



COLLEGE OF ARTS AND SOCIAL SCIENCES (CASS)

CENTER FOR CONFLICT MANAGEMENT (CCM)

MA of Peace Studies and Conflict Transformation

**EFFECTIVENESS OF BREATH ALCOHOL TEST ON
ROAD ACCIDENTS REDUCTION
CASE STUDY OF THE CITY OF KIGALI**

A dissertation submitted to the Center for Conflict Management in partial fulfillment of the requirement for the award of Master's Degree of Arts in Peace Studies and Conflicts Transformation.

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DECLARATION

I, KAYONGA Thomas, declare that this research is my genuine work, where others' works have been used, sources have been acknowledged.

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DEDICATION

This thesis is strongly to my Almighty God, my lovely wife Chantal MUKANKUSI, my children: Jachin KAYONGA, Joshua KAYONGA, Jayden KAYONGA and Jesse KAYONGA for unceasing love and patience during the time of course, may God bless them. It is again dedicated to the RNP for the efforts towards shaping the future career development of all its staff including myself which enabled me reach this milestone of undertaking.

ACKNOWLEDGEMENT

I am completely grateful to everybody who, directly or indirectly, contributed either morally or materially to the completion of this dissertation because without them it would not have been possible to accomplish it. First, my special thanks are accorded to my Almighty God who gave me strength to finish the coursework.

Second, my sincere thankfulness is expressed to Prof. MASABO Francois for his invaluable contribution, not only for the expertise offered as a supervisor but also for the amount of time and effort deployed in the entire period of study. His encouragement, guidance, suggestions and constructive criticisms helped me a lot for this research to meet the academic standard.

Indeed, I recognize Rwanda National Police as well as University of Rwanda and the Government of Rwanda for their respective contributions towards the realization of this level. Finally, my thanks go also to my dearly loved Chantal MUKANKUSI for her moral and financial contribution and also to all family members, their support and encouragement cannot be left unmentioned.

May Almighty God bless all of you!.

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LIST OF ABBREVIATIONS AND ACRONYMS

AFDB:	African Development Bank
BAC:	Blood Alcohol Concentration
DWI:	Driving while intoxicated
MADD:	Mother Against Drunk Driving
NHTSA:	National Highway Traffic Safety Administration
NISR:	National Institute of Statistics of Rwanda
NSDDAB:	National Survey of Drinking and Driving Attitudes and Behaviors
PAS:	Passive/Informal Alcohol Sensors
PBTs:	Preliminary Breath Test Devices
RNP:	Rwanda National Police
SFSTs:	Standardized Field Sobriety Tests
WHO:	World Health Organization

ABSTRACT

The present study investigates effectiveness of breath alcohol test on road accidents reduction. This study is grounded on deterrence and routine activity theories. The former which maintains that deterrence is vital to advance road users' protection via growing individuals' perceived anticipated price and apprehension percentage of attractive in drunken behaviors. To achieve the research objective, mixed approach was used to gather data by using questionnaire and interview guide. The study used 64 respondents as a sample size drawn from the population of 176. Outcomes of the collected data have been examined relating to other works on effectiveness of breath alcohol test on road accidents reduction. Results of qualitative and quantitative analyses of the data gathered showed that the breath alcohol test are effective in reducing road accidents if they are frequently used, highly visible and highly publicized before being used. This leads detection of drunken drivers and finally punished them. Generally, findings revealed that breath alcohol test device can be an indispensable strategy in reducing alcohol related crashes as confirmed by respondents at 60.9%. Also, results showed that there is a gap in using breath alcohol test whereby they are not frequently used, not highly publicized before being used, no use of standardized field sobriety tests and no use of passive alcohol sensor while detecting drink and drive offenders. Also, challenges which hinder effectiveness of breath alcohol tests have been identified including inadequate resources, misperceptions about effectiveness of breath alcohol test, and lack of support. Moreover, strategies for improvement have also been revealed including training of police officers; seeking support from public and public education programs. Finally, some recommendations and scope for further research directions were proposed. The traffic and road safety department was recommended to improve effectiveness of breath alcohol test by publicizing them before being used, using them frequently, use of standardized field sobriety tests and use of passive alcohol sensors. Likewise, recommended further studies included investigating into the relationship between over speeding and road accidents.

CHAPTER ONE: GENERAL INTRODUCTION

1.0. Introduction

Road traffic accidents are main cause of death or injuries worldwide. Therefore, it became a public health concern. Road accidents create expenses for individuals and the communities in general. About 1%, up to 2% of national products is swept by the management of post accidents injuries (WHO 2007, p. vii). Official data in some countries link approximately half of all road traffic deaths to alcohol-related accidents. Road victims in many countries for the year 2010 range between 2% and 38% of all road-traffic deaths (WHO, 2013; cited in OECD/ITF 2017, p.9). Hence, the use of breath alcohol test devices has been initiated while regulating the road traffic rules with the objective of hindering the increasing road traffic accidents rooted in drinking and driving.

1.1. Background of the study

Breath alcohol testing was tried since 1954 on the possibilities of testing for alcohol residue in a person's breath. The first breath alcohol test that could practically be used at the roadside, called a "drunkometer," was developed in 1931 by Rolla Neil Harger of the Indiana University School of Medicine. This device captured an individual's breath in a balloon inside the machine, (Elvik, 2000). This device that is breath alcohol test can be used interchangeably with alcohol breathalyzer.

Breath alcohol test/alcohol breathalyzer is a device which measures precisely the concentration of alcohol in "end-expiratory" air to afford a result that can be used as facts in drinking and driving offences (Great 2016, p.6). Universal, breath alcohol test devices are known to be used in the area of traffic checks by the police; not only in enforcement agencies but also used in other organizations to test their employees in order to check alcohol abuse and especially to eliminate work-related or industrial accidents due to the influence of alcohol (United States Patent, 2009).

The breath alcohol test was established in order to reduce risk of alcohol related accidents. According to Novak (2013), after world war 11, America experienced high rate of road traffic accidents. Afterward, it then became detected that alcohol

was one of the root causes of accidents, due to the fact that individuals had the habit of driving after becoming drunk even though started from 1920 alcohol was forbidden for motorists. After the thorough research, aimed at preventing drivers to drive under the influence of alcohol, the study came out by inventing the first breath alcohol test device/ a breathalyzer; and it was used since 1954. Then, it was found that testing breath would give a solid idea of how drunk a person might be, even more seriously than testing blood and urine. It also able to determine if someone was drunk by the color changing, after the potential drunk to blow the breath in it.

Initially, following the rules established in 1939 by National Safety Council and the American Medical Association, they detained that a driver worth of being punished is the one who had 0.15 of blood alcohol concentration (BAC). However, in 1960s, American courts challenged drunken driving offence, and many accused were declared innocent. But they later set it to 0.08 which appeals until now. By 1970s, the breath alcohol test/breathalyzer became electronic, and then, American begun to treat drunk driving seriously (Novak, 2013).

In California observed that many accidents caused by drinking and driving and reason of using breath alcohol test to overcome the problem. A machine operator must get two separate test results that differ by no more than 0.02 grams per 100 milliliters of blood alcohol in order to reduce road traffic accident caused by drinking driving. Breath tests measure deep lung air, also known as alveolar air. This type of air provides the most accurate sample to get results of alcohol in the blood. This provides the operator with your blood-to-breath partition ratio. The device then uses the amount of alcohol in your breath to calculate the amount of alcohol in your blood which was successfully for California traffic officers to know breath alcohol concentration (BAC) contain for the drivers (Office of Drug and Alcohol Policy and Compliance report, 2015).

Further, in Europe, the problem of drinking and driving leading to road traffic accidents was there too. But they handle it more seriously, at the extent that in Norway BAC limit was 0.05 by 1936, while in Sweden, BAC was fixed to 0.08 by 1941 (Lerner, 2011).

In Africa, is a breath testing device that is capable of measuring a driver's blood alcohol concentration against drinking and driving? It must be able to distinguish

alcohol from acetone at the 0.02 alcohol concentration level. An Evidential Breath Testing (EBT) must be capable of conducting an air blank and performing an external calibration check in order to confirm the tests. About 45% of African countries have a legal BAC limit for drivers; whereby 52% of them use random breath alcohol testing, and 1/3 of them use sobriety checkpoints (Borges, 2015). South Africa, road accidents cause 27% of all non-natural deaths. That is 51% of them were caused by alcohol, and 91% of all drivers tested registered the BAC superior of the accepted one, 0.05/100ml (Peden, 1999-2000).

In Democratic Republic of Congo the breath alcohol test (Breathalyzers) are intended to measure alcohol in human breath to maintain road safety. Readings obtained from this device are used in the diagnosis of alcohol intoxication and will measure the approximate blood alcohol concentration level for reducing traffic roads accident where 25% of accidents caused by drinking and driving where there is 0.06 percent of BAC. Each facility has different policies on when to perform a Breathalyzer test. Blood alcohol levels are typically tested when there is reasonable cause to suspect they have been drinking due to their actions especially for driver in order to reduce road accidents (Misuka, 2017).

For the case of Rwanda, Rwanda National Police (RNP) as the government institution has a mission to deliver high quality services, accountability, safeguard the rule of law, and strive to provide a safe and secure environment for all (Rwanda constitution, 2003, Art. 170). According to law n0 34/1987 of September 17, 1987 relating to Traffic and Road Traffic Policies, in its Section 3, Article 10; he/she will be imprisoned from seven days up to six months of imprisonment and a fine of 20,000 frw (current fine is 150,000 frw) or one of these penalties; if a driver is found to be driving with 80mg/100ml alcohol in blood (equivalent to 0.08% BAC). The BAC will be obtained in testing blood or by use of breath alcohol test.

As indicated above, this law that punishes drivers who drive under influence of alcohol has been there since 1987 but it was not operating. It was until 2010 when the breath alcohol test (breathalyzers) was introduced due to the rise of traffic road accidents in 2009 and 2010 whereby 155 and 270 people died whereas 1902 and 2270 people were sustained serious injuries respectively as claimed by National Institute of Statistics of Rwanda (NISR) and 10% of all accidents were attributed to

the driving under influence of alcohol (NISR 2013, p. 209). Since then until now Traffic and Road Safety department has been using breath alcohol test in order to identify easily those drivers who have more than 0.08 blood alcohol as drunker which may likely to cause traffic road accidents.

Indeed, some countries link approximately half of all road traffic deaths to alcohol-related accidents. And so, road victims in different countries for the year 2010 range between 2% and 38% of all road-traffic deaths (OECD/ITF 2017, P.9). So, it requires strong measures to detect and halt those drivers who continue drinking and driving and severe punishments are necessary to prevent the increase of road traffic accidents mostly resulting from drink and drive.

Further, as discussed in previous paragraphs, breath alcohol test had been used to testing blood alcohol concentration for drivers to identify those who driving under influence of alcohol; and it was adopted by many countries around the world as the one of the preventive measure among others to reduce traffic road accidents especially alcohol related crashes; and nowadays, road accidents have become a serious threat all over the world.

Road accident is define as any accident in which at least one road automobile engaged that taking place on a road open to public circulation, and finally at least one person is injured or killed (National Institute of Statistics and Economic Studies of French,2015). Also, it is once the car that is passing along a road hits another car or objects and finally causes the death, injuries, damage and environmental degradations (Bhat & Qureshi, 2015).

Annually 1.35 million people are killed and 50 sustain serious injuries due to the occurrence of road traffic accidents around the world. It is also indicated that 3700 people disappearing on the world every day. So, different categories of road users left their homes for work or going out for long journey suddenly will never come back due to road accidents leaving their beloved families as well as entire communities. Amongst road safety issues, drink driving is one of important as indicated in the global status report on road safety by WHO (2018, p.vii).

However, current efforts to address road safety are minimal in comparison to this growing human suffering. The WHO and the World Bank have jointly produced World report on road traffic injury prevention. It presents a comprehensive overview

of what is known about the magnitude, risk factors and impact of road traffic injuries, and about ways to prevent and lessen the impact of road crashes. The document is the outcome of a collaborative effort by institutions and individuals. Coordinated by the WHO and the World Bank, over 100 experts, from all continents and different sectors including transport, engineering, health, police, education and civil society have worked to produce the report, (World report 2019, P.8).

The report indicates that road traffic injuries are a growing public health issue, excessively affecting vulnerable groups of road users, including the poor. It is that more than half people killed in traffic crashes are young adults aged between 15 and 44 years often the breadwinners in a family. Furthermore, road traffic injuries cost low-income and middle-income countries between 1% and 2% of their gross national product more than the total development aid received by these countries. However, road traffic crashes and injuries are preventable (World report 2019, P.8).

Indeed, in high-income countries, an established set of interventions have contributed to significant reductions in the incidence and impact of road traffic injuries. These include the enforcement of legislation to control speed, driving under influence of alcohol, mandating the use of seatbelts and crash helmets, and the safer design and use of roads and vehicles. Consequently, reduction in road traffic injuries can contribute to the attainment of the Millennium Development Goals that aim to halve extreme poverty and significantly reduce child mortality (World report 2019, P.8).

Furthermore, in Nigeria, road accidents have been a disturbing phenomenon that has constituted a menace. It is generally believed but not statistically proven that the rate of road accidents in Nigeria has geometrically increased. Road accidents are caused by various reasons, over speeding, driving under influence of alcohol, inattention of the road users and also unfavorable condition of the road. The worrisome trend has tremendous negative impact on the nation's health system as well as its social and economic aspirations. As revealed by Federal Road Safety Commission, about 88,520 people were killed in road accidents for the past ten years, and these sufferers follow under the age 20-40 years old. So, preventive measures such as breath alcohol test, speed governors, mention but a few should be reviewed in Nigeria in order to reduce these fatalities as well as financial effects (Umar, 2019).

Indeed, In Uganda around 9000 road users lost their lives due to accidents every year. The current preliminary study' results conducted by the university of Makerere public health showed that about 3,500 persons were killed in road accidents in 2018; and the contributing factors being over speeding and driving after drinking (Uganda National Police report, 2019). For preventive measures, breath Alcohol Test has been used to reduce roads accidents in drivers means that many accidents caused by drinking and driving in Uganda.

In Rwanda, accidents continue to claim lives as traffic road accidents are being increased for the past three years as seen in report of National Institute of Statistics of Rwanda (NISR) which indicated that in the year 2016, 2017, and 2018 whereby 593, 549, and 597 people died while 2423, 2629, and 2772 were injured (NISR 2019, P.183).

This is due to various contributing factors including over speeding, driving under influence of alcohol, mechanical default, use of mobile phone, violation of traffic lights, and others. In this regard, RNP through Traffic and Road Safety department has been employed various measures to reduce those accidents including routine deployment police officers at on road, enforcement of breath alcohol test, speed radars, speed governors, motor vehicle inspection and use of cameras (Mazimpaka, 2019).

