

## **Evaluation of the unintentional firearm deaths and injuries in rural areas.**

**Murat Alkan\***

Ministry of Interior Affairs, Ankara, Turkey

### **Abstract**

When asked the reason of having a gun to millions of gun owners in the world, probably they would give the same answers such as for protection themselves, their family or place, recreation, security problems or hunting. This wide array of explanation sand the type of weapon they have chosen to own firearms depends on the place where they live weather rural or urban. Urban people mostly have handguns for protection whereas rural people generally use shotgun or rifle for protection and hunting. However, almost all around the world it is not hard to provide firearms through legal or illegal ways. Consequently, firearm-related injuries and deaths are quite common currently. Almost ten thousand people are injured and three thousand people are killed each year as a result of gunshot wounds. Firearms are also creates serious threat for children. According to some researchers in Turkey, gun accidents with rifle or shotgun mostly harm the people between the age 0-10. Since, their natural curiosity, children poke firearms which are at home and are substantial risk of exposure to firearm injury and death. In this research, a total of 261 unintentional gun and ammunition incidents were examined retrospectively which were occurred between the years 2001-2015 including 100 in Çorum, 21 in Kırşehir, 55 in Yozgat, 30 in Kırıkkale and 55 in Çankırı rural areas in Turkey. Each incident file, were examined in terms of sex, education, occupation and the age of the victim, origin of the event, the type of weapon used, the entry hole location of the gunshot wound, the status of the license of the gun and the consequences of the incident.

**Keywords:** Unintentional firearm deaths, Unintentional firearm injuries, Firearm accident, Rural area.

*Accepted on October 15, 2016*

### **Introduction**

There are a variety of reasons why people own weapons. However, basic factor is environmental insecurity. Feeling of vulnerability leads humans to have weapons to protect themselves, their family or property. Consequently, gun ownership whether legal or illegal may cause fatal results. As, people endanger others life through accident. On the other hand, possession of gun type also very according to the rural or urban area. Rural people mostly have rifle and shotgun for hunting or protection whereas urban people generally use hand guns for security and protection. Therefore gunshot deaths and injuries also differentiate according to the place where the accident occurred.

According to the research carried by Dresang, compared with urban Washington, rural Washington had a larger percentage of gun deaths by shotguns and rifles and a smaller percentage by handguns. For example, between the years 1981-1991 in a rural Wisconsin, 39% were inflicted by rifles, 21% by shotguns, and 20% by handguns among 122 gunshot wounds [1]. For example according to the research, the entire forensic autopsy carried on in Ankara between the years 2001-2004 were due to the gunshot wounds. According to the research studied the 403 death cases due to the gunshot wounds; 86.99% city-based gunshot wound cases occurred with the shot

barrel gun and 60.36% village-based gunshot wound cases occurred with the shotgun [2].

Underestimates of unintentional firearm injuries in Turkey are one of the frequently encountered problems which are mostly due to the effect of cultural property. Approximately 3000 people in Turkey loss their life because of firearm injury in every year [3]. According to the forensic autopsy of Institution of Forensic Medicine in Turkey, Firearm injuries are ranges between 8% and 13% [4-8].

In this work, a total of 261 unintentional gun and ammunition incidents were examined retrospectively which were occurred between the years 2001-2015 including 100 in Çorum, 21 in Kırşehir, 55 in Yozgat, 30 in Kırıkkale and 55 in Çankırı urban areas in Turkey. Each incident file, were examined in terms of sex, education, occupation and the age of the victim, origin of the event, the type of weapon used, the entry hole location of the gunshot wound, the status of the license of the gun and the consequences of the incident.

### **Methodology**

Data mining method is used for this research to analysis the firearm accident data collection in rural areas such as Çorum, Kırşehir, Yozgat, Kırıkkale and Çankırı in Turkey.

**Data mining**

Data mining is an analytical method [9] is used actively in scientific researches to analyse the large database and to define the sample [10].

**Association rule mining**

Association rule mining is one of the researched methods of data mining. It wishes to extract remarkable correlations, frequent patterns or associations among sets of items in the transaction databases. In other words, it emphasizes on the mining of association rules, finding the correlation between items in the transaction records [11-13].

According to association rule mining, associations are written as  $A \geq B$ , where A is called the antecedent and B is called the consequent. It attempts to find the relationship between antecedent and consequent when movement of A occurs and the movement probability of B [11,14-16].

Association rule mining is a suitable method for analysing the accidents [17] and it also reveals the unknown relationships in the data stack which provides results to decide [18,19]. Association rule mining has two important basic measures, called support(s) and confidence (c) [13]. Rule Support (s) is defined as the percentage/fraction of records that contain AB to the total number of records in the database [13-16,20-22]. It is formulated as;

$$Rule\ Support\ (s) = \frac{n(A \cup B)}{n(N)}$$

Confidence of an association rule is defined as the percentage/fraction of the number of transactions that contain AB to the total number of records that contain A [14-16,20-22]: It is formulated as;

$$Confidence\ (\alpha) = \frac{n(A \cup B)}{n(A)}$$

**Apriori algorithm**

Apriori Algorithm helps to analysis the association rule which entails many passes over the database to find the frequent item sets [23-25].

