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Trend analysis and economic effect of RTA deaths on dependency ratio in Ghana

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Road traffic accident (RTA) injuries and mortalities are some side effects of using automobile vehicles and Ghana is not deprived of them. This study enlightens some effects of road traffic accident mortalities on the Ghanaian economy and investigates its yearly trend, age range distribution and also reveals its influence on economic activities. 832 secondary data obtained on individuals who died through RTA from the Autopsy day book of Pathology Unit, KATH was studied. 15% (126) of the victims were children below 15 years (≤14), 9% (78) are aged over 64 (≥65) years. The total RTA deaths among these two economic dependent age range (≤14 + ≥65) was 25% (204) and that of the economic active population (15-64) is 75%(628). Yearly trend plot shows fluctations as the working group lies above the dependent population. There is 3:1 death ratio between the economic independent and dependent population respectively, contributing to high dependency ratio in Ghana. Support from the working group towards their families, society and any other dependent population decreases. Economic growth, development and GDP are negatively affected as tax revenue and productivity is comparatively decreasing. The Motor Transport and Traffic Unit should increase its effort to ensure discipline on roads.

Key words: Road traffic accident, active/working population, dependency ratio, mortality, economy.

INTRODUCTION

Collision of vehicles against each other and other objects on motorways and roads has been one of the leading causes of deaths and loss of resources. These various forms of road traffic accidents affect individuals and societies all over the world (Coleman, 2014). Some of the indicators contributing to most RTAs in Ghana include indiscipline behaviors of road users (drivers on phone, pedestrians crossing road at wrong places), poor road network (Amedorme and Nsoh, 2016), driving under the influence of alcohol and bad vehicle conditions (Coleman, 2014). Having unlicensed and minors driving on our roads, drivers driving long distance without rest and chronically-ill (visually impaired) drivers are factors contributing to road traffic accidents. Over 65% of

vehicles involved in accidents result from over-speeding (Hejase et al., 2017) and drivers failure to obey traffic signals (Ansari et al., 2000). As road traffic accident cases are predicted to increase to 80% in low and middle income countries (Orowhigo and Planning, 2017; Ossei et al., 2017), it is also seen to be pronounced much more among the economic working force or active adults (Oppong, 2012; Afukaar et al., 2003; Yunusa et al., 2014). RTA is not limited to the immediate known problems of losing lives and properties but extends to influence some economic factors like working hours of a victim and their relatives, high dependence on relative's income, increase in government expenditure on emergency and medical cost, and loss of wages and productivity (Gorea, 2016). Despite government contribution to availing facilities and equipment for health services delivery, patients medical bills in Ghana according to Afukaar et al. (2003) were estimated between $128.75 and $328.85, and $43.22 and $85.40 per urban area transport-related injury and rural area transport-related injury respectively, affecting Ghana's gross national income (GNI) (Afukaar et al., 2003). The country's human resources are affected as domestic production decreases.

Economic factors like savings is affected as medical payments become a shared responsibility of patient and their family (Afukaar et al., 2003). The country also faces decline in its labor force as some RTA victims become morbid. Even though road traffic accident is an occupational hazard, Ghana over the years has strengthened systems and initiated activities like National Road Safety Strategy (NRSS) I, II, and III to ensure road safety. The 2016 report from Ghana national road safety commission informs comparatively to 2015, an increase of 15.6% accidents but decrease in deaths (National Road Safety Commission, 2016). Economic total dependency ratio is grossly the match of individuals not working to those in the labor force. A low dependency ratio indicates greater number of working population over the dependent population. When people working are of high number to support the non-working population with their needs, it reduces government expenditure on some social amenities (Amadeo, 2019). The economic dependency ratio considers three age distribution; those below age 15, those from age 15 to 64, and those above age 64. Those of the age ranges below 15 and above 64 are grouped and considered as the dependent population while the individuals from the age 15 to 64 is related to as the active or working population. A total economic dependency ratio is greatly influenced by many factors which include road traffic accidents injuries and fatalities.

The population size of the economic dependency distribution, the dependent or non-working population and active population or labor force is greatly affected by RTA deaths. 90% of RTA occurs in low and middle income countries and they lose about 3% of their gross domestic product (Ivers et al., 2017). Economic development is examined to have a positive relationship with the growing number of traffic-related deaths, but it is also seems to stimulate adaptation mechanisms, such as improvements in the traffic infrastructure and trauma care (Van et al., 2000).