Traffic and Road Safety department report reveals that driving under influence of alcohol is among the main cause of road accident in Rwanda; following various operations conducted in August and September 2019 aimed at intercepting drivers who drive under the influence of alcohol, 120 motorists were arrested whose BAC was above the allowed one of 0.08 and also 611 cases of drinking and driving were registered (Mazimpaka, 2019) as revealed by the Police Spokesperson CP John Bosco Kabera spoken on July 23, 2018 (Taarifa, 2018).

Despite the efforts and various measures that RNP had put in place including breath alcohol test to detect drunk drivers in order to reduce traffic road accidents specifically alcohol related crashes but road accidents are still on increase and also drivers continue the behavior of driving under influence of alcohol as indicated by NISR as well as Traffic and Road Safety department.

Therefore, breath Alcohol testing can save lives; since alcohol consumption affects the human body by significantly longer response time to external provocations. In challenging conditions where the senses need to be on alert a prolonged reaction time can be the difference between life and death, both for the drivers under influence of alcohol and for surrounding people (Jonas, 2017). For this reason, researcher wishes to assess the effectiveness of breath alcohol test in reducing alcohol related accidents in the city of Kigali.

1.2. Statement of the problem

The government of Rwanda through Rwanda National Police strives to improve road safety in order to provide safe conditions to all road users. Everybody using road should feel safe and secure while driving or walking on the road and take care of his/her safety as well as the safety of others. Persons' safety on the road is one of the crucial aspects in order to prevent and reduce traffic side accidents, injury, and death. All road users need to be familiar with the traffic regulations particularly kids and young persons because they are more vulnerable to traffic road accidents dangers (WHO, 2008).

Worldwide, countries including Rwanda put in order several measures concerning road safety such as driver safety programs, pedestrian safety, child and teenager's safety programs, drink and driving related programs and speed management programs. These programs are planned to ensure that all road users know the causes of road accidents such as drunken driving, violation of road signage, speeding, non-compliance with seatbelt use among others in order to avoid those road accidents (Maqbool 2019, p.96). Also, various enforcement measures have been adopted to reduce the number of fatalities and injuries due to road traffic accidents like breath alcohol test, drunken driving laws, speed limits, obligatory seatbelt use among others.

In spite of above various driving safety programs and enforcement measures that all aiming at improving road safety and reducing road accidents, the problems have continued to raise over the years; whereby 1.35 million people are killed and 50 sustain serious injuries annually due to the road traffic accidents around the world (WHO 2018, p.vii). In Rwanda, more than one person dies every day due to road accidents as revealed by National Institute of Statistics of Rwanda (NISR) whereby

597 people died and 2772 were injured last year (NISR 2019, P.183); for this case, drink and driving factor has been contributed 7% of all total deaths. In fact, excessive alcohol decreases person's ability to drive a motor vehicle safely. The more you drink, the greater the effect. So, it is prohibited to drive a vehicle while under the influence of alcohol as it is known to cause tiredness and weakness which may result to road accidents, but people continue to do so.

Dealing with this drunken driving offences, Rwanda National Police (RNP) has been utilized breath alcohol test since 2010 as one of the most effective measure to deterring impaired driving among members of public through testing their blood alcohol concentration (BAC), fines and imprisonment for those who have been detected driving with excessive alcohol above legal limit of 0.08 g/dl of BAC in order to reduce road accidents. There is a problem that although we are aware that the breath alcohol test is being employed to reduce alcohol related crashes; there is no scientific research has been conducted in the city of Kigali so far to depict us if the breath alcohol test is truly or not answering to existing road accidents that resulted from drunken driving. Therefore, this problem inspires the researcher to asking this leading question: What is the effectiveness of breath alcohol test in reducing road accidents?

1.3. Research objectives

The objectives of this study will be divided into two main categories, such as: general and specific objectives.

1.3.1. The main objective

To assess of the effectiveness of breath alcohol test in reducing road traffic accidents.

1.3.2. Specific objectives

- a. To examine the effectiveness of detection of drivers under influence of alcohol in reducing death, injuries and property damage in city of Kigali;
- b. To find out the level of effectiveness of punishments of drunken driving to reduce death/injuries and property damage in city of Kigali;

- c. To identify challenges that hamper effectiveness of breath alcohol test in reducing road accidents, and suggest strategies for its effectiveness in road accidents reduction.

1.4. Research questions

- a. To what extent does the effectiveness of detecting drivers under influence of alcohol can reduce road accidents in city of Kigali?
- b. How does punishing drunken drivers can reduce road accidents in city of Kigali?
- c. What are the challenges that hamper effectiveness of breath alcohol test in reducing road accidents, and what could be the strategies for its effectiveness in road accidents reduction?

1.5. Scope of the study

It mentions the borders or delimitations of the research. These are the limits of a study where the researcher should designate the variables to be studied, such as period scope; domain scope and topographical scope: For this case, the researcher considered five years period (that is 2015 – 2019).

The study was conducted within the city of Kigali and had an emphasis on the reducing road accident via effective use of breath alcohol test. Respondents are some drivers, traffic police officers and representatives of transport companies who are all performing their tasks relating to the road safety in the city of Kigali.

1.6. Significance of the study

This study will be the great importance to the Researcher, University of Rwanda, Rwanda National Police in Road, Traffic and Safety Department, policy makers and other researchers. This study will improve the researcher's knowledge on effectiveness of breath alcohol test in reducing road traffic accidents

This research will work as instrument of orientation to upcoming study and progressive studies and to the public by putting into the consideration the findings, the results and recommendations that contributes to the thoughtful of the public.

This research report would be available in University of Rwanda's library which will use by other researchers who would be interested in this area of research. This research will find out the challenges that affect breath alcohol test in reducing road accident reduction and suggest possible strategies for its effectiveness.

The results of this study will function as policing instrument to security institutions, Government of Rwanda as well as other stakeholders to improve performance of breath alcohol test to reduce alcohol related crashes. Results of the research are also expected to make Government of Rwanda, law enforcement agencies and other stakeholders being aware that it is possible to reduce or to prevent road accidents through the effective use of breath alcohol test. All road users will be aware of their role in the reduction of road accidents by observing road safety regulations.

1.7. Organization of the study

The study is composed of five chapters. The first chapter focuses on historical background, problem statement, purpose, objectives, research questions, and the scope of the study, significance and subdivision of the study. Chapter two consists of literature review related to the study. Chapter three said about methodology which gives details about research design, population and composition of sample size, how the data was collected, coded, analyzed and processed. Chapter four comprises the analysis and interpretation of the outcomes from the collected data and the last chapter is based on major findings, conclusion and recommendations deducted from the analysis of the research findings.

1.8. Limitation of the study

The researcher was supposed to collect data from Rwanda national police in the Traffic and Road safety department, private transport companies and drivers. The respondents from these areas are often busy and have high demanding tasks. For this reason, some of the respondents do not value the importance of the study and this may lead them to provide inadequate information about the study. Another constraint during the study was pandemic COVID-19 where the lockdown throughout the country that interfered time frame. However, the researcher managed to get sufficient information and data required for the study from three categories of respondents.

1.9. Conclusion

This first chapter focuses on the historical background of the two variables. That is the breath alcohol test as an independent variable and road accidents as the dependent variable. The breath alcohol test being used as a strategy to reduce road accidents. Chapter one has also identified existing problem to be examined in the current research. Also, the purpose of the study was discussed. To assess the effectiveness of breath alcohol test on road accidents reduction was the main objective of this study and three research questions guided the researcher to attain the main objective. In addition, chapter one has explained the scope of the study, significance of the study, organization of the study as well as its limitation.

CHAPTER TWO: LITERATURE REVIEW AND CONCEPTUAL FRAMWORK

2.0. Introduction

Under this chapter, it is whereby the researcher acknowledges the papers done by various investigators and intellectuals on the identical subject in order someone to avoid plagiarism (Abdullah 2010, p.9). There are many literatures related to the topic under research, key concepts, theoretical framework, and the conceptual framework.

2.1. Definition of key concepts

In general, this section is all about the definitions of various concepts used in this study.

2.1.1. Breath Alcohol Test

Breath Alcohol Test is a device which measures precisely the concentration of alcohol in “end-expiratory” air to afford a result that can be used as facts in drinking and driving offences (Great 2016, p.6). Also, breath alcohol test is device used to determine how much alcohol is in your blood. The test measures the amount of alcohol in the air you breath out (exhale); and breath alcohol content describes the level of ethanol alcohol present in a person's breath. This level is measured using a breath alcohol device that calculates the amount of alcohol present in a person's expelled breath. These devices work by making calculations based on laboratory studies that have determined the relationship to alcohol in the breath to alcohol in the blood (Anstie, 2015).

According to United States Patent (2009) breath alcohol test devices are acknowledged to be used in the field of traffic checks by the police or, in other organizations to test employees in order to check alcohol misuse and particularly to eradicate work-related or industrial accidents due to the influence of alcohol.

In the current research, researcher's emphasis is on the usage of breath alcohol test within the police field where drivers are being tested to see whether he/she is driving under influence of alcohol or not aimed at reducing road accidents especially alcohol related crashes. So, drivers are initially tested for alcohol impairment at the roadside

(checkpoints) with a device that has a screen. If this produces a positive test, to mean if the screen shows the BAC superior to the one which is legally accepted, in the concerned country, the driver is suspected to be under the influence of alcohol (Great, 2016).

Moreover, motorists can be stopped and required to give a breath which shall be tested by police officers at the scene of a road traffic accident, as long as a police officer suspects them to be driving under the influence of alcohol, or if a motorist commits a poignant traffic offence (Great 2013, p.8). In the process, law enforcers mount a checkpoint on chosen roads and highways to detect and arrest drivers who drive under influence of alcohol by use of breath alcohol test. Police officers on duty may stop all passing vehicles or randomly select some of the vehicles basing on the traffic flow. He/she may choose for example every third or sixth vehicle to assess the drivers' impairment, hence increasing the apparent risk of apprehend for alcohol-impaired driving and subsequently reduces road accidents which may result from alcohol related crashes. By use of this device, police officer is able to detect drivers' impairment through his/her BAC.

2.1.2. Blood Alcohol Concentration

Blood alcohol concentration (BAC) is the concentration of alcohol in blood. It is measured either as a percentage by mass, by mass per volume, or a combination (British Medical Association, 2008). Furthermore, as described by Mother Against Drunk Driving (MADD) (2014), BAC is the amount of alcohol in your blood. For example, if a person's BAC is 0.02% that means they have 20 milligrams of alcohol in 100 milliliters of blood. Each drink you have within a certain timeframe increases your BAC.

In this regard, many countries have been put in place various measures to halt drivers who drive after drinking including publicity and education, tough drunk driving laws by establishing the maximum limits of BAC, use of breath alcohol test to detect drunkards. For many counties adopted their legal limits for BAC and they vary between 0.01% and 0.08% in order to reduce traffic road accidents that resulted from drink and drive. For instance, limit is 0.02% in Sweden; 0.05% in Israel, Korea, and Australia; and 0.08% in Canada, England, Mexico, and the United States. In China,

driving with a BAC higher than 0.02% is defined as drink-driving and the driver will be penalized (Jones, 1990).

Additionally, driving with a BAC higher than 0.08% is considered drunken-driving and it belongs to unlawful act (Xiaohua et al. 2014, p.1). For Rwanda, BAC is 0.08, to mean 0.08mg of alcohol, per 100ml of blood (law n0 34/1987, 1987). This means that if a driver drinks alcohol and exceeds the legal limit for BAC, the alcohol affects his/her driving performance which probably leads to serious accidents.

2.1.3. Alcohol

Surely, excessive alcohol affects drivers' performance. According to British Medical Association (BMA), alcoholic drink refers to whatever beverage containing ethanol (BMA, 2008). Then again, alcohol is a colorless volatile flammable liquid which is the intoxicating constituent of wine, beer, spirits, etc. it is also any organic composite containing a hydroxyl group. It is also a drink containing alcohol (Smith, 2004).

From the above two definitions of alcohol, the researcher prefers the former definition which is suitable for this research as it is said that every beverage with ethanol can be seen as alcoholic and it is researchers' focus about drivers who drive under the influence of alcohol. Drunk driving has a high probability to lead to serious traffic road accidents. Therefore, to detect and arrest those drivers who often drink and drive consequently causing road accidents, the use of breath alcohol test is so valuable device and this research aims to assess the effectiveness of this breath alcohol test on road accidents reduction especially in city of Kigali.

2.1.4. Effects of alcohol on the driving performance

Drinking and driving contributes a high rate of traffic accidents that is alcohol affects drivers 'performance in various aspects. According to Xiaohua et al. (2014, p.1-2) argue that alcohol affects driver's attitudes, judgment, vigilance, perception, reaction, and controlling due to the level of BAC; that is the higher level of BAC would lead poor driving performance which would result into higher traffic road accident rate. They further indicate that alcohol affects a driver's ability to operate a vehicle at a BAC level of 0.035%, alcohol decreases hand steadiness and operating a BAC level of 0.60%, it impairs capacity and control ability of steering and braking at a BACs ranging from 0.05% to 0.10%. They also stated that alcohol significantly

impaired driving performance, which included deviation of lane position, line crossings, steering rate, and driving speed and this consequently result into traffic road accidents. Even though people are aware that alcohol affects driving performance they continue drink and drive. Therefore, the use of breath alcohol test to identify those drunken drivers can play a big role in road accidents reduction.

2.2. Road Accident Reduction

Road accident reduction is the measures carried out by the concerned authorities especially law enforcement agencies in order to reduce accidents on the road(s) (Taylor and Baruya, 2000). For that reason, law enforcers initiated many strategies including engineering, education and enforcement of rule and regulations, use of speed governors, breath alcohol test mention but a few to reduce road accidents.

2.2.1. Road Accidents

According to Sethi and Zwi (1999), an accident is an unfortunate incident that happens unexpectedly and unintentionally, normally resulting in death, injury or damage. With the same view, Nagel and Woesler (2003) stated that an accident, disaster, or more archaically, catastrophe, is an unforeseen and unplanned event or circumstance, usually with lack of intention or necessity. However, in my humble view, both definitions above have some gaps whereby they generalize and did not show which elements may be involved in accidents and in which environment.

To fill the gap, the National Institute of Statistics and Economic Studies of French (2015) stated that road accident means any accident in which at least one road automobile engaged that taking place on a road open to public circulation, and finally at least one person is injured or killed. In this regard, "Killed persons" are accident victims who die immediately or within thirty days following the accident while "Injured persons" are accident victims having suffered trauma requiring medical treatment (with or without hospitalization). At this juncture, it will be meaningless to talk of road accident in the absence of road concept.

2.2.2. Road

According to Law N°55/2011 of 14/12/2011 governing roads in Rwanda, they talk of “public roads”: all roads, streets, public places, parking stations, footpaths, bridges,

ferries, as a whole, all ways opened to public traffic by land; “roadway”: the part of the road for automobile traffic (Art 2, Law N° 55/2011). On the other hand, accident is unpredicted unpleasant incident. May be a fall, crash, collision, explosion (European Union, 2003). In this research, researcher will talk of road to mean “public road” as defined above. In this sense, these traffic accidents happen in case automobile which is passing on the public road hits another one or some thing; and resulting in death, bodily injury to any person or damage to property, and this is due to various contributing factors.

