

Trends of Road Traffic Injury in Ethiopia, 2014 to 2017: eHMI Based Data Analysis.

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Research article

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Abstract

Background: Road traffic injury (RTI) is one of the leading causes of mortality and morbidity globally. It accounts for more than 1.35 million deaths per year. It has multiple risk factors that contribute to its occurrence. Low and middle-income countries are affected severely, thus, Ethiopia is among the most affected countries. Aim of this assessment is to analyze three years of Electronic Health Management Information System (eHMIS) surveillance data of Road traffic injuries in Ethiopia as general to describe the trends of injury based on sex, age, place, and time.

Methods: eHMIS Road Traffic accident data were reviewed retrospectively for three years period (2007 – 2009 Ethiopian calendar (E.C) / 2014 to 2017) and Analysis was done by Microsoft Excel.

Result: The trend of injury in Ethiopia increased from 69882 to 100,628 and inpatient death increased from 125 to 265 over the last three years. Males were affected more, hence contributed to 63.64% of total cases. Those who were above 15 years of age contributed to 80.6% of total cases. Cases reached their peak during the dry season of regions. Harari region had the highest incidence of injury; more than 2000 cases per 100,000 over three years period.

Conclusion: This analysis revealed that in Ethiopia burden of Road Traffic Injury (RTI) was increasing against the plan of the country. Being male and adult has a greater risk of RTI. Harari region and Dire Dawa has a much higher incidence than the national level. High-level political commitment, immediate decisions, and actions are needed to halt the problem.

1. Background

Road traffic injury is one of the leading causes of morbidity and mortality worldwide. According to the World Health Organization (WHO) report of 2018, It accounted for 1.35 million death annually (1). As the number of the vehicle increases the incident also increases. It results from a combination of factors related to the components of the system comprising roads, the environment, vehicles, and road users, and the way they interact [2].

Road traffic crashes are a global burden and increasing public health concern. Road safety performance has traditionally been measured by the reduction of fatalities but road traffic crashes also cause very large numbers of nonfatal injuries, leading to huge economic and human costs to society [3]. The burden of the problem is higher in Low and Middle-income Countries. Despite the lower proportion of vehicles available it accounts for about 80% of total global mortality and morbidity. The burden of road traffic crashes is increasing in recent years especially in sub-Saharan countries. It could be secondary to a newer tradition of vehicle usage, poor infrastructure design, substance driving, lack of strict safety rules and regulations, lack of sufficient knowledge of rule and regulation, and unboundedness to it [2, 3, 4].

The main risk factors for road traffic injuries can be classified as Factors influencing exposure to risk, risk factors influencing crash involvement, risk factors influencing crash severity, risk factors influencing the post-crash outcome of injuries [5]. According to the World Health Organization's (WHO) 2018 global status report on road safety, the road crash fatality rate in Ethiopia is increasing per 100,000 population; 2 in 2008, 3 in 2012, and more than 4 deaths per 100,000 population in 2016. Road traffic injury-related death also estimated to be 27,328 (21494–33159) [6]. Road traffic-related injuries and deaths per 100,000 motor vehicles were estimated to be 21,681 (95% CI: 18,090–25,938) and 4,922 (95% CI: 3325–7183), respectively (7).

It is a great public health problem that is progressively increasing year to year. It requires capturing appropriate data and analyze appropriately to identify risks and to point to solutions. This assessment is aimed to analyze three years (2007 to 2009 E.C) eHMIS surveillance data of Road traffic accidents in Ethiopia as general to see patterns and trends of the accident. Ethiopian physical year starts during the start of the budget year, which starts in July and ends in June month. The other thing, the Ethiopian calendar lags 7–8 years behind the Gregorian calendar. Therefore, 2007 E.C is similar to 2014/2015 G.C and 2009 E.C is 2016/2017 G.C.

2. Methods

Study Area

Analysis of road traffic accident data was done for Ethiopia as a whole.

