (Awoyemi, 2002). He said that the knowledge about biological hazards in the occupation of the auto mechanics was low and even accuracy of knowledge was even lower. This was in agreement with the findings of this current study.

One of the respondents reported that "even if I accidentally drank petrol, the only effect it would have on me is that it would make my eyes to be reddish in colour", and another respondent supported by saying that "the fellow will be confused for some time like say thirty (30) minutes before regaining consciousness". Another also added that "the person will be behaving in such a way that one may think he smoked marijuana (Indian hem)". This is true according to (ATSDR, 2014) which reported that acute gasoline exposure can cause transient CNS excitation followed by CNS depression. Confusion, giddiness, nausea, headache, blurred vision, dizziness and weakness can occur. In massive exposures, rapid CNS depression, respiratory depression, seizures, loss of consciousness, coma, and death has been reported (ATSDR, 2014).

Just like what was reported earlier in this study, benzene and xylene are other chemical components of petrol which have various degrees of health effects of their own. Xylene has the capacity to cause health effects from both acute and chronic exposures. But its seriousness depends on factors such as the amount of chemical one is exposed to and the length of time one is exposed. Also, there is evidence about health effects linked with low dose exposures to benzene in petrol. Benzene is acutely toxic by inhalation, causing mucous membrane irritation, neurological etc. This is supported by Udonwa et al, (2009) who conducted a study to investigate the potential risk of exposure to premium motor spirit (petrol) fumes in Calabar, Nigeria, among automobile mechanics, petrol station attendants and the general population, in which venous blood was taken for

methaemoglobin (MetHb) and packed cells volume (PCV). The study reported that mean MetHb value was higher in automobile mechanics (7.3%) than in the subjects from the general population (2.7%) and the increase was attributed to benzene exposure. Udonwa et al opined that few studies have reported haematological disorders associated with the exposure to benzene in the environment in less developed countries, and one of such studies is the one conducted by Ajugwo et al, (2013), reduced haematological indices in auto mechanics and fuel attendants in Elele, Nigeria in which haematological parameters were used to determine the level of exposure in fuel attendants and auto mechanics. The study reported that red blood cell (RBC), haemoglobin concentration (Hb), mean cell haemoglobin (MCH) and mean cell haemoglobin concentration were reduced in fuel attendants than in automobile mechanic when compared to the control ($P<0.05$). These were attributed to the effects of benzene and xylene in the petrol. Benzene causes pancytopenia and could lead to bone marrow aplasia while xylene has been found to cause leucopenia. These changes could lead to impaired migration of phagocytic cells, lower resistance to viruses, bacteria and foreign bodies Ajugwo et al, (2013). With poor or even lack of knowledge of these health hazards associated with petrol inhalation and drinking among the respondents portend a greater public health danger among this group of individuals, families and their immediate communities.

Although the knowledge of the respondents was poor, less than half (41.3%) mentioned CNS depression and eye irritation as diseases they can get from petrol inhalation and drinking. Although (11.2%) believed that lead poisoning is associated with drinking and inhalation of petrol, only (37.1%) agreed that death due to circulatory failure is associated with ingestion of petrol. This observation is in harmony with ((ATSDR, 2014; Oluwagbemi, 2007) which had in different studies reported sudden death.

5.4 Sources of Information

Despite the fact that the sources of information are not tied to a particular health hazards that can be caused by petrol poisoning, majority of the respondents (87.8%) reported that they learned about the health hazards associated with exposure to petrol through personal observation of its reaction in their body, this was followed by (25.5%) of the respondents who attributed their knowledge to awareness campaign on the health hazards of petrol (Table 4.8).

5.5 Factors Contributing to Mouth Pipetting of Petrol

Majority of the participants of this study 89.4% (Table 4.9a) considered lack of knowledge of associated health hazards (predisposing factor) as the major factor promoting the practice of mouth pipetting of petrol. This was followed by perception that mouth pipetting makes their work easier and faster (77.2%) and (62.2%) festive seasons (such as Christmas, Sallah, and Easter celebrations) respectively. But most of the participants believed that conducting training on work safety, provision of personal protective equipment (PEP) and awareness creation on health hazard associated with petrol inhalation and drinking (Enabling factors) can help them stop mouth pipetting of petrol. Likewise, provision of fuel by the customer who comes to their workshop for vehicle repairs and services, and the use of hand pump will go a long way in helping them stop the practice (Table 4.9b)