2.2.3. Some causes of road accidents

Road traffic accidents are main cause of death and serious injuries worldwide (Decker et al., 1988). There are various factors that contribute to the high number of road traffic accidents and they are grouped into three main categories which include: road environment factors, vehicle factors, and human factors stated by African Development Bank (AFDB) (2013). Likewise, it indicates that human factors rank highest in contribution of road accidents. For that reason, in this current research, the focus will be on human factors rather than other factors in our traffic safety programs though the other factors will not be ignored.

2.2.3.1. Environmental factors

Road accidents may happen due to environment factors. These include poor road designs, poor maintenance, heavy rain falls, snow , fog, unclear or inadequate road signs, poorly placed barriers, guard rills and speed bumps, insufficient use of road markings and poor condition of road surface to mention a few (Nurainie, 2011). All of the above factors lead to conditions that cause bad visibility and slippery of road surfaces which in turn lead to vehicles not able to stop and break in time and collide with each other thus road accidents.

2.2.3.2. Vehicle factors

Road accidents can also be caused by the state of vehicle itself. The vehicle is integrated with devices like, the horn, side mirrors, wipers, braking system, traffic-indicators, headlights and break-lights (to mention just a few) so as to circumvent road accident. The failure of any vehicle parts such as tires, engines, braking

systems, light systems can cause road traffic accidents. The reliability of the vehicle is itself a function of the condition of vehicle at every given time. Vehicle components and vehicle maintenance are the two main conditions which affect vehicle factors as it relates to causes of road traffic accidents (Agbonkhese et al., 2013).

2.2.3.3. Human factors

Human factors rank highest in contribution of road accidents; these include drunk driving, Violation of road signage, speeding, non-compliance with seatbelt use and increased use of hand-held devices such as cell phones while driving as argued by AFDB (2013). It is estimated more than ninety percent (90%) of road accidents are attributed to human error said by Goos (2012). That is the reason to why this study will be focused on human factors rather than other factors in our traffic safety programs.

According to Magnus (2011), human factors accidents are the results of driver's negligence, human error such as driving under the influence of alcohol (DUI) or driving while intoxicated (DWI), distraction while driving (For example answering mobile phone calls), violation of sign posts, over speeding etc. Additionally, the National Highway Traffic Safety Administration (NHTSA) drunken driving (alcohol) contributed thirty nine percent (39%) of all fatal traffic crashes and seven percent (7%) of all crashes that year. That is why, the researchers' aspiration in the current study focuses only on drink and drive as one of the human factors in causing road accidents and also will attempt to discuss the law enforcement strategy appropriately to overcome this problem, thus, effectiveness of breath alcohol test on road accidents reduction.

Drink and drive

In fact, if a person drinks alcohol or drug, and exceeds BAC limit of 0.08 g/dl he/she loses the ability to focus and function properly. This is unsafe especially to those people when operating a vehicle. It is advised to use for all time a designated driver if going out and drink (Michael, 2012). A driver is said to be driving while intoxicated (DWI) or driving under the influence of alcohol (DUI) if he/she has BAC 0.08 or above (Elvik et al., 2009) cited in (Assum et al., 2005).

In the same view, driving under the influence of alcohol enlarging the possibilities of road coincidences together with the decrease and harm that might happen to road users. (Agbonkhese et al., 2013). Furthermore, driving under the influence of alcohol or driving while intoxicated is among the main causes of accidents on daily basis but it can be prevented (Michael, 2012). However, some people continue driving while intoxicated putting not only their lives but also lives of other people in danger.

From this perspective, it is certain that driving with excessive alcohol consumption causes road accidents. Therefore, enforcement strategies of driving while intoxicated is seen as the main builder of reducing alcohol related crashes; among others include effective breath alcohol test. Therefore, through testing blood alcohol concentration (BAC), detecting drivers driving under influence of alcohol or impaired drivers and finally punish them can lead to the reduction of alcohol related crashes as to be discussed in the next paragraphs.

2.3. Discussions of specific objectives

This section will explain how detecting impaired drivers as well as punishing drunken drivers are vital elements for effectiveness of breath alcohol test in reducing road accidents especially alcohol related crashes.

2.3.1. Detection of drunken drivers in reducing death/ injuries and property damage

It is said that the effect of using alcohol can be severe and direct consequences of a sole event of alcohol-impaired operational like unintentional injury and death. By ages 19 and 20, 70 percent of all drunkards engage in heavy drinking, suggesting that the majority of young people are at great risk of making poor decisions that have significant long-term consequences especially for drivers (Flewelling et al., 2016).

Police enforcement is performed in order to detect and penalize those drivers who are driving with illegal BAC levels before they get involved in road accidents. Further, it is assumed that a high subjective risk of detection deters from drink and driving. At this stage, a driver is said to be driving while intoxicated (DWI) or driving under the influence of alcohol (DUI) and be charged of this traffic offense if

he/she has BAC 0.08 or above (Elvik et al., 2009 cited in Homel, 1988). However, BAC is varying from one state to another, but the universal BAC is 0.08.

Referred to different literatures as discussed above, there is no one collectively accepted standard for what is considered a “safe” level of drinking and driving. Each and every country has its own legal limits for alcohol use. Testing BAC by use of breath alcohol test helps law enforcement agents like police to determine immediately whether the traffic violation of driving under influence of alcohol has been committed; and also to apprehend the suspect as well as punishing him/her immediately. Also, the testing of BAC helps to identify the blood alcohol concentration for drivers in order to prevent traffic roads accidents which might resulted from alcohol related crashes. So, law enforcers should be skilled enough to detect impaired drivers.

Even though there are many enforcement measures to deter impaired drivers such as saturation patrols, integrated, sobriety checkpoints, breath alcohol test mentioned just a few, the later have to be utilized by law enforcement agencies as effective approach to deter and detect impaired drivers (Robertson & Holmes, 2011). Through effective implementation of this breath alcohol test, police officers should be skilled enough to detect and recognize that a driver whose BAC is above the legal limit in order to differentiate such a driver from being drunk. Through experiences as well as skills acquired from training police officers are capable to identify which driving behaviors most likely result from drunken driving.

According to Miller (2000), NHTSA has established some signs which police officers may use in detecting drunk drivers and these signs have probability percentage that a driver demonstrates a BAC of 0.08% or greater. These include among others:

65% turning with wide radius: when he/she is turning wider than normal traffic. 65% straddling Center or lane marker: when a driver is driving straight ahead with center line or the lane marker centered between the wheels. 60% weaving: if a driver driving zigzagging down the roadway. 55% in case a driver is driving on other than

designated roadway. 55% swerving: when a driver is abruptly turning direction or movement.

At this moment, after police officers have realized such cues, he must instruct immediately such a driver and ask him/her to go out of car and to move towards the sidewalk to conduct a breath test and/ or field sobriety tests.

2.3.1.1. A breath test

After police officers seeing that a driver shows signs of impairment, that driver should be arrested in a safe holding area for more questioning and also may be asked to perform a breath test and/or standardized field sobriety tests. Additionally, Stuster & Burns (1998) said that law enforcers have employed Standardized Field Sobriety Tests (SFSTs) to recognize impaired drivers for more than twenty years. It is the sequence of tests that comprises nystagmus checks as well as field coordination tests. Also, authors continued arguing that the combinations of these tests are more precise at rate of 91% in detecting drunken drivers with illegal limit of BAC. This breath test is performed by use of breath alcohol test device which is of two types thus preliminary breath test device and Passive/informal alcohol sensors.

2.3.1.2. Preliminary Breath Test Devices (PBTs)

Law enforcers use a test such as PBTs while at checkpoints after they have observed that intercepted driver has a sign of impairment. These PBTs are hand-held alcohol sensor utilized to estimate or analyze the BAC of a driver (MADD, 2012). Police on the road apply a preliminary breath test devices to assist institute facts for a DWI arrest.

If a police officer intercept the suspect driver, he/she orders such a driver to blow into the mouthpiece of PBT and automatically shows different numbers indicating the levels of BAC like 0.10 and if the device shows red light it means that the level is 0.08 or above. Therefore, if a police officer finds the tested driver has a BAC the level that exceed accepted one (legal limit), obviously such a driver will be charged of drink and drive cases.

In general, police institutions accept that PBTs are effective and convenient in case the driver who involved in accident is wounded and powerless to do physical tests. It is also witnessed that usage of PBT raises the number of apprehensions of drivers who driving under influence of alcohol thus reducing road accidents that result from driving after drinking (Century Council, 2008). For instance, these devices are used in 33 States in USA in order to present a proof that alcohol has been used before the court in order to backing the apprehension of the suspect. Furthermore, California permits law enforcers to exercise preliminary breath test as a proof to implement the policy of zero-tolerance to those drivers having less than 21 year (Ferguson, Fields, & Voas, 2000). Also, Taiwan regulations admit the use of PBTs to gather evidence of DWI is the principle method to do DWI arrests.

2.3.1.3. Passive/informal alcohol sensors (PAS)

In order to enhance the effectiveness of breath alcohol test, also police officers utilize PAS to detect drivers' impairment. It is a machine used in detecting the existence of alcohol in the midair. Regularly these devices are incorporated into a flashlight or clipboard and then law enforcers grasp the flash closer to the driver's mouth, where it measures alcohol presence in the air where the driver is breathing (NHTSA, 2006). It displays the results by showing lights of diverse colors to specify different alcohol concentration levels. Then if the officer found that there is alcohol presence, he/she requests extra tests with SFSTs or a PBT devices (Preusser, 2000).

According to Fell et al. (2004) and Century Council (2003), the PAS is particularly effective where law enforcers have no enough time to check or scrutinize rapidly all drivers in a short time. Also, numerous assessments indicated that law enforcers applying a PAS at checkpoints can detect twice as many drivers at BACs of 0.10 and above than those who do not apply a PAS and also assists police officers avoid arresting drivers with BACs of 0.04 or below. Again, as discussed above, law enforcers can use also SFSTs after observing that a driver shows signs of impairment as to be discussed in the next paragraphs.

2.3.1.4. A nystagmus tests

A nystagmus test (one of the SFSTs) is the unintentional jerking of the eye which occurs as the eyes move toward the sides (Miller, 2000). He said that, naturally and unwillingly someone's eyes jerk as a way of maintaining the sensory cells from fatigue. Therefore, if a person drinks alcohol or drug, they exaggerate it to the level where it is easily noticed. For the police officers who conducting checkpoints it is a trustworthy symptom of intoxication. However, alcohol and drug don't cause nystagmus.

Moreover, it should be well-known to police officers that "look" nystagmus appears as the eyes move away from center. They are of different categories which include: Horizontal nystagmus: this occurs as the eyes move from side to side; vertical nystagmus: occurs as the eyes move up and down; and resting nystagmus is a twitching of the eyes as the person watches straight ahead (Miller, 2000).

2.3.1.5. Field coordination tests

Another category of SFSTs is field coordination tests and they have been suggested by different experts as the powerful tools to assess the separated mind impairment of any drunken driving suspect. These tests include: Romberg balance, the walk and turn, the one leg stand and the finger to nose (Miller, 2000).

2.3.1.5.1. Romberg Test

This kind of test needs the suspect to stand with his/her feet together, his head twisted slightly back, and his/her eyes closed while he/she estimates the passage of 30 seconds. Then, if the suspect considers that the second have passed, he should return in normal condition and say "time's up." During the test police officer should observe eyelid tremors, muscle tension, and any statement or unusual sounds made by the suspect and note anything which is abnormal and put on your report (Miller, 2000).

2.3.1.5.2. Work and Turn Test

This test requires the suspect to stand heel to toe with his/her arms at his/her sides while a series of instructions are given. Then, the suspect must take nine heels to toe steps along a straight line, turn in a specified manner, and she/he repeats again the same steps along the line. Police officer can use a painted line on the roadway or an imaginary line. All of this must be done while he/she is counting the steps aloud and keeping his/her arms down at his/her sides and the suspect must not stop walking until the test is completed. So, a police officer should record every instance where the suspect cannot comply with the instructions or keep his /her balance (Miller, 2000).

2.3.1.5.3. One Leg Stand Test

This test requires the suspect to balance on one leg while extending the other leg stiffly in front of him with his foot about six inches above the ground. The suspect is to stare at his elevated foot and count out aloud for 30 seconds in this fashion: “One thousand and one, one thousand and two...” The suspect will perform this test twice, first standing on his left leg, then standing on his right (Miller, 2000).

2.3.1.5.4. Finger to Nose Test

The suspect is required to touch the tip of his nose with the tip of his index finger. It is performed with the suspect’s eyes closed and his head tilted back. The suspect attempts to touch his nose six times, three with each hand. The suspect should be instructed as to which hand to use, always using the sequence of “left, right, left, right, right, left.” Therefore, a person who is impaired by alcohol or drug will often use the wrong hand or miss the tip of his /her nose entirely, touching his/her lips, cheek, eyes or forehead (Miller, 2000).

Nevertheless, all these tests specifically a breath test play a big role in identifying drivers with BAC above the legal limits in every country and thereafter, police manage to arrest them and be given appropriate punishment for an offence they have

committed. This punishment acts as deterrence to those drivers who continue driving under influence of alcohol.

2.3.2. Punishments of drunken drivers to reduce death/injuries and property damage

Surely, if a person drinks alcohol or drug, and exceeds BAC limit of 0.08 g/dl he/she loses the ability to focus and function properly. This is unsafe especially to those people when operating a vehicle. So, driving under the influence of alcohol enlarges the possibilities of road coincidences together with the decrease and harm that might happen to road users (Agbonkhese et al., 2013). All over the world, a driver is said to be driving while intoxicated (DWI) or driving under the influence of alcohol (DUI) if he/she has BAC 0.08 or above (Elvik et al., 2009 as cited in Assum et al., 2005). However, each and every country has its legal BAC limits as discussed earlier. Even though there are legal BAC limits for each country to restrict people from drunk driving but some people continue driving while intoxicated putting not only their lives but also lives of other people in danger.

For that reason, those drivers who violate BAC legal limits are punished for an offence of driving under influence of alcohol as determined by the law of every country. As stated by Agnew and Cullen (2011), if an individual is punished for her/his wrongdoings, the punishment received constitutes a specific deterrence for him/her to not repeat the same bad behavior. It means that this particular discouragement indicates the consequences that a penalty has on the particular offender. In other words, specific deterrence has the deterrent effect of direct experience with punishment and punishment avoidance. For instance, if a driver is punished once for driving under influence of alcohol, they may determine that drink and drive is not value to be penalized once more, so he/she would stop to drink and driving next time. Thus, punishment is a vital element in reducing road accidents; and they are different in various countries.

In United States for drivers suspected the punishment are 180 days and/or \$1,000 and 6 months license revocation and imprisonment of 10 days (Metropolitan Police Department report, 2016). This punishment is too heavy for the reason of fearing the drinking and driving as many factors of traffic roads accidents.

