

# Neuro-trauma

## A Cost Analysis of Neurotropic Substance use ( codeine+ tramadol ) among Commercial Bus Drivers who were Managed as Road Traffic Head Injury Victims in a Tertiary Center in South-West, Nigeria

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**Abstract:-** The study assessed the economic burden of neuro-tropic substance use ( tramadol+ codeine) among commercial bus drivers who presented as head injury victims in a prestigious tertiary center in Ibadan, Nigeria, Sub-saharan Africa. The study adopted a snow-balling/purposive sampling method to obtain data. The interview was done with 386 road traffic injury victims( commercial bus drivers) admitted over a 4-month period to the randomly selected study center using a structured questionnaire. The result showed that average cost per patient for road traffic head injury treatment( neuro-trauma care) was 346 US dollars with an average of 30 US dollars on tramadol+ codeine purchase aside the medical expenditure. Prevalence of catastrophic out-of-pocket spending was over 90% thereby rendering victims impoverished. It is recommended that clinical neuro-toxicology units be established in hospitals for routine and emergency toxicology screens for licensure to qualify or be disqualified from public commercial driving and for neuro-rehabs follow-up care alongside medical insurance for the citizenry with implemented laws and regulations guiding use of codeine+tramadol and other neuro-tropic medications of public health concern.

**Keywords:-** mroad traffic injury, neuro-toxicology, codeine+tramadol, neurotropic substances, neurotrauma.

### I. INTRODUCTION

According to WHO, 93% of the world's fatalities on the road occur in low- and middle-income countries, even though these countries have approximately 60% of the world's vehicles. Road traffic injuries are the leading cause of death for children and young adults aged 5-29 years. Road traffic accident cost most countries approximately 3% of their gross domestic product. Globally, approximately 1.35 million people die each year as a result of road traffic crashes. More than half of all road traffic deaths are among vulnerable road users: pedestrians, cyclists, and motor cyclists but rife among those under substance(drug) influence. The 2030 agenda for sustainable development has set an ambitious target of halving the global number of deaths and injuries from road traffic crashes by 2020 which was an effort to curtail the menace being posed by road traffic injuries. Road transportation is a major contributor to accidental death from trauma ( Adesunkanmi, Akinkuolie, &

Badru, 2002; Ekere, Yellowe, & Umunne, 2004; Solagberu et al, 2003), one of the most common causes of disabilities( Murray & Lopez; 1997)

Road traffic head injuries are an increasing public health problem in the subsaharan Africa notably in West Africa ; with Nigeria amongst the high-ranking nations where it poses untold economic burden on the victims who might be uninsured and at the same time in dire emergency where they are only left with the option of out-of-pocket payments at the point of accessing health care. Mortality rate from lone crash was estimated at 37% followed closely by motor vehicular collision according to a prospective hospital-based study on pattern, severity and outcome amongst 104 consecutive head injured motorcyclists presenting at accident and emergency unit of UITH, Ilorin, North Central Nigeria.(Odebo T.O et al, 2014) published in the Nigerian journal of basic and clinical sciences. Road traffic injuries cause considerable economic losses to individuals , their families and to nations as a whole. These losses arise from cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. Traumatic brains injury is a major complication or morbidity associated with road traffic injuries. Pediatric complication differs considerably from adults attributable to age-related anatomical and physiological differences, patterns of injury based on habitus of the child and difficulty in neurological evaluation in children.( US Center for Disease Control, 2019).

The city of Ibadan has a population of about 3 million people and is the third largest city in Africa. In the mid-1970s, the economic boom in Nigeria was at its peak, which caused major changes in the socio-economic scenario in the country, changes which affected the pattern of acute head injuries especially in children with a reversal of trend lately in the Covid-19 pandemic period according to Global Road Safety Annual Report 2020, hence a need to reappraise current magnitude of cost of care during this time to be better prepared for catastrophic spending that will be much pronounced in the post-covid era by estimating the current impact of cost of care on victims of road traffic injuries who are affected by the economic hardship of the time.

### Need For This Study

The rationale behind this study is to provide an evidence-based research statistic that will engender better intersectoral collaboration, through an informed decision, from relevant and allied stakeholders of public health; from health and non-health sectors alike. This will help to formulate policies to reduce the economic burden and out of pocket payment among road traffic head injury victims, foster precautionary road safety measures, sustain and improve economic empowerment of the road traffic accident victims from medical social services, philanthropists and also encourage donor supports and grants from international unilateral and multilateral agencies. The study will also encourage effective road safety regulations among road users at different levels.