5.6 Preventive Practices for Avoiding Hazards Associated with Mouth Pipetting

Generally as expected, the results of this study shows that (76.3%) had poor preventive practice level, (20.7%) of the respondents had average practice level, while only (3.3%) had high preventive practices for avoiding hazards associated with mouth pipetting. Of course, this can be attributed to their poor knowledge of health hazards associated with petrol inhalation and drinking. It is corollary that with the observed poor knowledge of health hazards, preventive practices for avoiding inhalation and drinking will also be low. This claim is supported by Ashraph et al, (2013) even though the view is not entirely on knowledge of health hazard of mouth pipetting, Ashraph et al, said that the study realized very low awareness level (6.7%) of lead and its effects among the Jua Kali workers of which mechanics form the bulk of the respondents. This according to Ashraph et al, is despite all international campaigns to ban or reduce lead levels in products and in environment over four decades ago. The study found that since the workers' awareness level is low, it is expected that the use of personal protective equipment also was low (2.5%).

The result of this study also shows that almost all the respondents (88.9%) have never reported any incidence of accidental drinking of petrol to a health care provider (Table 4.10) even though (2.3%) reported when someone died as their source of information. It can also be attributed to a bit above half of the respondents who believed that whether one mouth pipettes or not, one thing must kill a man one day. However, a good number of the

respondents reported that they always wash their hands before eating during work hours – even at that – they make use of petrol to wash hands sometimes. Only (17%) agreed that they go for medical check-ups at the hospital/clinic regularly. This finding is in line with the report that these classes of workers are hardly subjected to regular medical check-ups to detect potential serious risk the exposure to petrol may have Udonwa, (2009).

5.7 Implications of the findings for Health Promotion and Education

Some of the major components of health promotion and education include health education, improved service delivery, and creating supportive environment amongst others. It involves the facilitation of skills in individuals and changes in environments which impact positively on health. In health education; information is directed to individuals, families and communities to influence their knowledge, attitudes and practices which will bring about change in behaviour. This could be accomplished through information dissemination and provision of improved service delivery. Creating enabling environment; changing of life's pattern, observing work safety measures can impact on the health of people. Health promotion and education also emphasizes development of personal skills, which means therefore, health promotion corroborates personal development through providing information, education for health and enhancing life building skills, by so doing, it increases the options available to people to bring to bear more control over their own health and over their environments, and to make informed decision that is conducive to health.

This study found out that the knowledge of health hazards and preventive practices among the automobile mechanics is poor, despite the high prevalence of practice of mouth pipetting of petrol. Providing Information, Education and Communication materials and constant skill acquisition seminars can be used to address the poor level of knowledge and preventive practices. The process can be achieved with the use of multiple strategies which stresses matching the various determinants of behaviour with different interventions and which must be systematically planned activity.

The educational intervention should include provision of information about the effects of mouth pipetting and its associated health hazards. For example provision of leaflet/booklets for the literate among the automobile mechanics which can actually

provide social support for their colleagues, visual displays of video clips on the danger of exposure to lead and one-on-one advice. Secondly, provision of opportunities for the automobile mechanics to share and explore their values and attitudes and come to a decision. For example, the use of group discussion and one-on-one counselling by the healthcare provider. Thirdly, helping them develop informed decision-making skills required for healthy exploring real life situations and role play. Examples, their reaction when required to mouth pipette petrol and negotiating the use of other means of transferring petrol rather than using mouth. Other strategies involve training opinion leaders on how to influence their followers to adopt work safety measures in the form of continuing education, conference or workshop and effective communication or public enlightenment based on the training needs assessment.

The programme intervention should be adequately monitored by the implementers by ensuring that the programme implementations are not going off track as against what was planned. It can be done with a good monitoring system put in place. For instance, attending training sessions or review meetings of automobile mechanics to ensure that what is taught is being followed and carried out. Monitoring can target the use of the services provided and also take note if there is any real resistance to adopting an innovation. With this signals, technical support can be offered by the program manager to guarantee the success of the intervention. The success or failure of the intervention is however dependent on the results of the evaluation of the programme.

Therefore, evaluation should span from the beginning of the programme to the end. That is, through programme inputs, process and outcomes of the programme implementation. For a training programme, a pre and post tests can be conducted to ascertain whether there is an increase in knowledge and acquisition of new skills and improvement in the preventive practices for avoiding hazards associated with petrol exposure. Also, observational technique with observational checklist as a tool can be employed to observe compliance in the use of personal protective equipment among the target population.

By providing adequate and appropriate information, steps must be taken to ensure that well-structured guidelines are set so as to achieve a communication that is effective. Service improvement and creating supportive environment can be achieved by providing required facilities and equipment needed for preventive practices for avoiding hazards.

This should be with health education component so as to provide the information that will promote the good preventive practices for avoiding petrol inhalation and accidental drinking.