In Indian, if a driver shows alcohol level above the permissible limit in the test, the offenders are liable to pay Rs 2000 fine and/or could be imprisoned for six months. For the second incident (within three years), the fine amount increases to 3,000 and one could face jail term for two years (Delhi Auto report, 2018).

Furthermore, other countries apply strong and harsh punishments to deter drivers from drink and drive cases. According to WHO (2015) indicates that in Missouri : a driver that convicted at the first time for driving under the influence of drugs (DUID) results in a 90-day suspension, and he/she is restricted for driving. If a driver is charged again the same offence within a five-year period, she/he gets a 5-year license denial; for the third sentence is a 10 year license denial.

Also, in France, drinking and driving is punishable by the equivalent of a \$1,000 fine, imprisonment for one year, and loss of license for three years. Finland and Sweden automatically sentence drunk drivers to one-year jail sentences including hard labor. Norway, a drunk driver is jailed for three weeks with hard labor and the offender loses their license for a year. If they do it again, they lose their license forever. In Russia, drunk drivers simply lose their license for life. Singapore law says that even first time drunk drivers face fine of up to \$5,000 or six months behind bars. For repeat offenders, the fines and jail time can be increased by up to 500 percent. South Africa, drinking and driving results in a ten-year prison sentence or the equivalent of a \$10,000 fine and, in some cases, both.

For the case of Rwanda, there two alternatives to punish them which are fines equivalent to 20,000frw or imprisonment of 6 months to 2 years stipulated in article 157 of Rwanda penal code, though these punishment is not frequently used except if the accident resulted into death. However, the current punishment for drunk driving is a fine equal to 150,000 frw and five days imprisonment (Traffic and Road Safety report, 2019). Looking at those punishments for drunkards, it indicates how some countries take severe measures to handle the issue of drink and drive in order to reduce road accidents but Rwanda has lenient punishment compared to other countries; and this may have less deterrence to drunk drivers.

2.3.4. Challenges that hamper effectiveness of breath alcohol test in reducing road accidents

2.3.4.1. Inadequate resources

In fact, breath alcohol tests are useful to save lives of all road users by deterring drunk driving, but there are some obstacles that can impede the frequent use of it. These include: inadequate resources, lack of support, and misperception of its effectiveness.

Normally, to implement breath alcohol test strategy in order to detect and arrest drunk drivers requires setting up checkpoints for its effective, and this requires 15 or more police officers and other materials which can cost around \$ 5,000 - \$ 7,000 to be conducted. These checkpoints to be effective should be frequently utilized which requires sufficient resources. However, research has revealed that breath alcohol test can be conducted by as few as 3-5 officers just as effective as checkpoints conducted by 15 or more officers (Fell et al., 2004).

Also, author argued that some states do not frequently use breath due to the insufficient resources as the principal issue. For this reason, Policymakers and law enforcement agencies may be more appropriate to allocate funding for this strategy due to the useful of checkpoints in relation to the costs of impaired driving (Mercer et al., 1996).

2.3.4.2. Lack of support

Ineffectiveness of breath alcohol test some time results from the lack of public support, citizen activist groups, public officials, who have not yet understood the value of the breath alcohol test as deterrence strategy which employed to deter and arrest impaired drivers. This leads to some countries not to use these checkpoints for detecting and arresting drunk drivers regularly. Consequently, this hampers the effectiveness of breath alcohol test, because to conduct these checkpoints require support from different categories of people as mentioned above, who may support either in terms of resources or positive perception of their usage (Fell et al. 2004).

2.3.4.3. Misperceptions about effectiveness of breath alcohol test

There are misperceptions about effectiveness of breath alcohol test at checkpoints whereby some citizens and even police officers may perceive this strategy as ineffective in reducing impaired driving regardless of crucial facts that proves otherwise. In this regard, some authors have talked of these misperceptions like Wells et al. (1997) who claimed that police officers at checkpoints have no enough time to watch behavioral signs, making it challenging to identify an impaired driver.

At this point of view as Wells et al. (1997) claimed above, they did not broaden their research to discover other means which can be used in case police officers have no time or little time to observe cues of impaired drivers.

To plug the gap, police officers usually use PAS while at checkpoints in case they have no enough time to identify impaired driver behaviors as well as to screen drivers rapidly on the road (Fell et al., 2004 & Century Council, 2003).

2.3.5. Suggest strategies for breath alcohol effectiveness in road accidents reduction

Law enforcement agencies should ensure the effectiveness of breath alcohol test by establishing different strategies which include: training of police officers; seek support from public, public education program.

2.3.5.1. Training of police officers

According to Scopatz (2008), checkpoints for detecting drunk drivers using alcohol test are effective when they are conducted by well-trained police officers who are able to identify impairment of drivers. Police officers must be skilled enough to detect and recognize that a driver whose BAC is above the legal limit in order to differentiate such a driver from being drunk. So, through experiences as well as extensive training, police officers learned which driving behaviors most likely result from drunk driving, and also to use breath test devices. Again, police officers should be encouraged to be proud of their professional and credible while conducting checkpoint even though it seems to be painful and exposed to the constituents.

2.3.5.2. Need for support

To as discussed earlier to detect drunk drivers, checkpoints are to be established and this requires more support from different angles. This can be done through mobilizing public for their support. So, public support from community groups, states as well as citizens is significant factor to persuade the use of breath alcohol tests. In some countries where alcohol tests are frequently used at checkpoint, it is due to the inspiration from a mixture of support from citizen activist groups, the public, and police officials who understand their value as a deterrence strategy (Fell et al. 2004). Additionally, through multimedia coverage communicating the success and the importance of breath alcohol test as an enforcement strategy to deterring and arresting drunk driving may generate support.

2.3.5.3. Public education program

The misperceptions from different people that the breath alcohol tests are ineffective in reducing road accidents and giving few arrests can be contradicted by encouraging public education about the general deterrent effect of alcohol test. First overall, population should be educated what breath alcohol test is all about, and its significance in reducing road accidents. Moreover, as long as police officers with normal feedback involving these efforts to crash avoidance may assist alleviate some of their aggravation (Castle et al., 1995). To accomplish the maximum worth of these devices should be supported by media coverage, including officers' interviews.

Briefly, despite the challenges that may affect the effectiveness of breath alcohol test at checkpoint, but detecting impaired drivers as well as punishing them play a vital role in contributing to the effectiveness of breath alcohol test hence reducing road accidents especially alcohol related crashes. In this concern, breath alcohol test is one of the enforcement measures to reduce road accidents. In this study, this enforcement measures may be considered as deterrence if properly utilized (Tay, 2011).

2.4. Theories related to the study

It contains various explanations and arguments of theories guiding this research, such as deterrence theory and routine activity theory.

2.4.1. Deterrence Theory

Deterrence theory is one of criminological theories. The criminologists argue that persons practice their rights/wishes in making choices in case they are choosing to offend or not. Therefore, likely criminal balances the charges and profits from the offense and chances to be apprehended then he/she will decide thereon (Bernard& Snipes, 2010).

This indicates that in case the profit of engaging in offense is greater than the likely sanctions, obviously the offender is expected to involve in criminal activities. Also, in case there are minimum chances to be arrested, the offender will commit crime. With reference to this research, the drunken driver could not drive if he/she fears the severity of punishment but after outweighing the benefits from alcohol and risks to be caught by law enforcers and punished for drunken driving and after having assessed that there is no probability of being detected, he/she choose to commit that traffic offence thus drink and drive. This perhaps rest on ineffective use of breath alcohol test while police officers conducting checkpoint as it has been said by Fell et al. (2004). In this regard, this research aimed to assess the effectiveness of breath alcohol test on road accidents reduction.

Deterrence is the main mechanism that acts to improve traffic safety in enforcement programs (Tay and de Barros, 2011). Moreover, deterrence indicates enacting laws that ban drivers from DWI, broadcasting and implementing these regulations as well as penalizing all violators. Once they trust that drink and drive behaviors will be observed and there is possibility of apprehending, sentencing as well as penalizing those drunkards, they will stop to drink and drive (NHTSA, 2006). Deterrence can be used in two different ways namely specific deterrence and general deterrence.

2.4.1.1. Specific deterrence

For the specific deterrence individual person is punished for his/her offence which has been committed. This punishment that has been given serves as a specific deterrence for him/her and not commits offences again. This theory explains the consequence of the sanction has on the particular person as said by Agnew and Cullen (2011). In other words, specific deterrence has the deterrent effect of direct

experience with punishment and punishment avoidance. For instance, in case an individual is penalized once for a robbery, he/she might decide that robbery is less value to be penalized once more then they stop committing the same offence next time.

In this study, specific deterrence is associated to efforts to influence individual drivers who have been detained for illegal behaviors such as to drive after drinking so that drunkards do not drive again in the same conditions (NHTSA, 2006). In addition, as the specific deterrence deters individual drivers who have been punished to drive while intoxicated, however, general deterrence has the effect to the public.

2.4.1.2. General deterrence

This theory generally explains consequences against an individual towards citizens. Despite the fact that the person getting the sanction this discourages him/her to offend once more, and when others realize how severe the punishment is, they will refrain from committing the same crimes. It has deterrent effect of indirect experience with punishment and punishment avoidance (Stafford and Warr, 1993). For instance, if a criminal is accused with murder case and convicted for life imprisonment, he/she will not commit the crime evermore. This will prevent those who witnessed such punishment to commit a crime.

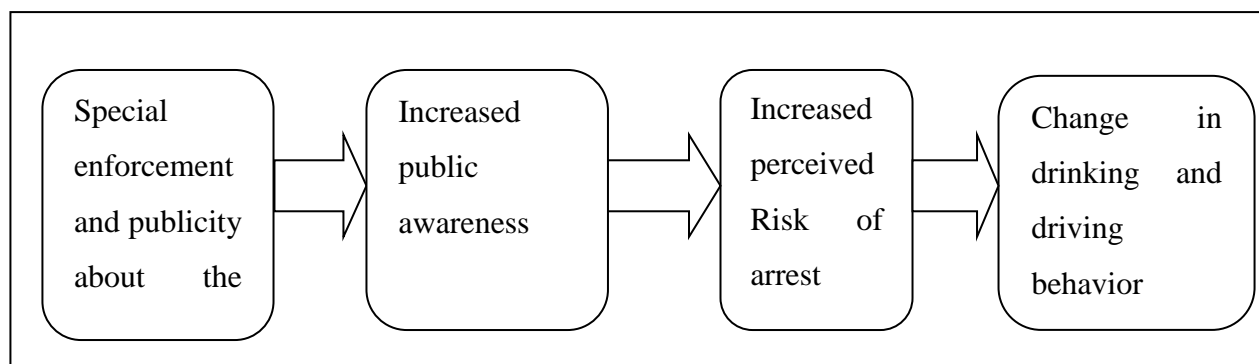
In this research, these forms of deterrence are used by law enforcers to deal with the problem of 'drink and driving'. Consequently, if drivers watched or are familiar with heavy punishment or heavy fine which was given to their fellow drivers due to drunken driving cases, they will fear to engage in the same traffic offences. This deterrence is accomplished by use of breath alcohol test effectively thus leading to road accidents reduction which may result from alcohol related crashes.

In this regard, these deterrence countermeasures influence the overall driving via broadcasting and physical employment of measures with the sanctions which explain overall discouragement (Tay, 2005). In this current research, enforcement activities include breath alcohol test among others which aimed not only deterring but also arresting impaired drivers thus reducing road accidents. This idea is reliable with the general deterrence model including special enforcement, increased public awareness,

increased perceived risk of arrest, and change in drinking and driving behavior (NHTSA, 2006).

The figure below demonstrates the theory of general deterrence as it was applied in the present research in an attempt to effect drink and drive habits. It explains an order of actual and theoretical measures, starting with special police enforcement activity and publicity about the special enforcement. Then, according to the model, the publicity increases public awareness about the special enforcement, which, in turn, creates the public perception that the risk of detection and arrest has been increased. If the perceived risk becomes sufficiently high, drivers will select to refrain from driving a vehicle after drinking alcohol, according to the general deterrence model.

Figure 2. 1 General deterrence models as applied in the present study



Source: Kenkel, 2014

Even though deterrence theory has many followers and has been practiced for long period of time, but it has some challenges. The challenge of the theory towards the current research is that if a driver under influence of alcohol is in the situation to make a proportional choice. Therefore, one can question if a driver who previously consumed alcohol is in a condition to judge the consequences and profits or measuring the rate of danger (Kenkel, 2014).

To fill the loophole of the doubt whether impaired drivers are actually in right condition to make a rational decision (Bernard et al., 2010), ascertain these critics of deterrence theory depending upon thoughts of comparative decision together with consequences and profit assessment is that the driver's choice of drunk driving is taken before she/he starts to take alcohol because she/he takes a vehicle to the bar knowing that he/she will not use another driver.

2.4.2. Routine activity theory

According to this theory, every crime requires victim, offender and location as explained by Cohen and Felon (1979). In other words, for a crime to occur, a likely offender must find a suitable target with the absence of capable guardianship (surveillance, vigilance) when coming together in time and space. In the perspective of this research, drivers who are not effectively deterred from drunken driving due to the irregularity of detectors or due to the static checkpoints are likely to repeat the said behaviors which may lead to accident any time.

If a drunkard observes that police officers at checkpoints (suitable target) are ineffective to deterring and arresting them, they are likely to continue drink and driving. This may also help impaired drivers to identify a location where police officers (capable guardianship) are usually put these checkpoints, thus use another route to escape their detection and apprehension. The removal of any of the elements can prevent crime. It is believed therefore that the crime may be prevented by changing something about the offender, something about the victim or something about the location.

In the same view of this research, something may be done about the drunkards, for instance by employing effective breath alcohol test as well as identifying new roads they may use while impaired not intercepting with police officers at checkpoints. Therefore, apprehending many offenders and employing many breath alcohol test, likely drunkards might start thinking about the possibilities to be arrested is higher, hence decreasing opportunities of driving under alcohol influence and thus reducing road accidents. On the contrary, in case law enforcers do not implement drunken driving measures, someone will suppose having many drunkards because of little chance to be arrested and consequently there would be an increase of road accidents (Robertson & Holmes, 2011).