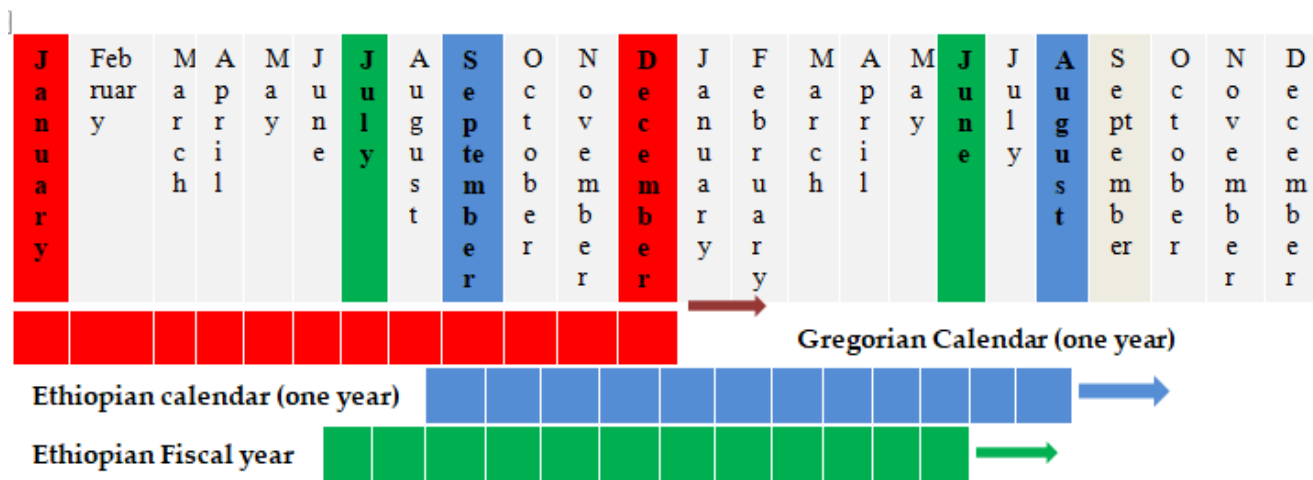
Study Period

Data of RTA from July 2007- July 2009 E.C was collected, analyzed, and interpreted from June 20 to August 30/2017.

Calendar

Ethiopian calendar lags seven to eight years behind Gregorian Calendar (G.C). From September to December it lags seven years and January to August lags eight years. It started in September and ends in August. In addition to this Ethiopian Fiscal Year (EFY) is considered to be the budget year which started in July and ends in June of next year. Electronic Health Management Information System (eHMIS) report starts during June and ends in July similar to EFY (Table 1). therefore the analysis of this data was done based on eHMIS report which starts in July and ends next year's June.

Table 1: comparison of the Gregorian calendar with the Ethiopian calendar. (Constructed by principal author)



Study Design

Retrospective record review of three years eHMIS data was conducted.

Source population

Total population of Ethiopia who exposed to an injury during study years.

Study Population

all Ethiopian population from 2007 to 2009 EFY.

Data Collection Procedure

Secondary data of RTI for consecutive three years from eHMIS database was accessed and the record was reviewed retrospectively for three years (2007–2009 EFY) at the Federal Ministry of Health of Ethiopia. The national database was used for accessing total cases captured by eHMIS throughout the whole of Ethiopia during the three years.

eHMIS - Electronic Health Information System (eHMIS) is a health facility-based electronic reporting system that filled by trained nurses every month. Theoretically, eHMIS is supposed to capture all RTI cases who come to health facilities and report centrally to the Federal Ministry of Health (FMOH) database. It is electronic documentation that will follow the principle of lossless collection of information at the source. Captures the clinical term or cause of death with the exact wording reported by the health provider.

Case Definitions:

- **Injury** – according to ICD, injury means physical or physiological bodily harm occurred secondary to interaction of the body with energy; usually has an immediate reaction to a well-defined event [8].
- **Road Traffic injury** – is an injury resulting from a traffic collision, occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree, pole, or building. According to ICD – 10, it is classified into multiple identifications based on the victim's mode of transport and the victim's counterpart. Victim's mode of transport is categorized as to whether he/she is pedestrian, pedal cyclist, a motorbike rider, the occupant of the three-wheels vehicle, car occupant, occupant of the car, pickup or van, occupant of the heavy transport vehicle, and bus occupant. Similarly, mode of transport of counterpart also classified as a pedestrian, pedal cyclist, motorbike rider, occupant of the three-wheels vehicle, car occupant, occupant of the car, pickup or van, transport vehicle or bus, railway train or railway vehicle, other nonmotor vehicles, a fixed or stationary object, no collision and unspecified[9].