In summary, interventions can only work when they have widespread community support and include the participation of community members. Developing and fostering this support among automobile mechanic community across Kogi State and Nigeria at large, is therefore critical in the anti-mouth pipetting of petrol campaign. All these are necessary in health promotion and education if desired positive behaviour change is to be achieved, and can be accomplished by health promoters in collaboration with key stakeholders in education and donor agencies.

5.8 Conclusion

The results from this study revealed a high prevalence of practice of mouth pipetting of petrol among the automobile mechanics in Lokoja local government area of Kogi State. This study has given us an insight into the level of petrol exposure to this group of professionals in Lokoja, Kogi State, Nigeria. Considering the proportion of the respondents with the prevalence of mouth pipetting of petrol and based on the fact that the effects of lead are the same irrespective of the route of entry - be it inhalation or ingestion, it is therefore safe to conclude that lead toxicity is a public health problem that does occur among automobile mechanics in Nigeria.

The current study also showed that (75.6%) had poor knowledge, (20.6%) had fair knowledge whereas only (3.8%) had good knowledge of the health hazards associated with mouth pipetting of petrol. Generally, the researcher can conclude that there was poor knowledge of associated health hazards of petrol among the automobile mechanics in the study location. The study demonstrated that the automobile mechanics' knowledge of health hazards is considerably influenced by their level of education because the hypothesis was subjected to statistical analysis it was found to be statistically significantly associated. The study further demonstrated that there was poor preventive practice level for avoiding hazards associated with mouth pipetting of petrol among automobile mechanics due to non-use or lack of proper utilization of PPE and their poor knowledge on the associated health hazards. The reason being that the association was established to be statistically significant with (P = 0.000). This indicates that the poor knowledge of

associated health hazards among the automobile mechanics has a statistically significant influence on their preventive practices for avoiding hazards associated with mouth pipetting of petrol.

In spite of the poor knowledge and poor practice level, few 3.8% and 3.3% amongst them who had good knowledge and high practice level respectively, indicated that their chief source of information for the associated health hazard is through personal observation of the reaction of the ingested and inhaled petrol in the body. This means that more campaign and awareness creation by health care provider is highly needed.

5.9 Recommendations

Based on the findings from this study, the following recommendations are made:

1. The use of technologically developed manual or hand pump should be encouraged among automobile mechanics. This will no doubt reduce exponentially the level of exposure to petrol poisoning associated with mouth pipetting of petrol.

2. The study showed poor level of knowledge of health hazards associated with mouth pipetting of petrol. So, training and awareness programmes should be organized for Nigerian Automobile Technicians Association (NATA) at the state level in order to increase their knowledge on the health hazards as well as the danger of siphoning fuel with mouth**.**

3. Advocacy should be used by the State Ministry of Health to influence programme planners and decision makers to design or create programme of intervention aimed at improving the preventive practices for avoiding petrol inhalation and accidental drinking, and also providing free personal protective equipments for them. This will no doubt encourage them in adopting the innovation as well as help to increase proper utilization of PPE

4. Also, the Nigerian Automobile Technicians Association (NATA) at the state level should make it mandatory for customers who come for vehicle repair and services, to come along with extra petrol so that automobile mechanics do not have to mouth pipette petrol in the course of car services.

5. Considering the high prevalence of the practice of mouth pipetting recorded in this study, the researcher thereby recommend that the Kogi State Government should conduct free medical check-ups for the automobile mechanics and treatment for those with health issues among them. This will serve as means of encouragement for subsequent intervention in the future.

5.10 Suggestion for further research

Based on the findings of this study, the researcher therefore suggested that further clinical trial be conducted to determine the blood lead level among the automobile mechanics in the state.

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APPENDIX 1 : QUESTIONNAIRE

Introduction

My name is AMEH, Stephen Audu. I am a Masters of Public Health Student from the Department of Health Promotion and Education, College of Medicine, University of Ibadan. I am carrying out a study titled**: "PREVALENCE OF MOUTH PIPETTING OF PETROL AND KNOWLEDGE OF ASSOCIATED HEALTH HAZARDS AMONG AUTOMOBILE MECHANICS IN LOKOJA LOCAL GOVERNMENT AREA, KOGI STATE".**

It is expected that the outcome of this study may provide the basis for increase health education and information about the health associated hazards involved in mouth pipetting among auto mechanics. This study will also avail the public health professionals and planners opportunity to design an intervention in this area. You are therefore invited to participate in this study by providing answers to questions below. There is no right or wrong answers so you are encouraged to contribute meaningfully. I do not require your name for the questionnaire. I shall be grateful if you are honest in answering all the questions. Information provided will be kept confidential and used for the purpose of this research only.