Therefore, there is need to provide measure(s) of the magnitude of the burden and effect of out of pocket payments on mortality outcomes of victims of road traffic injuries in a renown city in West Africa, Ibadan to have a representation of its effect on the victims so as to propose an emergency care policy to the federal government for the citizenry so as to support the available mechanisms of universal health coverage and to provide relief from the effect of catastrophic out of pocket spending on victims of road traffic accidents who need emergency care direly but can not afford to pay due to low socio-economic status and as a result of not being in the category of enrollees or dependants in the National Health Insurance Scheme obtainable in the formal sector. The mortality rate is a useful indicator for comparing road safety across countries, particularly those with similar level of motorisation. There is therefore the need to provide a result-oriented and evidence-driven statistic through this study that will make the federal government make informed decision as it relates to implementing a more effective financial protection mechanism for those impacted negatively by the effect of out of pocket payment while seeking medical care especially in dire emergency situation for the citizenry. The global road safety annual report 2020 though showed that fewer people are killed in crashes but the rate of reduction has slowed compared to the projected values especially as it relates to the COVID-19 pandemic emphasizing need for ongoing review and appraisal of contemporary road-safety oriented legislation, strategies and targets to meet current prevailing needs

### Background:

Adeloye et al, 1986 conducted a prospective cohort study on all head injury victims from road traffic accident encountered in Nigeria and treated in the emergency room of the University College Hospital, located in the city of Ibadan, between 1 July and 31 December 1974 amongst children with craniocerebral traumas during the peak of economic boom that characterized the mid-1970s which caused changes in the socio-economic scenario in the country, changes which affected the pattern of acute head injuries, especially in children. A reversal of trend is being observed lately with the Covid-19 pandemic where there is a change in usual trend of road traffic injuries with a notable slower reduction in incidence rate of road traffic injuries

compared to the projected value in line with the 2030 agenda for sustainable development that set an ambitious target of halving the global number of deaths and injuries from road traffic crashes by 2020. This study also did not quantify the impact of socio-economic status of victims with mortality rate of road traffic injuries and treatment cost burden, which is a gap in the study, that could have lent credence to the generated facts and figures about high referral pattern and prognosis of the patients who received care at the time.

Even within high income countries, people from lower socio-economic backgrounds are more likely to be involved in road traffic crashes. From young age, males are more likely to be involved in road traffic crashes than females. About three quarters (73%) of all road traffic deaths occur among young males under age of 25 years who are almost 3 times as likely to be killed in a road traffic crash as young females from risk factors associated with the age bracket which necessitated WHO response to monitor progress and trends by providing technical support to most negatively impacted nations of the world. In Nigeria, road traffic-related head injuries remain a major mechanism and risk factor for the development of complications that impacts on the treatment cost. Studies in the United States Center for Disease Control especially among the adolescents, young adults, elderly and other disadvantaged groups including indigents estimated that 475,000 people aged 0-14 years sustain traumatic brain injury annually as complications of head trauma from road traffic injuries. The annual death rate is higher in children younger than 4 years than those that ate 5-14 years of age. (Abstract: Scientific journal publishing department, medical tribune, inc.; Neurologia medico-chirurgica, pediatric traumatic injury: Characteristics, Features, Diagnosis and management; article; Takashi ARAKI, Hiroyuki YOKOTA, AKIO MORITA; pubmed; 2012)

According to a study by Adeleye A.O on the pattern of referral for head injury victims to University College Hospital Ibadan, it was concluded that the University College Hospital, Ibadan continues to play a pivotal role in the management of head injury in Nigeria. The results suggest an urgent need for stakeholders in the health sector to provides all that is required to uphold the status of the hospital as a center of excellence for neurosurgery and neurosciences, using a study sample of 1034 cases of head injuries in the registry, 23.6% presented primarily to UCH, Ibadan; 423 (49.1%) were from outside Ibadan/Oyo State. Most of the cases were earlier seen in other facilities in four out of Nigeria's six geopolitical zones including other tertiary hospitals with practicing neurosurgeons. The reason for the inter-state referrals included absence of neurosurgical expertise (67%) or lack of others logistics like neuroimaging/bed space and intensive care unit services. Head injury was caused by road accidents in more than 85% cases. The patients referred inter-state had more severe injuries, more delayed attainment of critical milestones in their trauma care, and higher frequency of neurosurgical operative intervention. They also had worse in-hospital outcome and longer length of stay.