**Data Collection**

In this research, a total of 261 unintentional gun and ammunition incidents were examined retrospectively which were occurred between the years 2001-2015 including 100 in Çorum, 21 in Kırşehir, 55 in Yozgat, 30 in Kırıkkale and 55 in Çankırı rural areas in Turkey. There is no single universally preferred definition of rural. However, rural definitions can be built on different units of geography such as density of population, health services, road network, resources or opportunities [26]. For this research, rural is defined as population density is below 150 inhabitants per square kilometre [27]. For this work, each incident file, were examined in terms of sex, education, occupation and the age of the victim, origin of the event, the type of weapon used, the

entry hole location of the gunshot wound, the status of the license of the gun and the consequences of the incident.

**Findings**

To reveal the relationship between the accident factors SPSS Clementine programme is used for analysing. A priori Algorithm method is practiced for this research and results are presented below according to associations between the accident factors;

**Table 1.** Statistics of Gunfire Accidents occurred in the Cities, Year and Month

Antecedent	Consequent	Support %	Confidence %	Rule Support %
2012	ÇORUM	14.55	63.15	9.19
2013	ÇORUM	12.64	63.63	8.04
ÇORUM	JULY	38.31	13.00	4.98
JULY	ÇORUM	13.41	37.14	4.98
JUNE	ÇORUM	09.19	50.00	4.59
MAY	ÇORUM	10.72	42.85	4.59
ÇANKIRI	JULY	21.45	19.64	4.21
AUGUST	ÇORUM	09.96	30.76	3.06
KIRIKKALE	MAY	11.11	20.69	2.29
YOZGAT	APRİL	21.07	10.90	2.29
KIRŞEHİR	FEBRUARY	08.04	19.04	1.53

Association rule were presented in the table according to the statistics of gunfire accidents occurred in the cities, year and month. Evaluating the Table 1; analysing the 261 firearm accidents 38.31% occurred in Çorum, 21.45% in Çankiri, 21.07% Yozgat'ta, 11,11% in Kirikkale and 8.04% in Kırşehir. Considering the years, accident occurred 14.55% at the 2012 and 13.41% at the 2008. Besides, accidents mostly occurred in July with 13.41% then follows May with 10.72%, August 9.96%, June 9.19%.

**Table 2.** Entry Hole Location of the Gunshot Wound and Its Condition

Antecedent	Consequent	Support %	Confidence %	Rule Support %
Hand	Wound	29.11	100.00	29.11
Wound	Hand	96.16	030.27	29.11
Leg	Wound	24.90	096.92	24.13
Foot	Wound	16.85	100.00	16.85
Tummy Tuck	Wound	04.98	100.00	04.98
Arm	Wound	04.59	100.00	04.59
Shoulder	Wound	03.06	087.50	02.68
Groin	Wound	03.83	070.00	02.68
Head	Wound	02.68	071.42	01.91

Evaluation of the unintentional firearm deaths and injuries in rural areas

Dead	Groin	03.83	030.00	01.14
------	-------	-------	--------	-------

wounded and 3.83% died. 29.119% were wounded from hand 24.90% from the leg, 16.85% from the foot.

Entry hole location of the gunshot wound and its condition were presented in the Table 2. 96.16% casualties were

Table 3. Firearm, gun license, gun owner and condition of who has wounded

Antecedent	Consequent	Support (%)	percent	Confidence (%)	percent	Rule Support percent (%)
Shot himself	His own gun	96.55		78.17		75.47
His gun	Shot himself	77.39		97.52		75.47
shotgun	Shot himself	47.89		95.2		45.59
Without gun license	Shot himself	42.52		94.59		40.23
Gun license	Shot himself	37.54		98.98		37.16
with his own shotgun	Shot himself	37.54		94.89		35.63
With his gun without gun license	Shot himself	33.71		96.59		32.56
With his gun and has gun license	Shot himself	30.65		98.75		30.26
gun	Shot himself	21.07		100		21.07
Show himself with his own shotgun	Gun license	45.59		44.53		20.3
Without gun license and shotgun	His own gun	25.28		77.27		19.54
Without gun license, shotgun and his own gun	Shot himself	19.54		94.11		18.39
Gun and his own gun	Shot himself	18		100		18
Gun license, shotgun and gun licence	Shot himself	16.47		97.67		16.09
Gun license, shotgun and shot himself	His own gun	20.3		79.24		16,09
blank cartridge pistol	Shot himself	14.94		94.87		14.17

Table 3. presents information about firearm, gun license, gun owner and condition of who has wounded. According to the Table 3; from the 261 firearm accidents, 96.55% victim shot himself, 77.39% gun owner become victim, 47.89% shotgun, 21.07% gun, 14.94% blank cartridge pistol and 7.66% mole gun were used. The guns that caused the accidents 42.52% were without gun license, 37.54% has gun license and 13.41% gun no subject the license. According to the research studied 2027 forensic cases between the years 1999-2003 in Samsun, 9.2% (187) forensic deaths were due to the gunshot wounds. 107 forensic deaths related with murder, 47 committed suicides and 32 gun accident [4].