DATA AND METHODS

A secondary data sample of 832 RTAs death cases from Komfo Anokye Teaching Hospital, Pathology Unit Autopsy day book was extracted to examine the objective of this study. The hospital serves the Ashanti region which contributed about 19.3% of the Ghana's total RTA fatalities in 2016, and it is the highest (National Road Safety Commission, 2016). The hospital hence has information on most of the RTA death cases in the region as it is the major referral hospital for most emergency cases. Only data with the following variables; age of the victims, gender, nationality (Ghanaian) and having underling cause of death as RTA were extracted for this study. Data were compiled with Microsoft excel 2013 and analyzed using the statistical analysis software, SPSS (SPSS v22) and Microsoft excel 2013. Time series plot and analysis, percentage, ratio and proportion are some of the analysis tools employed to achieve the objectives of the study.

RESULTS

General distribution

The mean age for the total number of deaths studied is 36 years. The modal age is 30, with 40 frequencies. The youngest age is 0.3 year (15 weeks) and the oldest is 97 years. About 60% of the victims died as passengers, followed by 31% who died as pedestrians. From the autopsy day book, the most underlying cause of death was hemorrhagic shock which results from injuries victims obtained during the accidents. More than half of the people suffered from head, chest and abdominal injuries which accounted for loss of blood, leading to the above stated underlying causes of death.

Age and gender distribution

A total RTA death cases of 832 was studied by eight different age ranges. Road traffic accident death is much mentioned among the following age ranges: 30-39 (21.75%), 20-29 (20.19%), and 40-49 (13.94%), respectively. However, the aged individuals' engagement in road accident is less seen as the studied age range of 60-69 formed 6.25%, and the aged above 69 years formed 6.85% of the total 832 RTA deaths. The total deaths among age ranges below 20 accounted for 163 (19.59%), which is proportionately about one-fifth of the total death cases studied. These are summarized in Table 1. Other results from the study show that the gender distribution of victims of road traffic accidents is as follows: 72.6% (604) are men while the women fatality number is 27.4% (227).

Table 1. Age Distribution of RTAs.

Age Range	Frequency	Percentage
≤9	86	10.34
10-19	77	9.25
20-29	168	20.19
30-39	181	21.75
40-49	116	13.94
50-59	95	11.42
60-69	52	6.25
≥70	57	6.85
Total	**832**	**100.00**

Table 2. Economic dependency ratio age distribution.

Age range	Frequency	Percentage
≤14	126	15.14
15-64	628	75.48
≥65	78	9.38
Total	**832**	**100.00**

Economic dependency age categorization

75.48% of the RTA death victims are of the economic working population, thus 15 to 64 years. Children below 15 years contribute 15.14% and those above 64 years amount to 9.38%. Table 2 gives a summary. Moreover, results show that 75.48% represent RTA deaths in the economic active or working population. 25.52% represent RTA deaths in the dependent population, which is the total portion of deaths for the two economic dependent population (≤14 and ≥65).

Yearly trend analysis

A yearly trend plot of the three economic age distribution shows fluctuation in the number of RTA deaths mentioned within the age groups; below 15, between 14 and 65, and above 64 years for the period 2010 to 2016. From Figure 1 which summarizes the trend plots, the trend graph for economic working group is shown in blue. It has a frequency of 115 in 2010, but massively increased in 2011 to 158. The number of deaths in 2012 significantly decreased below 80 and remained quite stagnant in 2013. In 2014, RTA deaths among the working force increased to 100 and later fell below 60 in 2015. It kept a slight trail in 2016. The dependent age group below 15 years is presented in green and the aged group is presented in red. Both have the maximum points not above 40. The number of RTA deaths among the children age group below 15 years reached its peak in 2011 at 40 and eventually fell below 20 in 2012. It slightly decreased

in 2013 and later increased to 20 in 2014. It again dropped in 2015 and rose back to 20 in 2016. The number of deaths among the aged group (≥65) looks to always lie below and follow a trend of the children below 15 years except in 2015 where both trends intersect. The yearly total of RTA deaths presented in orange shows a decreasing trend after the drastic rise in 2011 total cases. It has been sustained below 150 since the significant fall in 2012. Generally, the number of deaths mentioned in the working population lies far above the two dependent populations. Number of RTA deaths among the active working group seems to be decreasing over the years despite the fluctuations. The total frequency of RTA deaths seems to be decreasing over the years, assuring more decrease in the future.