Note: the research is free of risk and participation is entirely voluntary.

Thank you for your cooperation.

SECTION A: SOCIO-DEMOGRAPHIC INFROMATION

INSTRUCTION: *Please tick [√] as appropriate in the boxes provided*

1. Gender 1. Male [ ] 2. Female [ ]
2. Age in years as at your last birthday…….years
3. Area of specialization: 1. Truck/trailer [ ] 2. Car [ ] 3. Bus [ ]
4. Years of experience 1. Less than 5 years [ ] 2. 5-10 years [ ] 3. 11-20 years [ ] 4. 21-30 years above [ ]
5. Work Zone: 1. Ganaja Village [ ] 2. Army barracks [ ] 3. Felele [ ] 4. Town [ ] 5. Nataco[ ]
6. How much money do you make from your work in a week?.....
7. Level of Education:

   1. Primary [ ] 2. Secondary [ ] 3. Tertiary [ ] 5. Quaranic [ ] 6. No formal education [ ]

   7. Others (Specify)……

8. Religion:

   1. Christianity [ ] 2. Islam [ ] 3. African Traditional Religion [ ] 4. Others(Specify)……

9. Marital Status:

1. Single [ ] 2. Married [ ] 3. Cohabiting [ ] 4. Divorced [ ] 5. Separated [ ] 6. Widow [ ] 7. Widower [ ]

10. Ethnicity:

1. Igala [ ] 2. Yoruba [ ] 3. Okun/Kabba [ ] 4. Ebira [ ] 5. Igbo [ ] 6. Hausa [ ] 7. Oworo [ ] 8. Kakanda [ ] 9. Nupe [ ] 10. Others (Specify). . . . . .

11. Parental Marital Status

1. Single Parent [ ] 2. Married [ ] 3. Divorced [ ] 4. Separated [ ]

12. Father's Educational Status:

1. Primary [ ] 2. Secondary [ ] 3. Tertiary [ ] 4. No formal education [ ]
5. Quaranic Education [ ] 6.Others (Specify) ……

13. Mother's Educational Status:

1. Primary [ ] 2. Secondary [ ] 3. Tertiary [ ] 4. No formal education [ ]
2. 5. Quaranic Education [ ] 6. Others (Specify)……

14. Father's Occupation:

1. Farmer [ ] 2. Petty Trader [ ] 3. Businessman [ ] 4. Artisan [ ] 5. Civil servant [ ]
6. Retired [ ] 7. Clergy [ ] 8. Traditional ruler [ ] 9. Others, write them here……..……