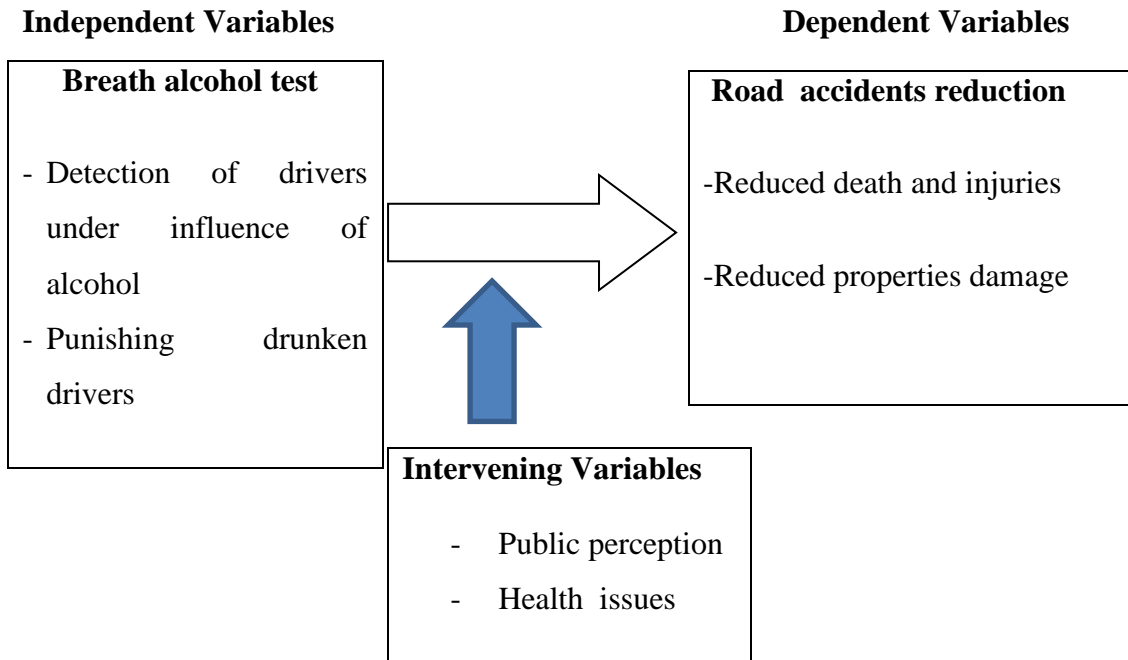
2.5. The conceptual frame work

Under this section the researcher explains the connection between independent and dependent variables with the intervening one which might upset them. Researcher presents how effectiveness of breath alcohol test leads to road accidents reduction and other factors such as public perception and health issues that are developed by

surroundings and hinder the connection between breath alcohol test and reduction of road accidents.

Figure 2. 2 Relationship between breath alcohol test and road accidents

Reduction



Source: Researcher, 2020

According to the above illustration, the researcher argues that breath alcohol test through testing the level of blood alcohol concentration, detecting drivers under influence of alcohol and Punishing drunkards facilitate in reducing road accidents. This can be attained by reducing the number of deaths and injuries as well as property damages that resulted from drunk driving. Intervening variables where there is Public perception and health issues caused by surroundings that influence the interlinked both variables.

2.6. Conclusion

Researcher showed the definition of the key terms and reviewed the literature related to the research topic and mentioned that breath alcohol test is one of the effective law enforcement measure that generally deters impaired driving among all drivers to reduce road accidents that may result from alcohol related crashes. The

breath alcohol test can be effective when there are proper detecting of drivers driving under influence of alcohol as well severe punishment for drunkards. Also, a breath test, like PBTs and PAS and SFSTs, are used by police to enhance detection and apprehension of impaired drivers. These road safety enforcement efforts have relied mostly to deterrence theory and lastly the researcher offered the conceptual framework presenting the interlinked of both variables.

CHAPTER THREE: RESEARCH MEHODOLOGY

3.0. Introduction

This chapter showed the research design, population under the study, sample size, sampling techniques, and the methods that will be used to collect data. The reliability and validity of the research instruments, data collection procedure and data analysis techniques of the study are tackled as well.

3.1. Research design and approaches

The research design is “the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data” (Kothari, 2004, p.31). It is indeed the outline of what the researcher will do and how they will be done, in their research. Concerning the research at hand, the researcher used quasi-experimental research approach. In other words, the researcher used mixed approach i.e. triangulation of both qualitative and quantitative approaches. Qualitative approach will be used to interpret theoretically underlying reasons, opinions, and motivations present in data which will be corrected from interview guides and library based data. And quantitative approach will be used to analyze and interpret numerical and statistical data from questionnaires.

3.1.1. Population

A population is a summation of all the organisms of the same group or species, which exist in same geographical area. It is a group of people or items that share one or more characteristics or from which data can be collected and analyzed (Strydom, 2005). Therefore, from this group of people some of them are more targeted by same the research and it is where the sample is chosen. In this research the population is about breath alcohol test and road accident reduction in city of Kigali. According to the NISR (2019) Kigali city is habited with 1,133 million people.

From this total population, there are three categories of people that have been selected and be considered as target population (Abdalla 2010, p.13) these include:

1. Drivers usually operate in the city of Kigali.

2. Senior officers from Traffic and Road Safety department in the city of Kigali,
3. Representatives of private transport companies in the city of Kigali,

3.1.2. Sampling techniques and Sample size

According to Gay (2003) sampling is the way of choosing a small group of people which symbolizes the features of a big cluster identified as populace in order to generalize the outcomes to the whole inhabitants. This is commonly applied in quantitative research. However, in qualitative research, sampling is used to choose representatives of the population not for generalizing outcomes but for the purpose of looking at certain research questions within definite cases which we accept that symbolize the inhabitants (Abdalla 2010, p.13).

Furthermore, a sample is "a set of units from a population that interests the researcher, the very unit will fairly permit to generalize the results, compared to the population the unit is chosen from" (Ngondijeremiah et, al. 2009 cited in Trachoma, 2006).

For this research which is mixed approach (quantitative and qualitative), two sampling techniques have been used to get sample size: these are random sampling techniques and purposive sampling depending on the categories of targeted population as mentioned earlier.

First, simple random sampling was used to the main category of targeted population that is drivers usually operating in the city of Kigali. The researcher selected those drivers who have a minimum working experience of three years (160 drivers). According to Glenn (1992, p.4) a sample is a predetermined fraction of a numerical population whose properties are calculated to get information about the whole. Whilst dealing with persons, it obviously meant a set of respondents that have been chosen from a larger population for the purpose of a study. For this category only (160 drivers) the below formula has been used to get sample size from the target population:

$$n = \frac{N}{1 + Ne^2} = \frac{160}{1 + 160(0.1)^2}$$

$$n = \frac{160}{1 + 160(0.01)}$$

$$n = \frac{160}{1 + 1.6}$$

$$n = \frac{160}{2.6} \approx 62$$

In the above formula, **n** stands for the sample, **N** is the population size and **e** is the level of precision. Regarding to the above, simple random sampling was used to determine the sample size from this category.

Second, purposive sampling here the researcher had chosen purposively the sample of persons whom they considered them being knowledgeable and experienced with breath alcohol test. In this regard, this technique has been applied on the two categories of targeted population: Senior officers from Traffic and Road Safety department in the city of Kigali (10 senior officers with at least 3 years' experience and to have used breath alcohol test); and Representatives of private transport companies (6) in the city of Kigali (06 persons with at least 3 years' experience and to have intervened in any case of drunk driving).

3.1.3. Data Collection Methods

For the purpose of completing this research, primary data and secondary data will be necessary. Primary data is that data that collected by the researcher at the first time while secondary data is that data collected by another person (Kothari, 1990). For this research, three collection methods will be used as explained below.

3.1.3.1. Questionnaire

Questionnaire are defined as a set of a number of questions printed or typed in a definite order on a form and send to respondents who are expected to read and understand the questions and write down the reply in the space provided (Kothari 2004, P. 100). For this case, the researcher designed questionnaires included close-

ended questions. These questionnaires were answered by drivers and traffic police officers.

Then, in the researcher's expectations, the questionnaires enabled to gather the most recent and truthful primary data about the research matter. It is for note that the "primary data" constituted first-hand information from the field; the information that the researcher collected specifically for the purpose of the research, whose advantage is that "it is specifically tailored to the researcher needs and includes the reality" (Investor Words, 2019).

3.1.3.2. Interview

According to Mathers (2007, p.8), an interview is an interaction in which oral questions are posed by the interviewer to elicit oral response from the interviewee. In this way, the researchers identified potential sources of information and structured the interaction in a manner that brings out relevant information from the respondent. Further, the researcher created a friendly atmosphere in order to conduct successful interaction. Therefore, the researcher conducted interviews with representatives of private transport companies often operating in the city of Kigali.

3.1.3.3. Documentary

This method used to collect secondary data. Minding that, secondary data is the information that is collected basically for a purpose different from your current research but has some relevance and utility for your research (Matthews and Rose 2010, p.285).

Secondary data, for this research, was accessed from text books, laws, publications, and online sources, provided that they were in line with the issues related to the use of breath alcohol tests, aiming at reducing road accidents rooted in drunk driving.

3.1.4. Data analysis

The analytic process consists of recognizing of issues, deciding of the availability of suitable data, choosing on which methods are appropriate for replying the questions of interest, applying the methods and evaluating, summarizing and communicating the results. It is the procedure of developing answers to the questions via the assessment and interpretation of data (Creswell, 2012).

During data analysis, the research questions and objectives were considered. Thus, data from structured questionnaires and interview guide to be processed and be quantitatively and qualitatively analyzed and interpreted. Indeed, Statistical Package for Social Sciences (SPSS) version 16 was used during this process of recording and entering data as effective tool of collecting and analyzing data in social sciences.

3.2. Validity and reliability

Data quality assurance and data quality control of the research are interdependent. These are factors which any study should be worried about in designing a study, analyzing results and evaluating the quality of the study (Chapman, 2004). They are helpful in preventing errors from entering a dataset, guaranteeing data quality for entered data, checking and upholding data quality throughout the project.

Moreover, the researcher ensured that the questions administered were simple, precise and easy to understand by participants. Because of the purpose of this research, the researcher guaranteed the validity of the instruments by ensuring that the designed questions in questionnaire and interview guide matched with the research objectives. The researcher utilized the gathered information only for academic use and extreme confidentiality was applied.

3.3. Ethical considerations

While conducting the research, the researcher observed and respected various ethical considerations such as being honest with the respondents, being objective, open and confidential with them. Before starting with data collection procedures, the researcher ensured that he discussed with different respondents, and explained to them the purpose of the research. He asked the respondents' consent to participate in the research. Further, he ensured that confidentiality had observed. For example, the names of the respondents were not revealed anywhere, during the research and after completing the research.

3.4. The position of the research

This section explains the role of the position of the researcher in the research. During the data collection, the researcher has thought and considered the position (police officer) as one of the factors that can influence the free will and the consent

of the respondents mostly the drivers to provide true information without any fear or dishonest because of that position. Therefore, to avoid such interferences, the researcher introduced himself to the respondents as a student from UR who conducting the research for academic purpose and he did not reveal that he is a police officer. Also, the researcher worn civilian clothes throughout the research and this enabled him to create a good rapport between him and respondents, and they were free and consent to participate without any pressure. In this regard, the position of the researcher positively impact in this research because of the knowledge, skills and experience the researcher had in this field of road safety helped him so much to gather all relevant and valid information from the respondents about the current study by questioning the respondents analytical questions in order to attain the research objectives.

3.5. Conclusion

Briefly, this chapter mainly showed the methodological technique used by the researcher to conduct the research as well as to attain its objectives. It illustrated the population of this research, described the ways by which data was collected, suggested strategies used to classify representative sample, disclosed the procedures of collecting data and underlines the validity and reliability of instruments, ethical considerations as well as researchers' position during the collection of data.

CHAPTER FOUR: BREATH ALCOHOL TEST AND ROAD ACCIDENTS

REDUCTION: STUDY FINDINGS

4.0. Introduction

Often chapter four shows, interprets and analyses primary information obtained from participants by use of questionnaires and interviews. This analysis and interpretation facilitated to respond to the research questions and check hypotheses with the aim to achieve the overall objective of the study. Thus, it helps to assess effectiveness of breath alcohol test on road accidents reduction. The data obtained from quantitative study are presented in tables by using SPSS whereas those found from qualitative using interview guide were used to supplement and interpret those obtained from questionnaires. In addition, they helped the researcher to come up with appropriate general conclusion and recommendations.

4.1. Administered questionnaires and interviews conducted

Three categories of population were considered. First, 62 questionnaires were given to drivers. But only 54 of them were recovered equivalent to 87%. Second, also 10 questionnaires were administered to senior traffic police officers and all of them were recovered. Third, 06 representatives of private transport companies were interviewed. This shows that all data instruments prepared have been recovered 96%. This shows that the information obtained is highly representative and dependable enough to help the researcher answering the research questions and making affordable conclusion and recommendations in this study.

4.2. Characteristics of the respondents

The population of this study was 176 from which 78 respondents were drawn as a sample size. In this regard, questionnaires totaling to 62 were administered to drivers working in the city of Kigali (54 were recovered), 10 were given to traffic police officers and finally 06 representatives of private transport companies were interviewed. Therefore, 64 respondents were managed to answer the questionnaires. All the results are shown below.

4.2.1. Information on gender

In any institution or company, employees are typically male and female. Gender differences play a significant role in data interpretation since they indicate the different perceptions which may influence the research in one way or another. This is the reason why gender variable was taken into consideration as presented in the following table.

Table 4. 1 Information on gender

Please provide info on your sex	Frequency	Percentage
Male	54	84.4%
Female	10	15.6%
Total	64	100%

Source: Primary data, March, 2020

The results shown in the above table of respondents male were 54 with 84.4% while female were 10 with 15.6%. This witnessed that the number of female who participated in the present study is small contrasted to that of male. It obviously indicated that the number of female personnel in traffic police department as well as in driving service is small which has impact in analysis of data whereby information from female respondents has to be supported by other relevant evidence comparing to the number of male (84.4%) which is relatively reliable.

4.2.2. Identification of respondent based on age group

The element of age is vital as far as research is concerned. Respondents required having an assured age for them to be considered mature enough to provide reliable information to the study. In this regard, researcher selected those who were aged from 21-50 year.

Table 4. 2 Respondents' age group

What is your age group?	Frequency		Percentage	
	Male	Female	Male	Female
21-30 years	13	3	20.3%	4.7%
31-40 years	24	5	37.5%	7.8%
41-50 years	17	2	26.56%	3.1%
Total	54	10	84.4%	15.6%

Source: Primary data, March, 2020

The above table shows that respondents who aged between 21 and 30 were 16 in number with 25%; from which 13 of them were male and 3 were female with 20.3% and 4.7% respectively. Those who are in age range of 31- 40 were 29 in number with 45.3%; from which 24 were male and 5 were female with 37.5% and 7.8% respectively. while those who are 41-50 were 19 in number with 29.7 %; from which 17 were male and 2 were female with 26.56% and 3.1% respectively. No one was above 50 years old. The most of respondents are mature enough whereby the age range of 31-40 occupies a big portion with 45.3% (37.5% of male and 7.8% of female). This can then picture the reliability and validity of information on the subject under study. The fact of not having population of above 50 years depends probably to the difficulties of that age in relation to the work of traffic policing and driving which is not easy for elder people.

4.2.3. Identification of respondent based on their educational level

In many societies, especially developing countries there may be both educated and uneducated people. Therefore, educated persons are classified into different categories and signify a lot in any research. For the purpose of this study these categories are shown in the table below.