Data Analysis Procedure

The data were retrieved from the national eHMIS database, entered to and analyzed by Microsoft Excel 2010. Descriptive statistics including proportion, percentage, frequency of sexes, age category, and place of residency to summarize the data; tables, and figures, were used for presenting the findings. The incidence of road traffic injury (RTI) was calculated per 100000 population for all regions of Ethiopia.

Data Variables

During data collection and analysis variables such as age category, and sex concerning time and place were considered accordingly.

Exclusion and inclusion criterion

All data extracted from the database was used since it is formatted initially.

Ethical Consideration

Official letter was written from, FMOH field epidemiology coordinator to Policy and planning Directorate to access eHMIS database.

3. Result

The problem of Road traffic injury captured by eHMIS was increasing year to year in Ethiopia. In 2007 it was about 69882 reported cases but in the 2009 year, it reached about 100,628 cases. The number of injuries reached its peak during the dry season of the years (January) consecutively (Fig. 1 *Figure 2*).

Even though eHMIS reports only deaths occurred among admitted patients, it showed an increment in the number of deaths occurred among admitted patients. Inpatient death captured by eHMIS during 2007 EFY was 125; less than half of the death captured during 2009 EFY which was 265 (Fig. 3).

Table 2
frequency of cases by sex in Ethiopia
from July 2007- July 2009.

Gender	Frequency	Percent
F	90358	36.36
M	158134	63.64
Grand Total	248492	100

Table 3
Frequencies of cases by age in Ethiopia
from July 2007–2009 EFY.

Age	Frequency	Percent
< 5	9011	3.6
5–14	39280	15..8
> 14	200210	80.6
Grand Total	248501	100

Distribution of cases by sex

From a total of 248492 cases, 158134 (63.64%) were males; this could probably be due to the risk of exposure and lack of carefulness on-road use. Females were affected less than males; only contributing to 36.36 percent of all affected (Table 2).

Distribution of cases by age

As shown in Table 3, from 248501 total cases, 200210 (80.6%) were adult age groups. It was more than four times the number of pediatrics age groups; which both contributed to 48291 (19.4%) of total cases.

Cases by region

The highest number of cases in the region is recorded to be 82822 cases in Oromiya which were 33.33% of all cases and the lowest number of cases was in the Gambella region is 992(0.48%) cases over the last three years.

Oromiya and SNNPR contributed to 57% of reported cases over three years (Fig. 4). Incidence of injury per 100000 population, when seen by years, was leading in Harari and Dire Dawa city administrations during the three years (Fig. 5).

4. Discussion

In Ethiopia, the trend of road traffic injury increased over the three years of eHMIS report. This could be due to an increased population of vehicles, increased network of roads passing through areas that are not familiar to vehicles, increased activities of trade in rural areas, and the absence or weak rule to control substance driving. This is similar to most low and middle income (LAMIC) countries especially, in the sub-Saharan region. Similar to this, the study done in Ghana show that road traffic accident is persistently increasing since 2000 [10, 11].

The increment of cases could be due to multiple factors like increment of the vehicle number, the increment of population, bad behaviors of road users including drivers and pedestrians, substance driving, and increased road network density passing through rural that are not familiar with the vehicles [5, 12, 13]; these risk factors can be concluded as epidemiological triads of Host, Agent, and Environment.

Being male and adult age groups have a higher risk of being exposed to RTI than women and younger age groups in Ethiopia. From a total of 248501 cases, 200210 (80.6%) were adult age group and 158134 (63.64%) were males. It was indicated in this study that Adult males were highly affected in Ethiopia. In a study conducted in Kenya, it was shown that 73% of all fatalities were among young males who are an economic asset to society [12]. Similar studies conducted in Addis Ababa Ethiopia show that from the total of fatal crashes that happened in Addis Ababa about 91.1% were male perpetrators with Adult Age group [14]. This could be due to increased outdoor activity of adults and risk-taking behavior and substance use in males [15].