15. Mother's Occupation

1. Farmer [ ] 2. Trader [ ] 3. Artisan [ ] 4. Civil servant [ ]
4. Retired [ ] 6. Others, write them here . . . . ……

16. Local Government Area of Residence: ……..……..…….

SECTION B: PREVALENCE OF PRACTICE OF MOUTH PIPETTING OF PETROL AMONG AUTO MECHANICS

17. Have you ever siphon petrol with your mouth from can (jerrycan or gallon) to vehicle tank before?

1. Yes [ ] 2. No [ ]

18. In which way did you transfer fuel (petrol) to a vehicle tank?

1. Use of hose [ ] 2. Use of funnel [ ] 3. Others (specify)……

19. How frequent to do mouth pipette petrol to vehicle tank?

1. Always [ ] 2. Sometimes [ ] 3. Never [ ] 4. Everyday [ ]

20. During which situations do you always mouth pipette petrol to vehicle tank?

1. Fuel scarcity [ ] 2. Vehicle repairs and services [ ] 3. Festive seasons [ ] 4.Weekends [ ]

21. How frequent do you draw petrol with mouth using a hosepipe in a week?

1. Once [ ] 2. Two times [ ] 3. Three times [ ] 4. Four times 5. Times [ ] 6. 10 times and above [ ]

22. Do you prefer the use of hose to funnel?

1. Always [ ] 2. Sometimes [ ] 3. Never [ ]

23. When last do you mouth pipette?.....

24. Why did you mouth pipette the last time?.....

SECTION C: KNOWLEDGE OF HEALTH HAZARDS ASSOCIATED WITH PETROL INHALATION AND DRINKING

25. Questions	**Options (Prompt if no answer)**	**1. Yes**	**2. No**	**3. I don't know**
. Please mention any disease one can get when you inhale or drink petrol	i. Central Nervous System (CNS) Depression			
	ii. Respiratory (breathing) problem			
	iii. Cardiovascular Disease			
	iv. Kidney failure			
	v. Gastrointestinal disease			
	vi. Skin irritation			
	vii. Eye irritation			
	viii. Lung dysfunction			
26. Questions	**Options *(Do not Prompt if no answer)***	**1.Yes**	**2.No**	**3.I don't know**
. If you answer yes to any of the above, where did you hear about it? (Sources of information about health hazards due to mouth pipetting	i. Through awareness by health workers			
	ii. Boss at work			
	iii. Media reports			
	iv. Mass media campaigns			
	v. Friends			
	vi. Postcards from a health care provider			
	vii. Health warning labels on a product			
	viii. When someone died suddenly from siphoning petrol mouth			
	ix. School			
	. x. Through personal observation of its reaction in my body			

Please kindly answer Yes, No or I don't know to the following statements				
	STATEMENTS	**1.Yes**	**2.No**	**3. I don't know**
27	Mouth pipetting or sucking of petrol is not dangerous to my health			
28	Even if someone drinks petrol, it does not last in the body			
29	Lead poisoning is associated with drinking and inhalation of petrol			
30	Any mechanic who has accidentally swallowed or inhaled petrol has a chance of becoming sick			
31	Some mechanics who allow petrol to enter their eyes or pour on their body do not know how to pipette petrol			
32	Petrol poisoning can cause problem of depression in the brain and spinal cord			
33	Heart disease has nothing to do with exposure to petrol			
34	Respiratory problem can never be as a result of exposure to petrol			
35	Symptoms of ingestion (drinking) of petrol can range from vomiting, drowsiness, convulsions and confusion to loss of consciousness			
36	Delayed effects of petrol ingestion may include uncontrollable bleeding of blood, problems to the liver and kidneys			
37	Death due to circulatory failure is associated with ingestion of petrol			

SECTION D: FACTORS CONTRIBUTING TO MOUTH PIPETTING OF PETROL AMONG AUTO MECHANICS

a) PREDISPOSING FACTORS:

38. Which of these factors can enhance mouth pipetting of petrol?

	STATEMENTS	**1.YES**	**2.NO**
i.	Fuel scarcity		
ii.	Festive seasons (e.g. Christmas, Sallah, Easter celebration)		
iii.	High cost of funnel		
iv.	Lack of knowledge of associated health hazards		
v.	Busy schedule at work		
vi.	Perception of professionalism in the practice of mouth pipetting		
vii.	Belief that it cannot harm you		
viii.	Unavailability of funnel		
ix.	Inaccessibility in the market		
x.	Perception that mouth pipetting makes work easier and faster		

xi.	Belief that whether one mouth pipette or not, one thing must kill a man one day		

39. List other factors you think can enhance mouth pipetting…….

b) ENABLING FACTORS:

40. Which of the following factors can help one stop mouth pipetting of petrol?

	STATEMENTS	1.Yes	2.No
I	Conducting training on work safety		
ii	Provision of personal protective equipments		
iii	Awareness creation on health hazard associated with petrol inhalation and drinking		
iv	Subsidize cost of funnel		
V	Ban on mouth pipetting		
Vi	Accessibility to the market		
Vii	Provision of fuel by the customer		
Viii	Use of hand pump or rubber pump		

c) REINFORCING FACTORS

41. The following can help to sustain behaviour of not mouth pipetting of petrol

	STATEMENTS	**1.Yes**	**2. No**
i.	Monitoring by your boss/master at work		
ii.	Encouragement from colleagues at work		
iii.	Reminder messages on danger of mouth pipetting from a health care provider		
iv.	Encouragement from the family members to stay away from mouth pipetting		
v.	Awareness creation from the media e.g. TV, Radio etc		
vi.	Accessibility to the market		
vii.	Use of hand or rubber pump		

SECTION E: PREVENTIVE PRACTICES FOR AVOIDING HAZARDS ASSOCIATED WITH MOUTH PIPETTING

	Please tick on 'Yes', 'No' or 'I don't know' to the statement below			
	STATEMENTS	**1.YES**	**2. NO**	**3. I DON'T KNOW**
42	Have you ever reported any incidence of accidental drinking of petrol your health care provider?			
43	Do you have post exposure prophylasis (PEP) contact person's number in any hospital in case of an emergency			
44	Do you use hand gloves when transferring petrol from one can to vehicle/motorcycle tank?			
45	Do you use nose cover when transferring petrol from one can to vehicle / motorcycle tank?			
46	Do you use goggle/glasses when transferring petrol from one can to vehicle/motorcycle tank?			
47	Do you use apron/jacket when transferring petrol from one can to vehicle/motorcycle tank?			
48	Do you always wash your hands before eating during work hours?			
49	Do you go for regular medical checkups at the hospital/clinic?			
50	Do you always use safety boot during working periods?			