DISCUSSION

Total life expectancy in Ghana is 63.4 according to the latest WHO data published in 2018. Life expectancy for Male 62.5 years, and females is 64.4 years which gives Ghana a World Life Expectancy ranking of 155 (WHO, 2018). With the country's life expectancy study, road traffic accidents are found to be one of the leading causes of unnatural deaths in Ghana. An earlier study on "trend of medicolegal manner of deaths in Ghana" shows similar findings (Ossei and Agyeman-Duah, 2017). Out of the 832 studied RTA death cases, men are seen to be more affected than women with an approximate ratio of 3:1. Other studies stated similar results on men to women RTA death ratio (Ivers et al., 2017; Peden, 2007; Hassan, 2018; Wong et al., 2002; Jha et al., 2003). Men are more seen on the road with sociocultural reasons and high tendency of taking risk (Peden, 2007). A study by the United Nations also has shown that RTA is one of the leading causes of death among children (Ivers et al., 2017). Deaths among children (below 10) by RTA accounted for about 10% of the total RTA deaths in this study. About 50% of children dying on roads are killed as passengers (Ivers et al., 2017). The remaining proportion is shared among being a pedestrian, and other forms of road users. About two thirds of the global road traffic injury deaths among children occur in places including Africa (WHO, 2008). Even though the International Monetary Fund (IMF) placed embargo on white collar jobs in the country, the World Bank's report on Ghana's labor force participation indicate an average value of 67.48% in 2018 and is the highest ever (The Global Economy, 2018). This informs that higher proportion of the active labor force is being employed in the private sector and the country's National Employment report affirms that (Anthony et al., 2015). 2015 labor force report from the Ghana Statistical Service shows that 3% of the country's labor force is commercial drivers. The private sector which is characterized by bad working conditions, uncertain work relationships and low wages still employs 80% of Ghana's labor force (Osei-Boateng and
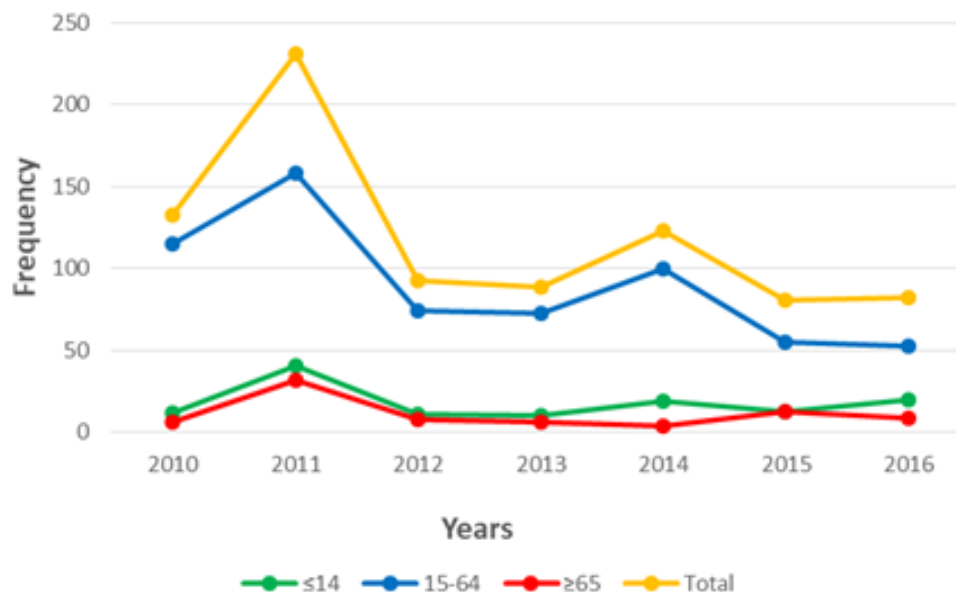
Figure 1. Yearly trend plot of economic dependency ratio age distribution.

Ampratwum, 2011). Male and female within the same working age of 15 to 60 years have 0.3/0.2 probability of dying, respectively (WHO, 2018), but income level, education level, age and occupation type have been studied to be the most influential factor for them to decide on the type of transport mode to patronize. Similar studies reveal that "trotro" (commercial vehicle) is the main transport mode of choice in Ghana (Hotor, 2016; Nantulya, 2002).

Deaths on the road among the age ranges 30-39, 20-29 and 40-49 in this study were very high. The aforementioned stated age groups recorded the highest frequencies of 181, 168, and 116, respectively. Related studies and other studies report similar findings about these age groups in relation to death on the road (Ossei et al., 2017; Peden, 2007; Hassan, 2018; Wong et al., 2002; Jha et al., 2003). Road traffic accidents mostly kill the economic working population. A high proportion of road traffic accident victims are the bread winners of their households. They are the economic active workers in their families (Nantulya, 2002). A study by the Center for Disease Control and Prevention on motor vehicle safety reveals that, in 2016, 2,433 young adult in the United State died on the road. Most developing countries, especially in Africa with relatively low vehicle densities are experiencing higher fatality rates than most industrialized countries. Relative countries like Nigeria and Kenya observed a five-fold increase in traffic-related fatalities over the last 30 years (Odero, Garner, and Zwi, 1997). Developing countries account for 48% of motorized vehicles but contribute almost 90% of its fatalities (Schmucker et al., 2010).