Table 4. 3 Respondents’ education level

What is your level of education?	Frequency		Percentage	
	Male	Female	Male	Female
Primary education	16	-	25%	-
Senior six	31	08	48.43%	12.5%
Bachelors’ degree	05	02	7.81%	3.1%
Masters’ degree	02	-	3.12%	-
Total	54	10	84.4	15.6

Source: Primary data, March, 2020

The findings in table 4.3 above show that the majority of participants equal to 39 (That is 31 male and 08 female) with 60.9% (48.43% male and 12.5% of female) had studied up to senior six. The second category comprised those who had studied only primary education represents 16 in number with 25%. All of them were male and no female was found in this category. The third category they were 07 respondents (05 male and 02 female) with 10.9% (7.81% male & 3.1% female) bachelor’s degree holders while fourth category had 02 respondents (only male) with 3.1% had masters’ degree.

It is evident that the educational level of respondents is considerable since 60.9% have done senior six, thus they are able to understand what has been asked and to respond reasonably. Consequently the results can be taken as reliable. Indeed, primary education level cannot affect the results since they have minimum knowledge and skills required for their job. Normally, views from traffic police officers are paramount since they were experts in identifying and detecting impaired drivers. This is the same for drivers since they were aware of law prohibiting them to drink and drive as well as traffic regulation in general.

4.2.4. Information on working experience of respondents

It has been noted that skills and experience play a big role in performing a certain job or duty. In this context, traffic police officers necessitate the skills in various fields such as being knowledgeable on road safety regulations as well as having experienced in identifying and detecting those drivers who drink and drive. Furthermore, drivers are more experienced and aware of traffic rules and regulations and dangers that may result from the violation of those rules. In this study, the researcher selected those respondents who had a minimum working experience at least of three years.

Table 4. 4 Work experience in service

How long have you been in service	Frequency		Percentage	
	Male	Female	Male	Female
3-6 years	23	5	35.9%	7.8%
6-9 years	10	3	15.6%	4.7%
Above 9 years	21	2	32.8%	3.1%
Total	54	10	84.3%	15.6%

Source: Primary data, March, 2020

The table shows that 28 (that is 23 male and 5 female) with 43.7% (35.9% male and 7.8% female) of the respondents have working experience ranged between 3-6 years; other 23(21 male and 2 female) with 35.9% (32.8% male and 3.1% female) are experienced above 9 years; while 13 (including 10 male and 3 female) with 20.3%(15.6% male and 4.7% female) are experienced between 6-9 years. Therefore, they can obviously contribute significantly in this study due to their certain views since they are deemed to be experienced enough in road safety matters.

4.3. Presentation of findings related to the research objectives

Under this section, the researcher presents the research findings related to the specific research objectives of the study such as to evaluate the effectiveness of

detection of drivers under influence of alcohol in reducing property damage in city of Kigali; to find out the level of effectiveness of punishments of drunkards to reduce death/injuries and property damage in city of Kigali; to identify challenges that hamper effectiveness of breath alcohol test in reducing road accidents, and suggest strategies for its effectiveness in road accidents reduction.

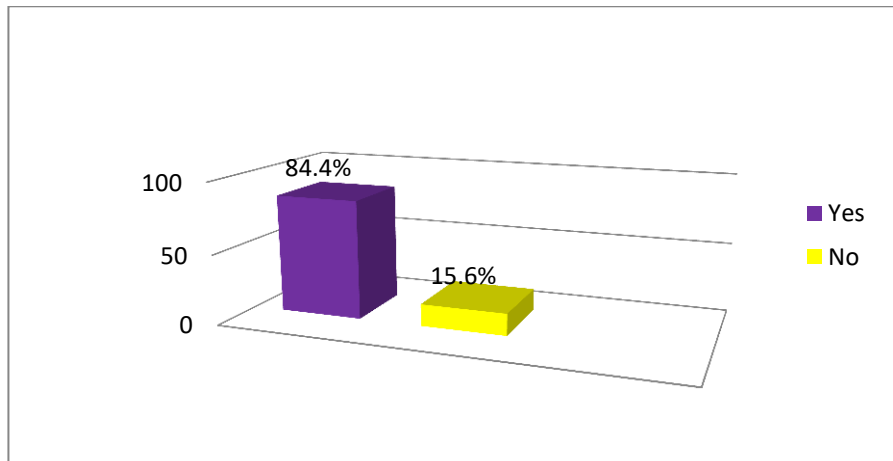
4.3.1. Effectiveness of detection of drunken drivers in reducing death/injuries and property damage in the city of Kigali

This section is all about the presentation, analysis and interpretation of views of respondents in relation to the effectiveness of detection of drunken drivers as one of the elements of breath alcohol test in reducing road accidents in the city of Kigali as shown in tables below. In this standpoint, for the high detection and apprehension of drunk drivers will depend on the application of breath alcohol test; how frequency it is being used; the publicity and visibility of breath alcohol test in the city of Kigali; the use of standardized field sobriety tests and various types of test devices all aiming at detecting drivers under influence of alcohol for the purpose of reducing alcohol related accidents.

4.3.1.1. The awareness on the use of breath alcohol test in the city of Kigali

The community's expectation from law enforcers is social order including road safety among others. In this regard, the respondents were asked if they are aware of the use of the breath alcohol test as the effective strategy in detecting, deterring and arresting of impaired drivers should be used in the city of Kigali in order to reduce alcohol related crashes.

figure 4. 1 Views on the awareness of the use of breath alcohol test by concerned respondents



Source: Primary data, March, 2020

According to figure 4.4 a higher number of respondents equal to 54 out of 64 with 84.4% revealed that the breath alcohol test are used in the city of Kigali because they met them. while traffic police officers are detecting those drivers who might have drunken and driven. While the other 10 respondents with 15.6% had their views saying that they have never met those breath alcohol tests. The reasons given are that probably those breath alcohol test devices are used but in the late night or in others hours which shows that they are not frequently used.

4.3.1.2. Frequency of using breath alcohol test

The effectiveness of breath alcohol test in detecting and preventing impaired drivers aiming at reducing alcohol related crashes, is witnessed by their regularity.

Table 4. 5 Frequency of breath alcohol test use

To what extent do you agree or disagree that breath alcohol tests are frequently used in the city of Kigali?	Frequency	Percentages
Mostly agree	2	3.1%
Slightly agree	15	23.4%
Slightly disagree	2	3.1%
Mostly disagree	45	70.3%
Total	64	100%

Source: Primary data, March, 2020

The above table illustrates the views of respondents about the frequency of using breath alcohol test in the city of Kigali, as it is shown in the table, respondents were of different views whereby a big percentage of respondents (70.3%) mostly disagreed by saying that these breath alcohol tests are not frequently used.

On the other hand, 23.4% slightly agreed that these breath alcohol tests are frequently used whereas 3.1% mostly agreed and also the same number of respondents slightly disagreed. To corroborate the questioned respondents, the interviewees also strongly confirm that these breath alcohol tests are not frequently used since they only work in the weekend.

4.3.1.3. Publicity of breath alcohol test

After frequency of breath alcohol tests to be qualified as effective they have to be highly publicized before their implementation. This means that the message should be communicated to the public indicating the date(s) of conducting such breath alcohol tests to attract their attention so that they could not engage in drunken driving behaviors.

Table 4. 6 Publicity of breath alcohol test before being used

To what extent do you agree or disagree that breath alcohol tests are highly publicized before being used in Kigali city?	Frequency	Percentage
Completely agree	1	1.6%
Mostly agree	2	3.1%
Slightly agree	3	4.7%
Slightly disagree	5	7.8%
Mostly disagree	45	70.3%
Completely disagree	8	12.5%
Total	64	100%

Source: Primary data, March, 2020

As shown in table 4.8 above, 69.2% of the respondents mostly disagreed on the publicity of breath alcohol test, 12.3% completely disagreed and 7.7% slightly disagreed upon their publicity before being used. However, 1.5%, 3.1% and 4.6% respectively completely agreed, mostly agreed and slightly agreed on publicity of breath alcohol test before their utilization.

The information provided on the question of whether the breath alcohol tests are publicized before their use or not are attributed to the high percentage of respondents (69.2%) whereby they mostly disagree. With the same view, interviewees also have strongly shown that those breath alcohol tests are not communicated in advance by responsible authority about their implementation. Of course, this reveals that there is a need of publication of breath alcohol tests before using them in order to ensure their effectiveness in reduction of road accidents.

4.3.1.4. Visibility of breath alcohol tests

The effectiveness of using breath alcohol tests requires another element of visibility whereby they have to be deployed in several routes to attract many drivers' attention.

In this juncture, the table below provides information revealed by respondents about the visibility of breath alcohol test during their administration.

Table 4. 7 Respondents’ views on whether breath alcohol tests are highly visible

To what extent do you agree or disagree that breath alcohol tests are highly visible in the city of Kigali?	Frequency	Percentage
Completely agree	8	12.5%
Mostly agree	44	68.8%
Slightly agree	10	15.6%
Slightly disagree	2	3.1%
Total	64	100%

Source: Primary data, March, 2020

In the above table, 68.8% of respondents mostly agreed that in using breath alcohol tests, their visibility is assured. With the same view, 12.5% and 15.6% respectively completely agree and slightly agreed on the visibility of breath alcohol tests.

In contrast, a small number of respondents are opposed to the above said respondents who agreed whereby 3.1% slightly disagree that breath alcohol tests are visible. In this regard the information taken shows that their visibility is assured since only 3.1% respondents can be tolerated in the study.

It is generally agreed that breath alcohol are used in the city of Kigali and visible as means to reduce road accidents, particularly alcohol related crashes, however, and it seems that there is a need to improve their use since there is a small number which is not aware of their use. That is the matter of frequency.

4.3.1.5. The use of standardized field sobriety tests

To ensure the effectiveness of using breath alcohol tests is worth that there should be the standardized field sobriety tests. Of course, these field sobriety tests must be the same and having the same composition and stands in all areas of operation. The main

idea is that they are used after suspecting the driver under the influence of alcohol to confirm if it is true or not and to know whether they are used.

Table 4. 8 Views on the use of standardized field sobriety tests

What kind of standardized field sobriety test (physical test) does traffic police use to detect drunk driving among the following?	Frequency	Percentage
Observing unintentional jerking of the eye	17	26.6%
One leg stand test	1	1.6%
All of them	4	6.2%
None of them	42	65.6%
Total	64	100%

Source: Primary data, March, 2020

The big number of respondents as it is shown by the above table (65.6%) is on the view that there are no standardized sobriety tests on the ground during the time of testing drivers who may drive while drunken. Though, by considering observing unintentional jerking of the eye and one leg stand test as standardized sobriety tests, there is a low percentage of respectively 26.6% and 1.6% of respondents who affirmed that those tests are used.

However, this number is relatively small to be considered in this study to confirm that the standardized sobriety tests exist and work. Probably they exist but not work since many drivers are not experienced in them. In complement, a big number of interviewees support the view that there are no field sobriety tests. The general idea about this is that there is no use of standardized sobriety tests and consequently there is a need of setting and using them.

4.3.1.6. The types of test devices

As it has been said earlier, after suspecting that a driver can be under the influence of alcohol, it is advisable to law enforcers to use an appropriate devices like

Preliminary Breath Test Devices (PBTs) and Passive Alcohol Sensors (PAS) for effective detecting and apprehending impaired drivers.

Table 4. 9 Views on the types of breath test devices used

Which of the two breath test devices do you think are being used for effectiveness detection of drunk drivers in reducing road accidents?	Frequency	Percentage
Preliminary breath test device	59	92.2%
Passive/informal alcohol sensors	2	3.1%
All of them	1	1.6%
None of them	2	3.1%
Total	64	100%

Source: Primary data, March, 2020

In reference to the table above, a higher percentage of respondents at 92.2% confirmed that among the two test devices, preliminary breath test device is mostly being used for effectiveness of detection of drunk drivers in order to reduce road accidents. In the same line, 3.1% said that passive/informal alcohol sensor is also used while 1.6% affirmed that all of the test devices are used and finally 3.1% of respondents argued that none of them are used.

The reliable information shows that Preliminary breath test devices are mostly used with 92.2% while Passive or alcohol sensors are used with 3.1%. This is also confirmed by the majority of respondents who were interviewed that most of time they experienced only preliminary breath test device being utilized during the detection of drunken drivers. Generally, the two test devices need to be used alternatively since the later plays a significant role in detecting alcohol presence in the air and it is particularly effective at checkpoints, where law enforcers must screen drivers rapidly in short time.

4.4. Effectiveness of punishment of drunken drivers to reduce death/injuries and property damage in the city of Kigali.

This section is all about the presentation, analysis and interpretation of views of respondents in relation to the effectiveness of punishments of drunk drivers in order to reduce road accidents in the city of Kigali. As discussed earlier, a driver is said to be driving under the influence of alcohol if he/she has BAC of 0.08 or above. Therefore, if an individual is punished for her/his wrongdoings, the punishment received constitutes a specific deterrence for him/her to not repeat the same bad behavior.

4.4.1. Views on the punishments for drink and drive offence to reduce road accidents.

Punishment is one of the factors which contribute the deterrence among the drivers who drink and drive, and this reduces road accidents.

Table 4. 10 Views on the types of punishments for drink and drive offence to reduce road accidents

Which of the following punishments do you think are more effective to deter drunk drivers in reducing road accidents?	Frequency	Percentage
Fines of 150,000 frw	5	7.8%
Imprisonment of 5 days	3	4.68%
Impounding of vehicles	2	3.12%
Fines, imprisonment and impounding vehicles	54	84.4%
Total	64	100%

Source: Primary data, March, 2020

The findings indicated that all respondents are aware of punishments for driving under influence of alcohol; whereby 54 respondents with 84.4% revealed that combination of all three sanctions thus fines of 150,000 frw, imprisonments of 5 days and impounding of vehicles play a big role to deter people from driving under

influence of alcohol. 5 respondents with 7.8% focused more on fines of one hundred and fifty thousand francs is enough to deter people from driving under influence of alcohol; 3 respondents with 4.6% insisted on five days imprisonment as deterrence to stop people from drink and drive while 2 respondents said about impounding of vehicles that help them to avoid alcohol while they are driving. This implies that breath alcohol test device reduces drunkards as well as death/injuries and property damage in city of Kigali.

4.4.2. Views on the level of agreement that punishment (Breather Alcohol Test device) for drink and drive reduce death/injuries and property damage in city of Kigali

Table 4. 11 Views on the level of acceptance that punishments reduce alcohol related accidents.