THANK YOU FOR YOUR TIME.

APPENDIX 2: Informed Consent Form

INFORMED CONSENT FORM

Proposed ENGLISH written informed consent

(a) Participants Recruitment Procedure:

A descriptive cross sectional study design shall be used to recruit the study participants. Research Participants shall be recruited into the study using a Multistage sampling technique. These stages are stated below;

- **First:** A stratified cluster sampling method will be used to select the auto mechanic workshops in to clusters where study participants will be studied
- **Second:** Simple random sampling will be used to select auto mechanic workshops into the study by balloting
- **Third:** Proportionate sampling will be used to select the actual number study participants from each of the mechanic workshop
- **Fourth:** Table of simple random numbers will be used to select the actual study participants

(b) Information about payments and compensations available to participants including costs to participants for study participation

No compensation shall be given to the participants, but their indulgence and time spent filling the questionnaire will be highly appreciated. Your participation in this research will not cost you anything other than the time you will use in filling the questionnaire.

(c) A list of site details including site address and names of the PI, sub-investigating, study coordinators etc

The principal investigator of this research is Mr. Ameh Stephen of the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan.

(d) Confidentiality clause

All information collected in this study will be given code numbers and no name, address and contact information of the participant will be recorded. This cannot be linked to you in any way and your name or any identifier will not be used in any publication or reports from this study.

(e) Expected duration of research and participants involvement:

I am expecting to spend at least 4 weeks for the data collection using the interviewer-administer questionnaires. A participant would not spend more than 40 minutes in filling the questionnaire.

(f) A description of the procedures to which the participant will be subjected, including any experimental procedures that are innovative and have not been used in medical procedure:

There is no risk involved in this study as participants will only fill a questionnaire voluntarily in the comfort of their automobile workshops.

(g) Motivation for use of a placebo:

Use of placebo is not applicable because this research is not a clinical trial.

(h) Investigator's qualification

BSc (Ed) Chemistry Education

(i) Explanation of participants responsibility, foreseeable risk/discussion, benefits to participants, others or both during and after the research:

The participants are expected to answer the questions as contained in the questionnaires with all sincerity and truthfulness. Findings from this research shall be forwarded to the School Management and Kogi State Ministry of Health which can inform formulation of policies that would help in providing appropriate interventions for the target group.

3. Description of the extent to which confidentiality will be maintained:

Confidentiality of each participant will be maximally maintained during and after the collection of data. It will be ensured that the names and address of the participants are not written on the questionnaires. The data will be collected and kept in a secured place where public access will be restricted.

4. Statement of sponsor of the study (if any) may be able to inspect research records

Self-sponsored and the research records maybe inspected if need be by Department of Health Promotion and Education, Faculty of Medicine, University of Ibadan

5. **Explanation as to who to contact in the event of research related injury.**

You can contact the Principal Investigator in the event of research related injury.

6. **Explanation as to whether compensations will be given for research related harms.**

God willing you shall not suffer any research related harms, because the research is not invasive and filling of questionnaire will be done in the comfort of their automobile workshops

7. **Explanation as to the consequences of injury including medical treatments**

If you suffer any injury as a result of your participation in this research, the PI will be responsible for treatment in any government owned hospital in the state.

8. **Voluntariness:**

Your participation in this research is absolutely voluntary and you have the right to withdraw at any time you wish to do so