The incidence per 100000 populations is much higher in the Harari region and Dire Dawa city. They have more than 2000 and 1500 incidences respectively, while other regions are below 300 incidences. Much higher than the estimated incidence of African countries which is 65.2 per 100000 [1, 13]. There might be some association between chewing chat and exhaustively working which can result in increased incidence. It is shown that the Use of Amphetamines is about 5 times the risk of someone who hasn't [1]. Therefore it requires further study to see the association between chewing chat and exposure to an accident.

In eHMIS analysis, death report is incomplete because it only includes death happened during Inpatient treatment. It does not include a report from Emergency OPD, Death occurred at the scene and which reported by police. Both hospital and police do not report all injuries and deaths. The study conducted in Ethiopia in 2005, shows that neither police nor hospital report independently provides accurate coverage of road traffic injury death [16].

Limitations

- Age classification in eHMIS is only into three: under five, five to fourteen, and above fourteen.
- eHMIS was designed with few variables (age, sex, and place), thus, makes it difficult to analyze important variables like type of injury, severity, safety protocols, and substance use.
- Since eHMIS is filled manually at the health facility level errors like omission and duplication of data could be happened.

Conclusion And Recommendation

A road traffic accident is one of amongst high public health concern. It increased tremendously over the last three years in Ethiopia. The reason for the Increment could be due to the triads of Epidemiological factors: host, agent, and environmental factors. Being male and adult had a higher risk of being exposed to the accident. Therefore, to halt the trend or growth of cases it is necessary to act on at Host, Agent, and Environmental level. It should be worked on to change behaviors of road users, setting rules and regulations, determine the type and quality of vehicles to be used, and appropriately designing and timely repairing of roads would help in the control of the accident.

Abbreviations

CI- Confidence Interval

eHMIS - Electronic Health Management Information System

FMOH - Federal Ministry of Health

E.C – Ethiopian Calendar

E.F.Y – Ethiopian Physical Year

G.C – Gregorian Calendar

LAMIC low and middle-income country

WHO – World Health Organization

Declarations

We hereby declare that this surveillance data analysis of Road traffic Injury is our original work and has not been submitted to peer review journals elsewhere, and all source materials used for this analysis have been duly acknowledged.

Ethics approval and consent to participate: Not applicable

Consent for publication: Not Applicable

Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request at (Fufa Hunduma , email: fhunduma@gmail.com)

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Authors' contributions

FH: conceived the idea, wrote the proposal, conducted the data collection, data processing, analysis, and data interpretation, wrote the first draft, and wrote the final paper and manuscript write-up.

B L: Supervised the paper write up, reviewed, and approved the final manuscript. All authors have read and approved the manuscript.