A seven-year yearly trend viewed in respect of the

three dependency ratio age groups in this paper shows that deaths on the road have been decreasing over the years. Among the working population, it decreases slowly with some fluctuations. A report from the Ghana transport commission on RTA shows that, accidents on the roads over the years are increasing but its mortality rate is decreasing (National Road Safety Commission, 2016).

Reference to some governmental intervention program like the Traffic System Risk (TSR) index and road safety campaigns has played significant roles in reducing deaths on the road (National Road Safety Commission, 2016). Comparatively to other developing countries, rapid motorization, poor traffic management system and bad road network contribute to the disproportionate number of road traffic accidents (Nantulya, 2002). The existence of unauthorized speed ramps, high speed motor traffic at pedestrian traffic like schools, bus stops, parks among other hinders accident avoidance (Vasconcellos, 2005). This study reveals that deaths on the road among the economic active or working population are very high. It is three-fold that of the two non-economic active populations put together. Most of the non-economic active people comparatively patronize our transport system at a low rate (Peden, 2007). Their less engagement in economic activities relatively keeps them away from the road than those of the working group (Peden, 2007). As individuals of the economic working population die 3-times more than those in the dependent populations, it affects the country's economy and result in high total dependency ratio (Amadeo, 2019). In 2016, an estimate of 13.6 billion dollars was spent by the United States on issues of motor vehicle accidents, influencing government expenditure. The effect of RTA death ratio between the economic

active and dependent population is not appreciable to economic dependency. Once the number of people in the working force decreases more than those in the economic dependent population, it causes an increment in the number of economic dependents (Amadeo, 2019). This put more financial stress on the remaining working population. The working group has a greater responsibility of paying tax and their absence by death on the road influences the country's revenue mobilization. High dependency ratio relatively affects government expenditure especially on providing infrastructures for the dependent population. The decrease in the number of high taxpayers group will call for high taxes and government borrowing (Razin et al., 2014). Dependency ratios are statistically significant and quantitatively important influencer of aggregate saving ratios. High dependency ratios among other important factors account for the great disparity between developed and underdeveloped countries (Ram, 1982). Deaths on the road affect GDP, economic growth and development. Diminish in productivity, loss of production hours of victims and their relatives, medical cost, and premature mortality among others hinder economic growth (Sachs and Malaney, 2002). Some studies have shown that, countries that fail to invest in road safety lose about 7 to 24% of their per capita GDP (Ivers et al., 2017). Reducing road traffic accident can boost economic growth. Earlier study on deaths and economic indicators estimates that, 10% reduction in road traffic deaths raises per capita real GDP by 3.6% on the average. Improving road safety intervention will not only benefit the society but in the macro economy, it will save huge economic tolls and human potentials. Limiting road traffic injuries and deaths plays a significant role in global development, with many benefits for public health, wellbeing, and economic growth (Ivers et al., 2017).

Conclusion

The economic dependency ratio in Ghana is influenced by deaths on the road. The country faces the issue of labor force declining as RTA injuries render its victims incapacitated. RTA over the years is increasing but its mortality is decreasing. Deaths on the road among men are three times more than that for women. Men engage more in vehicular activities than the women and have high tendency of taking risk on the roads. Yearly trend analysis shows that RTA deaths are generally decreasing but it is much seen among economic working force than the dependent population. The death ratio of 3:1 among the economic independent and dependent population respectively influences total dependency ratio to be high in the country. Losing high numbers of taxpayers through RTA diminishes productivity and economic development. The country's savings rate is influenced as victims of RTA burden their relatives with medical bills and loss of economic working hours. The country's economic growth

and development are affected as more human potentials are lost due to the deaths on the roads. Despite the Ghana government road safety interventions like Traffic System Risk (TSR) index and other road safety campaign activities which are positively influencing the number of deaths on the road (National Road Safety Commission, 2016), more interventions like double lane road and good traffic light system should be built to enhance the road transport system. Regular public education on road safety measures should be organized. Driving when tired or drunk should be discouraged. The Motor Transport and Traffic Unit (MTTU) should increase its force to ensure discipline on roads.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests

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