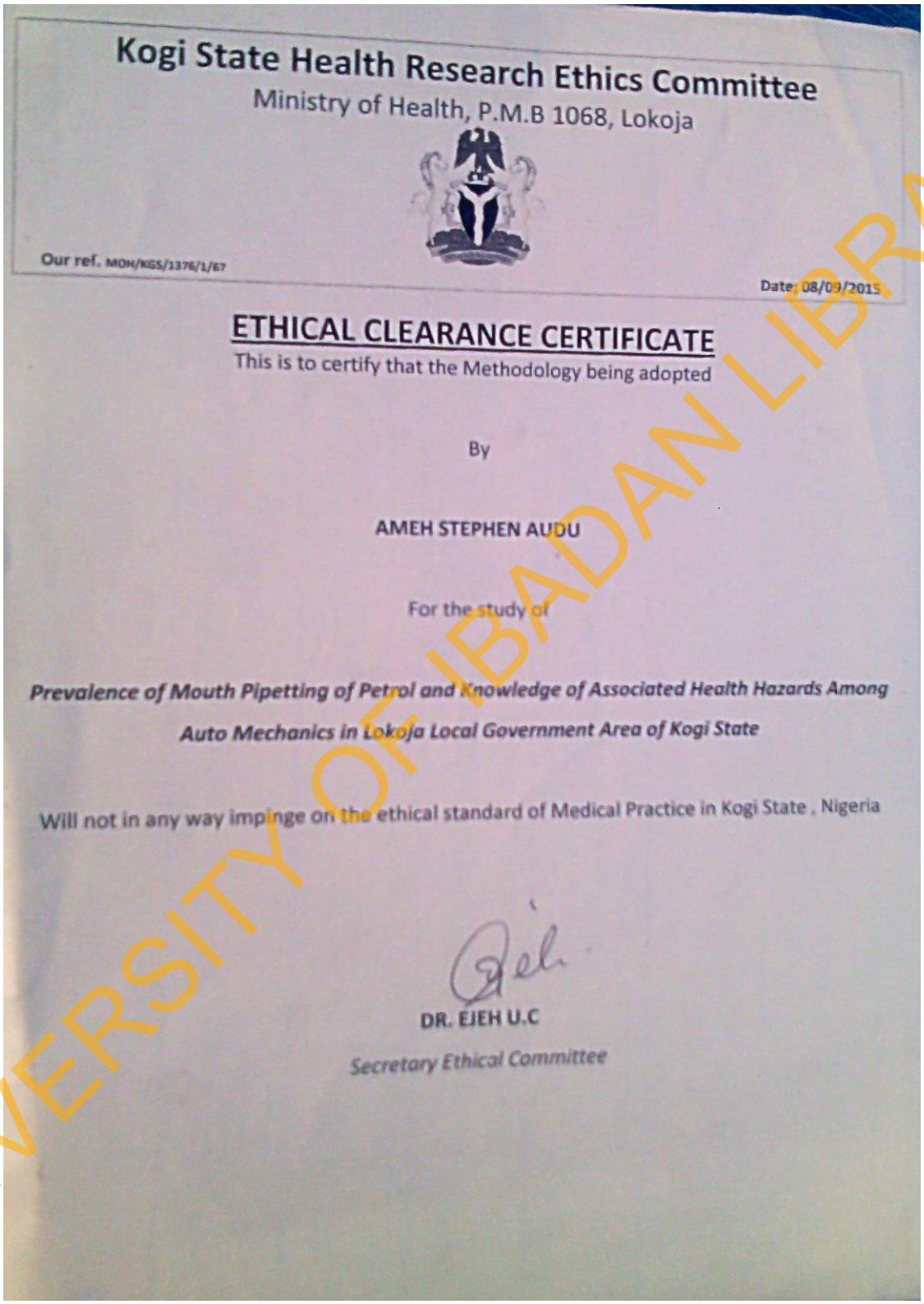
Alternatives to participation:

If you choose or decide to discontinue your participation, this will not affect you in any way neither involve any penalty whatsoever

9. **Consequences of participants' decision to withdraw from the research and procedure for orderly termination of participation:**

You have the right to withdraw from the research at any time you wish to do so. Please note that some information that has been obtained about you before you choose to withdraw may have been modified or used in reports and publications. These cannot be removed anymore. However we shall make effort in good faith to comply with your wishes as much as is practicable.

APPENDIX 3: Ethical Approval



Kogi State Health Research Ethics Committee
Ministry of Health, P.M.B 1068, Lokoja