To what extent do you agree or disagree that punishments for drink and drive reduce alcohol related accidents?	Frequency	Percentage
Strongly agree	56	87.5%
Agree	6	9.4%
Disagree	2	3.1%
Total	64	100%

Source: Primary data, March, 2020

As per the objective of this study; the researcher sought the punishments of drink and drive to reduce death/injuries and property damage in city of Kigali, the researcher evaluated different views on the role of breather alcohol test device where caused punishment illustrated above. The findings are presented here below:

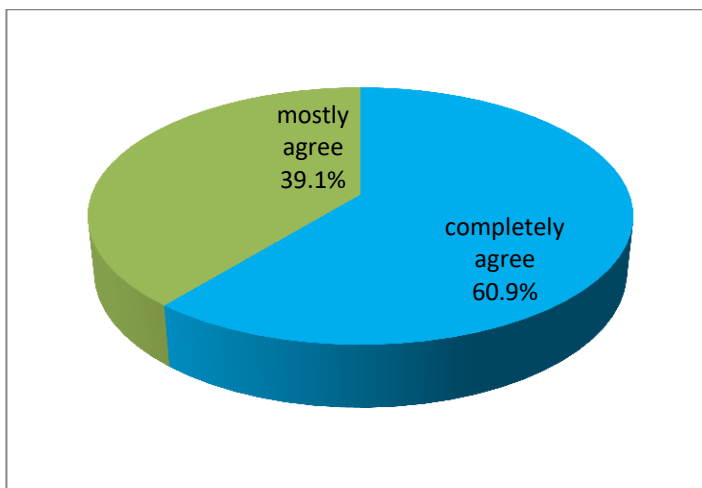
The results in Table above indicates that 56 respondents with 87.5% are strongly agreed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali, 6 respondents with 9.4% are agreed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali, 2 respondents with 3.1% are disagree that punishments of drunkards to reduce death/injuries and

property damage in city of Kigali. As revealed by the findings; the majority of respondents confirmed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali.

4.4.6. Effectiveness of breath alcohol test on road accident reduction

The essence of this question in research is to assess whether breath alcohol test can be a valuable tool to reduce road accidents especially accidents having causal link with drink and drive.

figure 4. 2 Views on effectiveness of breath alcohol test in reducing road accidents



Source: Primary data, March, 2020

The above figure shows how effective use of breath alcohol test is in reducing road accidents in the city of Kigali. All respondents agreed on the importance of using the said strategy in preventing and reducing road accidents even though they do not agree on the same degree. 39 respondents with 60.9% have completely supported the view that the use of breath alcohol test can be an indispensable tool to reduce road accidents while the rest 25 with 39.1% and even the all interviewees also supported that the use of breath alcohol test can be effective in reducing road accidents that mostly result from alcohol related crashes.

Furthermore, it is also witnessed by the secondary data from Traffic and Road Safety department in Rwanda National Police indicating the reduction of road accidents for the past five years as shown in the table below.

Table 4. 12 Accidents recorded from 2015 to 2019 in the city of Kigali

CAUSES OF ACCIDENTS	YEARS	2015	2016	2017	2018	2019	TOTAL
	Over speed		346	455	410	397	315
Drunkenness		77	125	129	98	53	482
Reckless Drive		2439	2548	2014	1721	1023	9745
Wrong maneuvers		1572	1644	1369	1366	1297	7248
Violation of Right of Way		755	677	662	666	552	3312
wrong overtaking		433	444	413	463	290	2043

Source: Secondary data, report from Traffic & Road Safety department, April 2020

As shown in table above, drink and drive is among the main causes of accidents in the city of Kigali for the past five years. For the year 2016- 2017, the alcohol related crashes were 125 and 129 respectively. Due to the enforcement of breath alcohol test the road accidents that might result from drink and drive were reduced in the year 2018 and 2019 at the rate of 41% comparing the year 2017 and 2019.

Even though these breath alcohol tests may not be used appropriately, it is evident that they can work in reduction of road accidents resulting from alcohol related crashes by deterring and apprehending impaired drivers. Indeed, according to the principles of modern policing, the prevention is the priority than reacting on the crime already endangered life of people.

4.5. Challenges to the effectiveness of breath alcohol test in reducing road accidents

A breath alcohol test is useful mechanism to save lives of all road users by deterring drunk driving, but there are some challenges that can impede the appropriate use of it. These may include Legality, inadequate resources, lack of support, and misperception of its effectiveness and others. The table below shows the respondents' views on the possible challenges mostly hamper the effectiveness of using breath alcohol test in reducing road accidents.

Table 4. 13 Challenges to the effectiveness of breath alcohol test in reducing road accidents

What is the challenge that mostly hampers the effectiveness of breath alcohol tests in reducing road accident among the following?	Frequency	Percentage
Inadequate resources and misperception of people on effectiveness of breath alcohol test	36	56.2%
Lack of support	6	9.4%
Lack of support and misperception on effectiveness of breath alcohol test	22	34.4%
Total	64	100%

Source: Primary data, March, 2020

The above table illustrates the views of the respondents the challenges which influence effectiveness of breath alcohol test. Most of the respondents pointed out that effectiveness of breath alcohol test in reducing road accidents can be mostly hindered by inadequate resources and misperceptions of some concerned people about their effectiveness. This is affirmed by 56.2% while those who said that lack of support and misperception on effectiveness of breath alcohol test are 34.4%. In this juncture, inadequate resources symbolize manpower, equipment such as modern breath tests, transport and communication, to mention just a few which may be deemed necessary.

Indeed, a small percentage of 9.4% argued that lack of support from various stakeholders is another challenge that hinders effectiveness of breath alcohol test. The interviewed respondents also affirmatively supported that those challenges exist because the implementation of breath alcohol test requires sufficient resources, to know their usefulness in deterring and arresting impaired drivers, and support from different stakeholders including State officials, citizens and others.

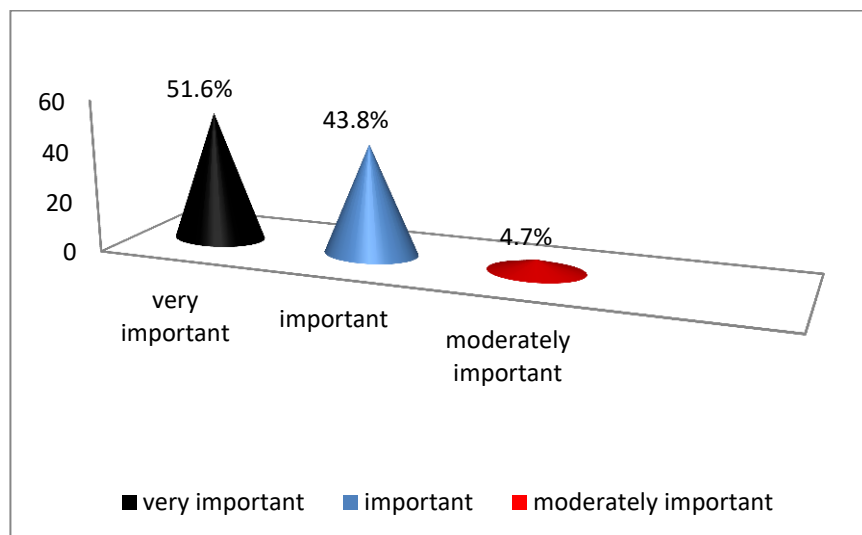
4.6. Strategies for better use of breath alcohol test

According to the information provided in this research, there are many strategies that could be established by law enforcement agencies for ensuring the better use of breath alcohol test in reducing road accidents, thus enhancing its effectiveness. The following tables indicate those strategies which have been suggested in the research.

4.6.1. The training of police officers on the use of breath alcohol test

Training is a main and formal source of knowledge in any field of activity. The use of sobriety checkpoints also requires special skilled police officers mostly to detect impaired drivers in order to be effective. The table below synthesizes the views of respondents on this skill police officers requirement.

figure 4. 3 Views on the need of training police officers for use of breath alcohol test



Source: Primary data, March, 2020

As it is seen in the figure above, a big percentage of respondents supported and urged the training of police officers for the effective use of breath alcohol test. 51.6% of respondents see this requirement as very important, 43.8% appreciated it as important while only 4.7% seen it as moderately important. From the information

pictured above it is thus important to have skilled and trained police officers to use breath alcohol test in order to ensure their effectiveness.

4.6.2. The public support on effectiveness of breath alcohol test in reducing road accidents

In modern policing, people play a key role in determining the security priorities. Effective use of breath alcohol test also requires the support of public as partners in security either by providing resources to the police or information about the commission of traffic offenses even the provision of advice on how to prevent otherwise in order to serve their purpose. The summary on this is displayed in the table below.

Table 4. 14 Views on the public support on effectiveness of using breath alcohol test

To what extent is the importance of public support on effectiveness of breath alcohol test in reducing road accident?	Frequency	Percentage
Very important	44	68.8%
Important	18	28.1%
Moderately important	2	3.1%
Total	64	100%

Source: Primary data, March, 2020

As it is summarized in the table above, there is importance and need of involving community in preventing and reducing crimes. In this regard, all road users should become partners of police to prevent and reduce road accidents that may result from drink and drive.

All the respondents supported this view whereby 68.8% accepted this as very important, 28.1% as important while 3.1% deemed this as moderately important. From this, it is then important to use breath alcohol test as effective tool to reduce road accidents but it is also necessary and important to cooperate with the

community as it is recommended in community policing as modern policing tool to reduce any crime.

4.6.3. The importance of public education program on effectiveness of breath alcohol test

Any program involving the public cannot be achieved without prior teaching or mobilizing citizens. It is in this view that the table below indicated the views of respondents on the public education program.

Table 4. 15 Views on importance of public education program

To what extent is the importance of public education program on effectiveness of breath alcohol test in reducing road accident?	Frequency	Percentage
Very important	41	64.1%
Important	21	32.8%
Moderately important	2	3.1%
Total	64	100%

Source: Primary data, March, 2020

This table above displays the views of respondents on public education program as key tool to achieve effective use of breath alcohol test. This program of education has deemed crucial since 63.1% assessed it as very important, 32.3% seen it as important while 3.1% assessed it as moderately important. The interviewees also strongly supported this idea of educating people on this program.

Of course there is a need of educating the public on the use and effectiveness of breath alcohol test since it is the program designed to curb road accidents while these people are the ones to implement it in partnership with police as it has been stated earlier. Finally, the information provided on this program shown that is of paramount importance to teach the community the effectiveness of using breath alcohol test in reducing road accidents that might result from drink and drive.

4.7. The link between the findings and theories

The deterrence theory states that persons practice their rights in making choices in case they are choosing to offend or not. Therefore, likely criminal balances the charges and profits from the offense and chances to be apprehended then he/she will decide thereon. For the deterrence theory as it was applied in the present study in an attempt to influence drinking and driving behavior. The drunken driver could not drive if he/she fears the severity of punishment but after outweighing the benefits from alcohol and risks to be caught by law enforcers and punished for drunken driving and after having assessed that there is no probability of being detected, he/she choose to commit that traffic offence thus drink and drive.

The findings showed that the real use of breath alcohol test and its visibility in the city of Kigali leads high detection and apprehension of drivers under influence of alcohol and also the severe punishments given to the offenders including fines of 150,000 frw, imprisonment of five days and impounding of vehicles have created a fear among drunken drivers. Consequently, this enforcement has increased drivers and public awareness about the breath alcohol test, which, in turn, creates the public perception that the risk of detection and arrest those drunken drivers has been increased.

Therefore, perceived risk becomes sufficiently high, and most of drivers selected to refrain from driving a vehicle after drinking alcohol and this led to the reduction of alcohol related crashes at 41% as indicated in the report from Traffic & Road Safety department (table 4.12). Also, findings revealed that breath alcohol test is crucial strategy in reducing alcohol related crashes through deterring, detecting and punishing drunken drivers as affirmed by respondents at 60.9%.

The routine activity theory states that a crime to occur, a likely offender must find a suitable target with the absence of capable guardianship (surveillance, vigilance) when coming together in time and space. In this study, drivers who are not effectively deterred from drunken driving due to the irregularity of detectors or irregular use of breath alcohol test he/she is likely to repeat the said behaviors which may lead to accident any time. So, if one of the three factors is removed the crime will not occur.

Therefore, in this study, the findings revealed that by employing breath alcohol tests in the city of Kigali as well as the presence of police officers on the road have increased the possibilities of higher detection and arrests of offenders. Therefore, likely drunkards have observed that the possibilities to be arrested is higher, hence decreasing opportunities of driving under alcohol influence and this has led to the reduction of alcohol related road accidents.

4.8. Conclusion

This chapter showed the findings that collected from the terrain where the researcher used questionnaires, interview guide as data collection methods and also documentary to collect data from various literatures. Also, this chapter demonstrates the effective detection and apprehension of drunken drivers depends on how the breath alcohol test is frequently used, publicized before using, highly visible at the field and use of standardized field sobriety tests and various types of test devices.

The collected data was quantified and analyzed by using SSPS and the findings were discussed grounded on the information obtained under the objectives of the study which include effective detection of drunken drivers in reducing death/injuries and property damage, and effectiveness of punishment of drunken drivers to reduce death/injuries and property damage. Also, this chapter indicates some of the challenges observed in this study and also possible strategies to overwhelm these challenges.

CHAPTER FIVE: SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.0. Introduction

This chapter summarizes the findings, presents recommendations and suggestions. The research was conducted with overall objective to assess effectiveness of breath alcohol test on road accidents reduction in the city of Kigali with a sight to suggest strategies for the better use of breath alcohol test due to the identified problems.

5.1. Summary of findings

To attain the research objective of this study as mentioned above, data were gathered by using diverse instruments including structured questionnaire distributed to the 10 traffic police officers and 54 ordinary drivers all of them often working in the city of Kigali. Moreover, an interview guide was conducted to collect data from 06 representatives from public transport companies and interpret information from questionnaires. The present study primarily investigated effectiveness of breath alcohol test on road accidents reduction in the city of Kigali.

Throughout the survey, the findings showed that breath alcohol test can be a vital strategy to reduce road accidents mostly those that may result from drunken driving. This is due to the fact that breath alcohol test are aimed at deterring and apprehending drivers who decide to drink and drive. This is done by systematically stopping drivers for assessment of alcohol impairment, hence increasing the perceived risk of arrest for alcohol-impaired driving.

Indeed, the research highlights some elements or principles on which can be based evaluation of effectiveness of breath alcohol test in reducing road accidents. These elements include publicity, visibility and frequent use of breath alcohol test which are used to provide information to the general public about the implementation of these devices. This increases the deterrence among the drivers and therefore, they could refrain from engaging in drinking and driving behaviors thus reducing road accidents especially alcohol related crashes.

However, the research findings did not affirm that drink and drive is only factor of root cause of road accidents since there are also over speed, reckless drive, wrong

maneuvers, and violation of right of way, wrong overtaking and others. But the common assertion is that drink and drive may highly contribute to the road accidents due to the fact that excessive alcohol causes sleepiness, over speeding, loss of road control and fatigue to drivers thus leading to possible occurrence of accidents.

Furthermore, the findings revealed that a breath alcohol test is not only the law enforcement strategy for reducing road accidents which may result from drink and drive. It has been observed that there are also other strategies which can be used to reduce road accidents such as saturated and integrated patrols. For the later, drunkards are identified and apprehended by police officers during regular patrols and accident inquires while the former consists of a large number of law enforcement officers patrolling a specific area for a set time to detect and arrest impaired drivers.