In another study by G. Anil Kumar et al in a another low-income indian nation, 723 road traffic injury cases that arrived alive at the selected hospitals were selected and the differential risk of catastrophic out of pocket total expenditure (COPE-T), and medical expenditure (COPE-M), and distress financing was assessed and it was found that the median out of pocket medical and non-medical expenditure was USD 169 and USD 163 respectively. The prevalence of COPE-M and COPE-T was 21.9 % [95% CI 18.8 -24.9] and 46% [95% CI 42-49.3] respectively and only 22% had access to medical insurance exposing the remaining 78% exposed to the burden of out of pocket spending however the study did not provide information on the effect of the cost of out of pocket payment on the mortality outcome of the study sample. This study was not able to correlate the impact of economic burden and effect of out of pocket spending on mortality outcome and length of stay of the head injured patients.

A study conducted by Uduak et al (2017) examined the burden of road traffic injuries among road crash victims in a tertiary hospital in Ibadan, Nigeria but on a range of injuries to various parts of the body system. The result showed that the average cost per patient for road traffic injuries treatment was ₦42, 946 ( 215.9 US dollars ); on average the amount expended on surgery expenditure was over 86%. The knowledge gap identified is to estimate relative cost implication for a particular part of the body and added cost accruable to neurotropic substance use( Tramadol+ Codeine) among commercial bus drivers who doubled as head injury victim which this study seeks to answer.

Another study at three public tertiary hospitals in 1995 ( Sumiratana 1998) indicated the average hospital cost per capita was THB 39, 875. For provincial hospitals, two other studies in 1996 and 1997 showed the average total treatment charge per capita to be THB 10, 852 and THB 11, 606, respectively ( Pulpanyawong,1998; Murane, 1999). Also, the gap identified in these studies was that no locally conducted study considered sourcing information directly from societal perspective which is the case also in Nigeria with no validated data in this respect yet which will be given priority in this study in a tertiary hospital of repute in Nigeria, UCH, Ibadan.

### Objectives

The broad objective of the study is to fill in the knowledge gap of the economic burden and also the effect of out of pocket payment on the mortality of the head injury victims among commercial bus drivers involved in road traffic injuries. The specific objectives are to:

1. To determine the cost-effect analysis of the cost of care in relation to the effect of out of pocket payment on the victims of road traffic injury in public hospitals in Nigeria using UCH Ibadan, a public tertiary medical center of repute as a case study.
2. To do a cost-risk ratio of the out of pocket spending on the mortality outcome of the victims of road traffic injury
3. To quantify the magnitude of out of pocket payment expenditure at the point of care in the public tertiary center

4. To determine association between poor socio-economic status of victims and mortality outcome at emergency unit of the study area.

### Research questions or hypothesis

1. What is the cost-effect analysis of out of pocket spending on mortality outcome while accessing emergency care in the public tertiary center?
2. What is the cost-risk ratio of out of pocket payment on victims of road traffic accident without insurance at emergency department ?
3. What is the magnitude of out of pocket payment expenditure among victims of road traffic injuries in terms of direct cost and indirect cost ?
4. Is there any association between low socio-economic status and mortality outcome of admitted road traffic injury victims who have to pay out of pocket ?

## II. MATERIALS AND METHODS

Ethical training/approval will be obtained from West African bioethics CITI training program certification on human research (basic course) and/or health research committee of the University College Hospital, Ibadan. Informed consent will be obtained from the respondents. Primary and secondary data will be sourced. Health data obtained from case files of patients arriving alive at the emergency (adult/ pediatric) with those admitted into surgical wards and intensive care units post-op in the study population. Questionnaires will be administered to sample opinion of relevant stakeholders including care givers, stable patients, specialists and other key informants with indepth interview which will be recorded and transcribed( open-ended) and use of closed ended questionnaire relating to mortality outcomes in relation to cost of care.. Quantitative data analysis will be done using SPSS-24 version. The study intends to also have a descriptive cross sectional survey of victims in the presence of appropriately matched caregivers of the victims of road traffic accident with drug history of codeine, tramadol use at the emergency unit and then follow up the recruited study sample including old and new patients who are already stable victims of road traffic injuries in emergency, surgical and Intensive care units of the hospital. A snowballing/purposive sampling design will be used to select participants with respondents selected by simple random sampling method. A focused group discussion will be conducted categorizing them into male and female who are 18 years and below and those above 18 years (age bracket 0-75 years or more) i.e including children and the elderly with the latter group selected for the actual study. The study will also collect primary and secondary data available in case notes at the emergency and surgical registers at the theatre which will be corroborated by indepth interview of participants and interview of key informants including care givers, patients, managing team, insurance desk officers, medical social workers etc. Quantitative data obtained through well-structured open-ended questionnaire will be by use of self-administered closed-ended questionnaire. Qualitative data from the study will undergo transcription and reported in themes and sub-