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Figures

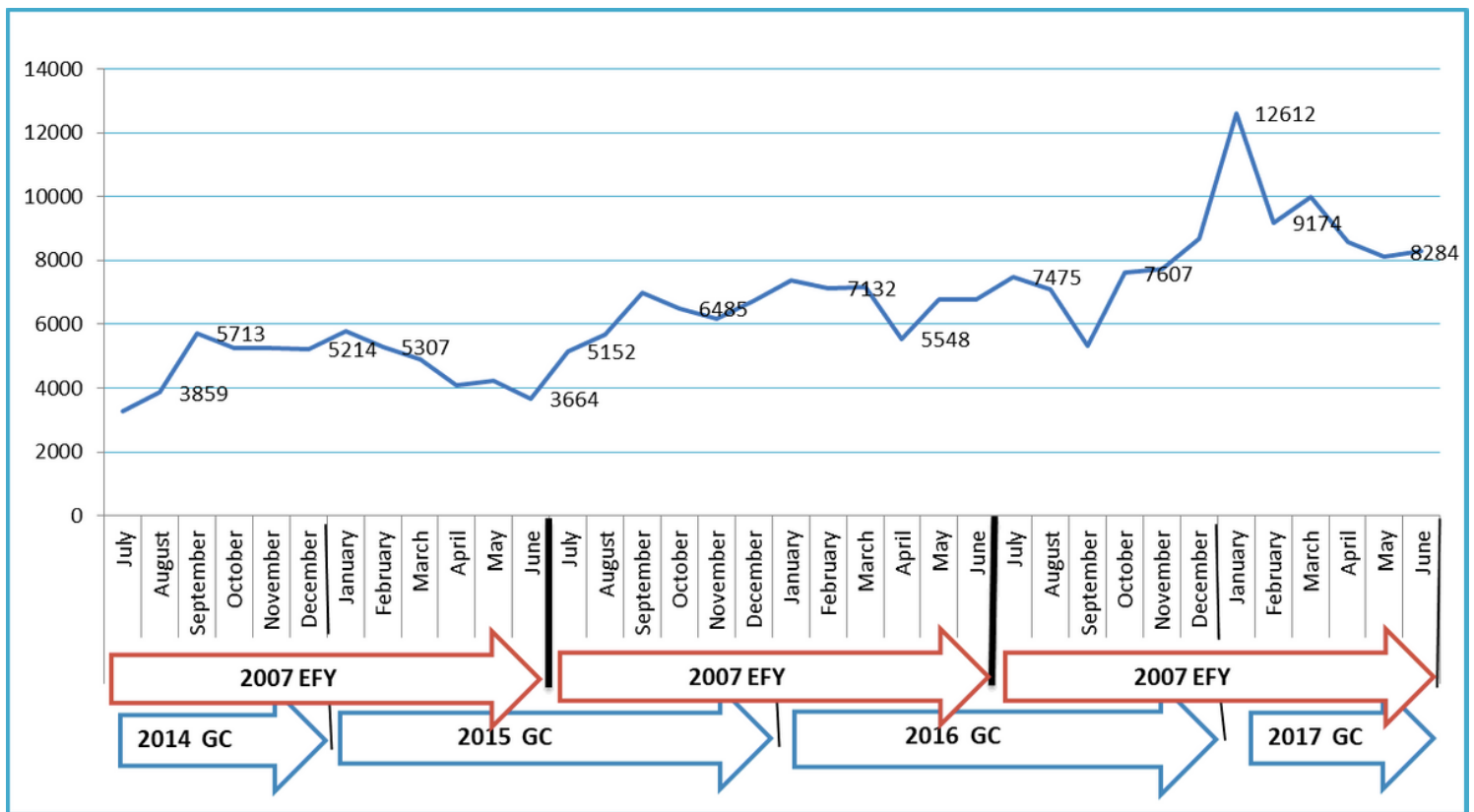


Figure 1

Trends of road traffic accident from 2007-2009 EFY (2014 to 2017).

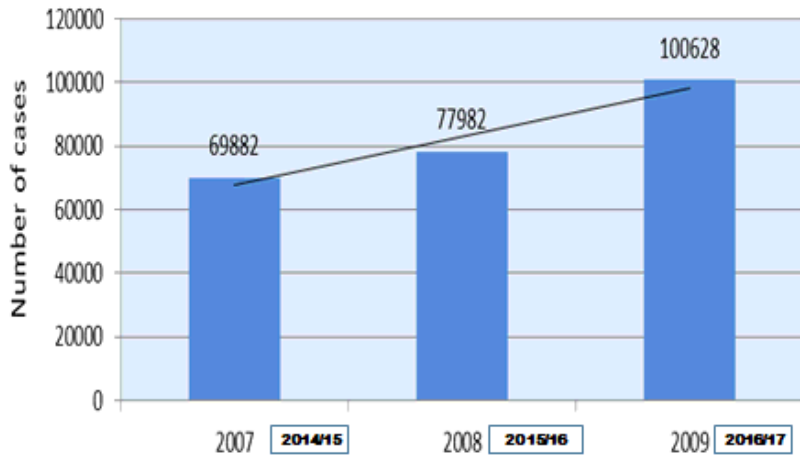


Figure 2

Magnitude of cases in each year, Ethiopia.