5.1.2. Effectiveness of detection of drivers under influence of alcohol in reducing property damage in city of Kigali

During the research, it has been seen that the majority of the respondents (70.3%) mostly disagree with the frequent use of such breath alcohol test while 69.2% of the respondents mostly disagree with the publicized of breath alcohol test before being used. However, concerning the visibility of breath alcohol test, 68.8% of the respondents mostly agree their visibility in the city of Kigali.

Indeed, the majority of respondents (65.6%) argued that standardized field sobriety tests are not used during the implementation of the strategy thus breath alcohol test. Moreover, 92.2% of respondents confirmed that preliminary breath tests are being used while conducting operation to detect and arrest impaired drivers and also indicates that passive alcohol sensor is used at low level since it was voted at lower percentage of 3.1%.

Certainly, the respondents have shown that there is a gap in using breath alcohol test whereby they said that these devices are not frequently used, not highly publicized, no use of standardized field sobriety tests and the use of passive alcohol sensor while conducting breath alcohol test to ensure their effectiveness.

From the above respondents' views therefore, there is a need of improvement of these breath alcohol test by increasing their frequency, publicity, the use of

standardized field sobriety tests, and use of passive alcohol sensors which could help to enhance their effectiveness.

5.1.3. Effectiveness of punishments of drunkards to reduce death/injuries and property damage in city of Kigali

The findings indicated that all respondents are aware of punishments for driving under influence of alcohol; whereby 54 respondents with 84.4% revealed that combination of all three sanctions thus fines of 150,000 frw; imprisonments of 5 days and impounding of vehicles play a big role to deter people from driving under influence of alcohol; 5 respondents with 7.8% focused more on fines of one hundred and fifty thousand francs is enough to deter people from driving under influence of alcohol; 3 respondents with 4.6% insisted on five days imprisonment as deterrence to stop people from drink and drive while 2 respondents said about impounding of vehicles that help them to ovoid alcohol while they are driving.

Furthermore, 56 respondents with 87.5% are strongly agreed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali, 6 respondents with 9.4% are agreed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali, 2 respondents with 3.1% are disagree that punishments of drunkards to reduce death/injuries and property damage in city of Kigali. As revealed by the findings; the majority of respondents confirmed that punishments of drunkards to reduce death/injuries and property damage in city of Kigali. This implies that breath alcohol test device reduces drunkards as well as death/injuries and property damage in city of Kigali.

5.1.4. The challenges that hamper effectiveness of breath alcohol test in reducing road accidents, and suggest strategies for its effectiveness in road accidents reduction.

Finally, after an analysis of revealing that a breath alcohol test can be valuable tool to reduce road accidents, some challenges have been identified such as insufficient resources, misperceptions about effectiveness of breath alcohol test and lack of support from various stakeholders which affirmed by respondents with 56.2%, 34.4% and 9.4% respectively. However, this does not mean that it is practically impossible to implement breath alcohol test. The interviewed respondents also affirmatively supported that those challenges exist because the implementation of

breath alcohol test requires sufficient resources, to know their usefulness in deterring and arresting impaired drivers, and support from different stakeholders including State officials and citizens.

Indeed, the possible strategies have been also suggested to successfully deal with these challenges so that these devices can be effectively utilized in order to reduce road accidents. These include; training of police officers; seek support from public and public education program. In the same line, some recommendations and suggestions have been proposed in relation to the research.

5.2. Conclusion

Every country faces with the challenges of road traffic accidents. But Rwanda's ambitious and complex reform program may offer lessons for protecting the citizens thought largely how to overcome that challenges where bring Breather Alcohol Test.

One key to its achievements has been the strong commitment to reform shown by traffic police and its partners like public transport companies and drivers. Rwanda National Police has established measures for effectiveness of breath alcohol test for road traffic accidents reduction. And it has created a well-defined, long-term reform strategy that informs all of the country.

The government entities involved in the process have had clearly defined roles of breath alcohol test, and all appreciated objectives fixed for the application of this strategy. The RNP has played a essential part not only in guaranteeing coordination in traffic and road safety department but also involved all road users and other partners such as transport companies.

RNP has worked to meet the needs of roads users by streamlining regulatory processes involved in operating of breath alcohol test. Beyond undertaking legal and administrative reforms, the RNP has invested in training for professionals including traffic officers.

All these efforts are showing results in Rwanda's for accidents reduction. And Rwanda's dedication to private and public transport development, in triggering

positive legal reforms, has contributed substantially to its overarching goal of promoting national citizens lives and prosperity.

This study was conducted for a purpose of effectiveness of breath alcohol test on road traffic accidents reduction where the first objective was to evaluate the effectiveness of detection of drivers under influence of alcohol in reducing property damage in city of Kigali. On this point, majority 92.2% of respondents confirmed that preliminary breath tests are being used while conducting operation to detect and arrest impaired drivers and this resulted into the reduction of road accidents though these devices are not frequently used in the city of Kigali.

Indeed, the second objective was to find out the level of effectiveness of punishments of drunkards to reduce death/injuries and property damage in city of Kigali. On this point, the findings indicated that all respondents are aware of punishments for driving under influence of alcohol, whereby 56 respondents with 87.5% are strongly agreed that punishments of drunkards play a big role in reducing death/injuries and property damage in city of Kigali.

Furthermore, the third objective was to identify challenges that hamper effectiveness of breath alcohol test in reducing road accidents, and suggest strategies for its effectiveness in road accidents reduction. The findings indicated insufficient resources, misperceptions about effectiveness of breath alcohol test and lack of support from various stakeholders are some of the challenges that affect the effectiveness of breath alcohol tests which affirmed by 56.2% of respondents. Also, some of the strategies were identified like training of police officers; seek support from public and public education program.

All those objectives were discussed in detail. The researcher used questionnaire on the sample size of 64 respondents in order to collect data and gather all information needed and used both and quantitative and qualitative in order to analyze and interpret data collected from the field.

Furthermore, after seeing challenges and strategies to Breather Alcohol test, respondents have accepted that when RPN are able to influence government policy in roads traffic accidents reduction will be accomplished at time and will be effective. Thus, it was shown that RNP play a role for road accidents reduction

where respondents agreed that when there is RNP there is a good practice for road users.

5.3. Recommendations

In order to improve the effective utilization of breath alcohol test in reducing road accidents especially those which may result from alcohol related crashes, it would be attractive to the government of Rwanda, Rwanda National Police, stakeholders and the community for the purpose of reducing road accidents to take care of the following recommendations:

5.2.1. The Government of Rwanda

Basing on the research findings, breath alcohol test can be a valuable strategy to reduce traffic related offences especially in reducing road accidents. Therefore some recommendations were proposed to the Government of Rwanda:

- ✓ To provide the requirement resources aiming at supporting police through its traffic and road safety department in reducing accidents using breath alcohol test and other means assessed to be effective.
- ✓ Participating actively in various programs aiming at reducing road accidents through sensitizing people or road users in general on positive perception and complying with traffic rules and regulations.

5.2.2. The Rwanda National Police

Rwanda National police as one of the security organs, has to recognize other existing threats to the security other than violence which include road safety related offences and accidents. For this reason it is important to:

- ✓ Prevent and reduce road accidents particularly those which may result from drunken driving by using breath alcohol test as useful strategy aiming at improving the security of road users.
- ✓ To be effective, these breath alcohol test must be used in a manner that they are frequently used and highly publicized before being used
- ✓ Improving effectiveness of breath alcohol test by use of standardized field sobriety tests and passive alcohol sensors to detect more impaired drivers.

- ✓ Using all possible preventive measures including education of road users on negative impacts resulting from road accidents and usefulness of breath alcohol test in road accidents reduction so that they are actively involved in their implementation hence complying with the traffic rules and regulations.

5.2.3. The stakeholders and the community

- ✓ Providing support either financially or relevant information especially on drink and drive behaviors to enhance effective use of breath alcohol test as one of strategies in reducing road accidents
- ✓ To suggest the location(s) where these breath alcohol test can be employed to apprehend impaired drivers and other areas of improvement in relation to the issue.

5.3. Suggested further studies

Because of little time and resources, the scope of this study was limited to effectiveness of breath alcohol test on road accidents reduction, challenges and some strategies to be used in the city of Kigali in solving the problem of road accidents which are especially associated with drink and drive. This study gives a room for other researchers to carry out the future research on the role of breath alcohol test on road accidents reduction. There is also a need of conducting further research on the relationship between over speeding and road accidents.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE FOR RESPONDENTS

Dear Respondent,

Re: Requesting for information for research project

Thomas KAYONGA, I am student at the University of Rwanda; in postgraduate program, Master's Degree in Peace Studies and Conflicts Transformation; as part of the academic requirements, I have undertaken a research project entitled:” *Effectiveness of breath alcohol test on road accidents reduction with case study of the city of Kigali*”. This research will achieve the following objectives: to assess effectiveness of testing blood alcohol concentration in reducing death/injuries in city of Kigali; To assess effectiveness of detection of drivers under influence of alcohol in reducing property damage in city of Kigali; and to assess effectiveness of punishing drunkards in reducing death/injuries and property damage in city of Kigali.

To this end, I hereby request you to provide me with information related to this study which evidently falls in your field of work. It is a purely academic questionnaire and will be treated with high confidentiality it deserves.

Thank you for your cooperation.

Phone N°: +250 781 463 966

KAYONGA Thomas

Instructions:


(a) Try to give answers that you feel are most appropriate to each question

(b) Tick the number corresponding to your choice

(c) Answer all questions

NO	Questions	Tick the answer of your choice
Section1	Characteristics of respondents	
QN 01	Please provide info on your gender	1. Male 2. Female
QN 02	What is your age group?	1. 21-30 2. 31-40 3. 41-50 4. 50 above
QN 03	What is your level of education?	1. Primary level 2. Senior six 3. Bachelor's degree 4. Master's degree 5. Above
QN 04	How long have you been in service?	1. Less than 3 years 2. 3-6 years 3. 6-9 years 4. above 9 years
Section 2	Effectiveness of detection of drunken drivers in reducing death/injuries and property damage in the city of Kigali	
QN 05	Have you ever use or met breath alcohol test?	1. Yes 2. No
QN 06	To what extent do you agree or disagree that breath alcohol tests are frequently used in the city of Kigali?	1. Mostly agree 2. slightly agree 3. Slightly disagree 4. Mosly disagree
QN 07	To what extent do you agree or disagree that breath alcohol tests are highly publicized before being used in Kigali city?	1. Completely agree 2. Mostly agree 3. Slightly agree 4. Slightly disagree 5. Mostly disagree 6. Completely disagree
QN 08	To what extent do you agree or disagree that breath alcohol	1. Completely agree 2. Mostly agree

	tests are highly visible in the city of Kigali?	3. Slightly agree 4. Slightly disagree
QN 09	What kind of standardized field sobriety test (physical test) does traffic police use to detect drunk driving among the following?	1. Observing unintentional jerking of the eye (a nystagmus test) 2. One leg stand test 3. All of them 4. None of them
QN 10	Which of the two breath test devices do you think are being used for effectiveness detection of drunk drivers in reducing road accidents?	1. Preliminary breath test devices 2. Passive/informal alcohol sensors 3. All of them 4. None of them
Section3	Effectiveness of punishment of drunken drivers to reduce death/injuries and property damage in the city of Kigali.	
QN 11	Which of the following punishments do you think are more effective to deter drunk drivers in reducing road accidents?	1. Fines of 150, 000 frw 2. Imprisonment of 5 days 3. Impounding of vehicles 4. Fines, imprisonment and impounding of vehicles
QN 12	To what extent do you agree or disagree that punishments for drink and drive reduce alcohol related accidents?	1. Strongly agree 2. Agree 3. Disagree
QN 13	What is the effectiveness of breath alcohol test on road accident reduction?	1. Completely agree 2. Mostly agree
Section 4.	Challenges that affect the effectiveness of breath alcohol test	
QN 14	What is the challenge that mostly hampers the effectiveness of breath alcohol tests in reducing road accident among the following ?	1. Inadequate resources 2. Lack of support 3. Misperceptions on the effectiveness of breath alcohol test
Section 5	Strategies for better use of breath alcohol test	
QN 15	To what extent is the importance of training of police officers on effectiveness of breath alcohol test in reducing road accident?	1. Very important 2. Important 3. Moderately important
QN 16	To what extent is the importance of public support on effectiveness of breath alcohol test in reducing road accident?	1. Very important 2. Important 3. Moderately important
QN 17	To what extent is the	1. Very important

	importance of public education program on effectiveness of breath alcohol test in reducing road accident?	2. Important
		3. Moderately important

APPENDIX 2: INTERVIEW GUIDE FOR REPRESENTATIVES OF PUBLIC TRANSPORT COMPANIES

Topic: Effectiveness of beath alcohol test on road accidents reduction

Target Audience: 06

Principal Investigator: Thomas KAYONGA

Total Participant time required: **15-30mins**

1. INTRODUCTION (10 m)

- Welcome the interviewee and researcher self introduction
- Explain the general purpose of the interview and why the participant was chosen
- Discuss the purpose and process of interview (interviewer & interviewee)
- Outline general ground rules and discussion guidelines such as the importance of speaking up and being prepared for the interviewer to interrupt to assure the line of the study
- Address the issue of confidentiality: Inform the participant that information discussed is going to be analyzed as a whole and that participant's name will not be used in any analysis of the discussion.

11. DISCUSSION GUIDELINES:

The researcher would like the interview to be informal, so there's no need to wait for the researcher to call on you to respond. The researcher would like to encourage you to respond directly to the asked question. If you don't understand a question, please let the researcher know. Hopefully you'll feel free to speak openly and honestly.

No one else will have access to these tapes and they will be destroyed after our report is written.

111. QUESTIONS:

Q1. Have you ever met breath alcohol test especially in the city of Kigali?

Q2. How frequently are breath alcohol test being utilized?

Q3. As a representative of the transport company how do you come to know that police will conduct breath alcohol test?

Q4. What are the main causes of road accidents in Rwanda especially in the city of Kigali

Q5. How do you see the magnitude of drunk driving accidents/cases in the city of Kigali?

Q6. Do you think that breath alcohol test is effective measure to reduce road accidents that mostly resulting from drunk driving in the city of Kigali?

Q7. In your view, what could be done by police to reduce road accidents that might result from drink and drive?.

Q8. Do police use breath alcohol test everyday (regularly) or some days (periodically)? What could be the reasons?

Q9. Do you think that if breath alcohol test be used regularly can reduce alcohol related crashes?

Q10. Do you think that testing blood alcohol concentration (BAC) and detection of drunk driving by use of breath alcohol test can reduce alcohol related crashes? If yes or not, please explain?

Q11. What is the punishment (s) for drunk driving offence? How do people appreciate or what are their views about that punishment (s)?

Q12. What do you think are the challenges faced by police while using breath alcohol test in reducing road accidents?

Q13. What are your suggestions for better use of breath alcohol test in reducing road accidents?

Thank you for your valuable time in answering to these questions.

KAYONGA Thomas