Our ref. MOH/KGS/1376/1/67

Date: 08/09/2015

ETHICAL CLEARANCE CERTIFICATE

This is to certify that the Methodology being adopted

By

AMEH STEPHEN AUDU

For the study of

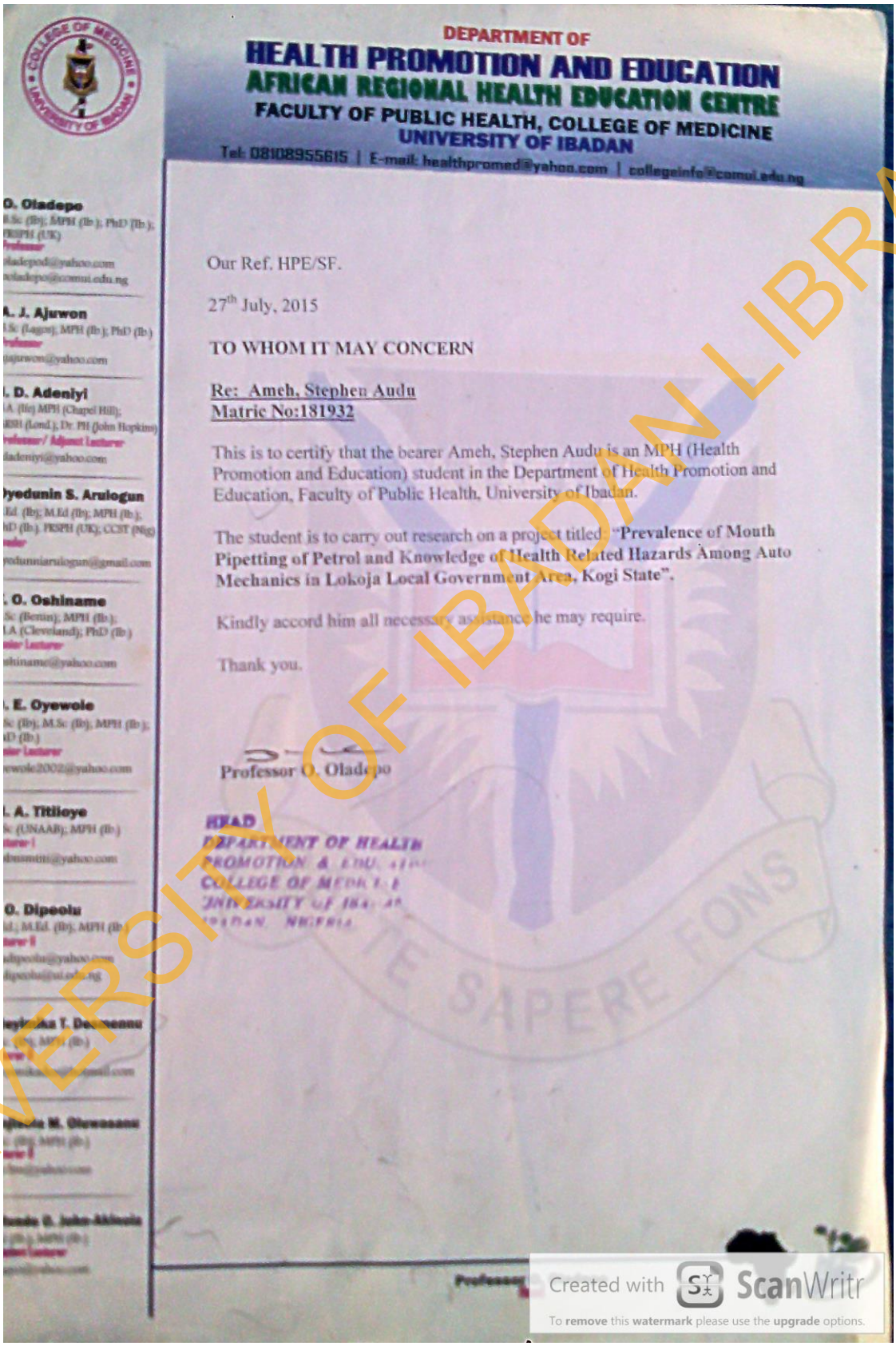
Prevalence of Mouth Pipetting of Petrol and Knowledge of Associated Health Hazards Among Auto Mechanics in Lokoja Local Government Area of Kogi State

Will not in any way impinge on the ethical standard of Medical Practice in Kogi State , Nigeria

DR. EJEH U.C

Secretary Ethical Committee

APPENDIX 4: Letter of Introduction



DEPARTMENT OF
HEALTH PROMOTION AND EDUCATION
AFRICAN REGIONAL HEALTH EDUCATION CENTRE
FACULTY OF PUBLIC HEALTH, COLLEGE OF MEDICINE
UNIVERSITY OF IBADAN
Tel: 08108955615 | E-mail: healthpromed@yahoo.com | collegeinfo@comui.edu.ng

Our Ref. HPE/SF.

27th July, 2015

TO WHOM IT MAY CONCERN

Re: Ameh, Stephen Audu
Matric No:181932

This is to certify that the bearer Ameh, Stephen Audu is an MPH (Health Promotion and Education) student in the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan.

The student is to carry out research on a project titled "**Prevalence of Mouth Pipetting of Petrol and Knowledge of Health Related Hazards Among Auto Mechanics in Lokoja Local Government Area, Kogi State**".

Kindly accord him all necessary assistance he may require.

Thank you.

Professor O. Oladepo

HEAD
DEPARTMENT OF HEALTH
PROMOTION & EDU.
COLLEGE OF MEDICINE
UNIVERSITY OF IBADAN
IBADAN, NIGERIA

APPENDIX 5: Pictures of Activities

The Researcher with the Zone B Excos and members of NATA

Interview session with one of the Zone B Executive members of NATA