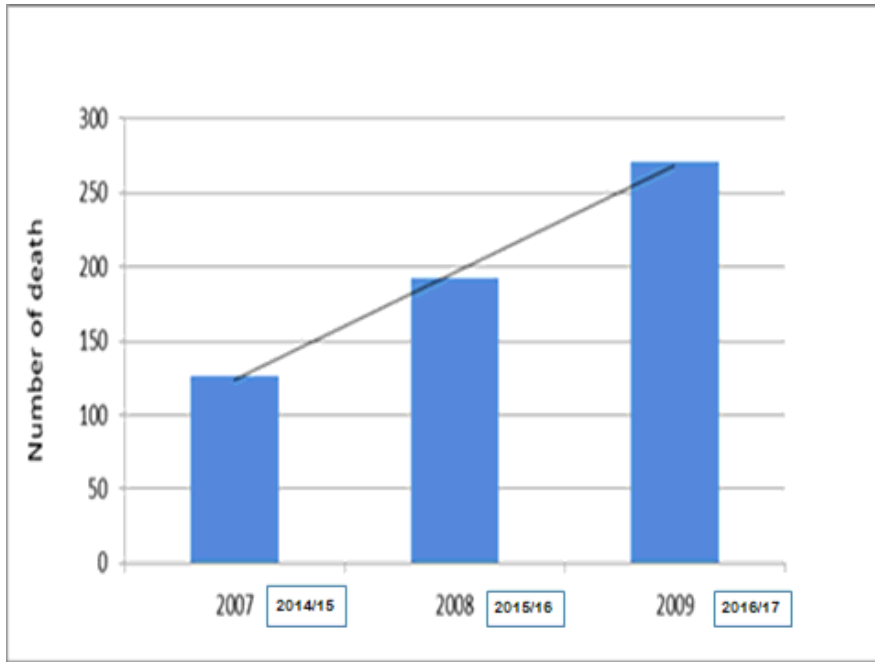


Figure 3

Inpatient death captured by HMIS over three years period.