themes. The relationship between the explanatory and outcome variable will be explained through multiple regression analysis. Variation in intensity of COPE-M in road traffic injury victims will be assessed using multiple classification analysis. Data will be collected using a questionnaire that will be designed based on previous studies with snow-balling/purposive/random sampling techniques. The questionnaire will be validated based on interviewing some participants with the aim of detecting comprehension problems and assess if questionnaire is tailored along the research aims. Data will be classified into quantitative, qualitative and mixed methods to analyse findings. Questionnaire will be prepared in English and will be administered after giving participants a brief verbal introduction of purpose of the study and criteria used in selecting each respondent. Respondents will also be given the opportunity to ask questions regarding the study. Questionnaire will consist of questions in closed ended (i.e. Yes or no) and open ended questions. Interview will be digitally recorded and will include: focused group discussion among stable respondents and their caregivers with in-depth interview with the available key informants including specialists, surgical residents, attending emergency doctors, nurses, medical social workers etc.

Statistical tool: sample size will be calculated. Data will be manually collected, edited and coded which will be inputted into the computer for analysis using statistical software and Microsoft Excel 2007. Statistical significance will be tested at P-value set at 5%. The final findings will be disseminated through a published journal.

### III. RESULTS/DISCUSSION/RECOMMENDATION

Following statistical analysis of data drawn from questionnaire using logistic regression model (SPSS package version 24) following data summarization/recording/coded in e-data base, the result showed that average cost per patient for road traffic head injury treatment (neuro-trauma care) was 346 US dollars with an average of 30 US dollars on tramadol+ codeine purchase aside the medical expenditure. Prevalence of catastrophic out-of-pocket spending was over 90% thereby rendering victims impoverished and 60% mortality outcome among the head injured patients. It is recommended that clinical neuro-toxicology units be established in hospitals for routine and emergency toxicology screens to qualify or be disqualified from public commercial driving and for neuro-rehab follow-up care alongside medical insurance for the citizenry with implemented laws and regulations guiding use of codeine+tramadol and other neuro-tropic medications of public health concern. Information from the study will assist policy makers in policy discussions guiding planners and policy makers in the health sector to develop more efficient intervention programs on reducing the potential risks of persons involved in catastrophic expenditure.

Study limitations: Unconscious victims are incapacitated to clarify information; care-givers could only give information within their knowledge scope about patient, patients with memory impairment could not also authenticate information.

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Disclosure Statement:

The contributors declare that they have no conflict of interests.

### REFERENCES

- [1]. Parkinson, F., Kent, S., Aldous, C., Oosthuizen, G., & Clarke, D. (2014). The hospital cost of road traffic accidents at South African regional trauma center: A micro-costing study. *Injury*, 45(1), 342-345
- [2]. Amoo G, Ogunlesi AO. Financial cost of treating Nigerian in-patients with schizophrenia. *Afr J Med Med Sci* 2016; 34: 15-23.
- [3]. Murray, C.J., Vos T., Lozano, R. Naghavi, M. Flaxman, A., Michaud, C. & Memish, Z. (2012). Disability adjusted life years ( DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010. *Lancet*, 380, 2197-2223
- [4]. Chernew, M., Cutler D. and Keenan P. (2005) Increasing health insurance costs and the decline in insurance coverage, *health service research* 40:4.
- [5]. Labinjo, M., Juillard, C., Kobusingye, O.C & Hyder, A. (2009). The burden of road traffic injuries in Nigeria. Results of a population-based survey. *Injury Prevention*, 15(3), 157-162
- [6]. Adesunkanmi, A.R, Akinkuolie, A.A. & Badru, O.S (2002). A five-year analysis of death in accident and emergency room in semi-urban hospital. *West African Journal of Medicine*, 21(2), 99-104
- [7]. Ekere, A.U, Yellowe, B.F., & Umune, S. (2004). Surgical mortality in the emergency room. *International orthopedics* 28(3), 187-190.