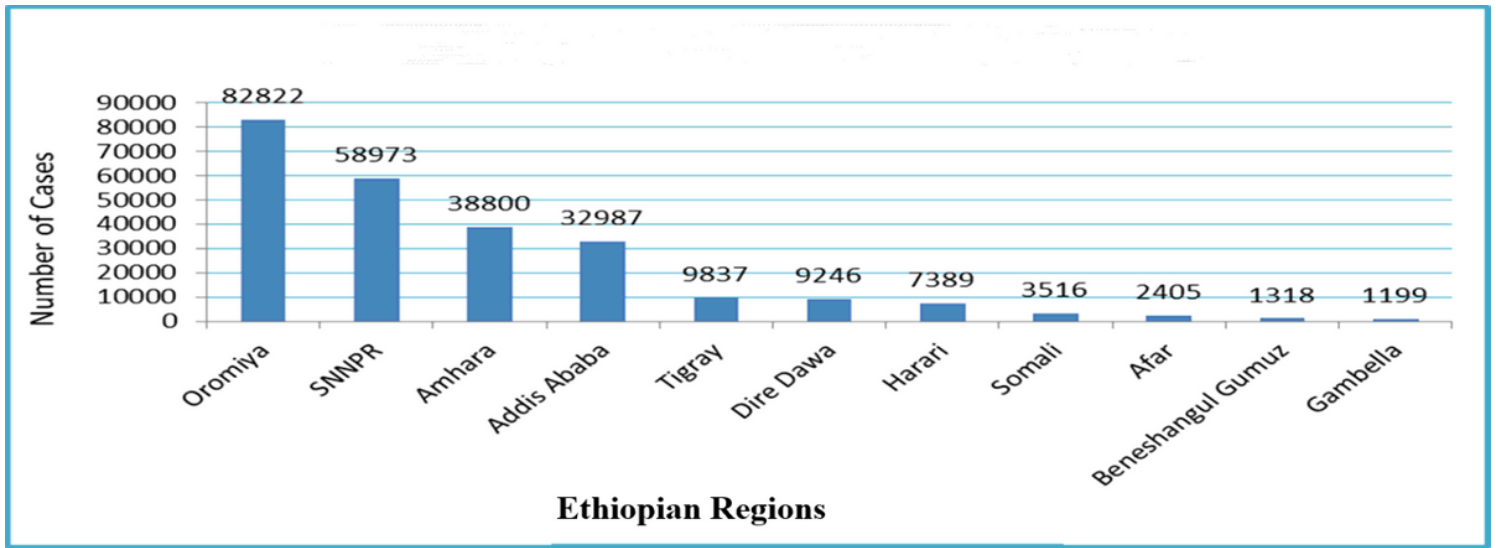


Figure 4

Total sum of cases over the three years period presented by regions of Ethiopia.

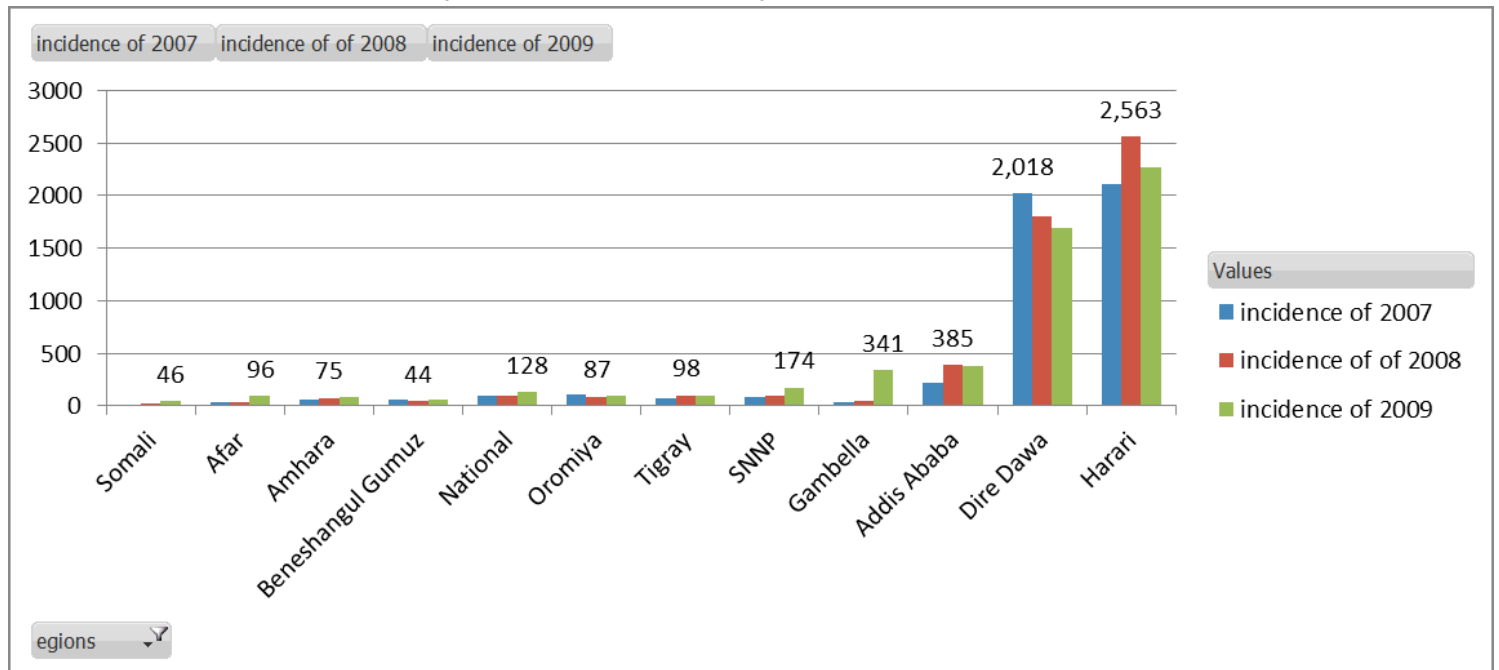


Figure 5

Comparisons of incidence of RTI per 100,000 in regions of Ethiopia, 2007 to 2009 EFY.