Evaluating the binary and triple association; (shotgun and his own gun) ≥ (shot himself) association rule support 35.63%, (without gun license and his own gun) ≥ (shot himself) association rule support 32.56%. Other binary and triple association could be seen in Table 3.

Table 4. Sex, job, age and education level

Antecedent	Consequent	Support percent (%)	Confidence percent (%)	Rule Support percent (%)
primary school	male	56.32	96.59	54.40

male	primary school	95.40	57.02	54.40
farmer	male	38.31	100.00	38.31
primary school and male	labourer	54.40	55.63	30.26
21-30	male	23.75	96.77	22.98
Nov-20	male	22.98	91.66	21.07
31-40	male	13.79	97.22	13.41
41-50	male	14.55	92.10	13.41
primary school and male	21-30	54.40	22.53	12.26
41-50	primary school	14.55	71.05	10.34
11-20 and primary school	male	09.96	96.15	09.57
41-50 and primary school	male	10.34	92.59	09.57
Secondary school	male	09.96	92.30	09.19
student	male	09.19	91.66	08.42

labourer	male	08.04	100.00	08.04
----------	------	-------	--------	-------

Sex, job, age and education level of the victims were presented in the Table 4. Their occupation were 38.31% farmer, 9.19% student and 8.04% labourer, and their education level 56.32% primary school, 9.96% secondary school and 9.19% high school. Among the victims 95, 96% is male; 23.75% age between 21-30. 22.98% age between 11-20. 14.55% age between 41-50. 13.79% age between 31-40.

According to the research in France; due to the gun shot accident 77 death cases occurs yearly, it makes the 2.5% (68 male and 9 female) of all the death cases. It is seen that most of the death cases intensify between the ages 20-24 and 70-74 [28]. According to the research examined the 133 death cases due to gunshot wounds in Institution of Forensic Medicine in Antalya between 1987-1993; 12.03% death cases occurred (16) due to the gunshot accident and all the death cases were heavily between the ages 21-30. Besides, 78.95% male and 21.05% female involved the cases [6].

Evaluating the binary and triple association; (primary school)  $\geq$  (male) association rule support 54.4%, (primary school and male)  $\geq$  farmer association 30.26%, (primary school and male)  $\geq$  (21-30) age association 12.26%. Other association could be seen in the Table 4.

## Discussion

According to the firearm accident evaluated for this research, 47.89% mostly occurred with shotgun and 7.663% with mole gun at least. Due to the preferability of shotgun in rural areas it is not surprising that firearm accidents were mostly occurred by shotguns and mole gun. 29.119% victims were wounded in hand, 24.90% in leg and 16.85% in foot due to the use of shotgun. Likewise, victims were shot from the limb parts of the body due to the shotgun long barrel. 42.52% of guns which caused accident was without license. Owners of guns without license had no gun training it may be the enhancing factor for gun accidents.

Firearms are also creates serious threat for children. Because of their natural curiosity, children poke firearms which are at home and are substantial risk of exposure to firearm injury and death. In a study examining the deaths due to 249 gunshot wounds between 1992-2002 in Kahramanmaraş 52.9% gunshot wounds are mostly occurs between the ages 0-10 and 47% with shotgun [3]. As it is seen that firearm injury mostly occurs between the ages 0-10 [3]. Another research carried by [29] about unintentional firearm death to children. They collected the data from the National Violent Death Reporting System for 16 states from 2005 to 2012 in the USA. They estimated that there were 110 unintentional firearm deaths to children 0-14 annually in the U.S. during this 8 year time period. The victims were predominantly male (81%) and 97% of those cases the shooter was a male. The current study found that 23.75% victims of gun accidents were between the age group 21-30 and 22.98% were between the age group 11-20. Age group of 11-20 is engrossing. Because of their curiosity about guns and

hunting habit with shotgun 95.40% of victims were male. This result compatible with the literature [28]. Considering their occupation 38.31% were mostly farmers and their education level 56.32% primary school graduation due to the condition of the rural area.

Considering the results of gun accident in rural areas; the year it mostly occurred is 2012, the month it mostly occurred in July, the entrance hole it mostly occurred in hand, who had shot was the owner of the gun, shot himself, mostly with shotgun, with gun license, male victims, farmers as an occupation, primary school graduation and age between 21-30. Binary, triple and quartet association; (primary school)  $\geq$  (male), (primary school and male)  $\geq$  farmer, (primary school and male)  $\geq$  (21-30), (shotgun and his gun)  $\geq$  (shot himself), (without gun license and his gun)  $\geq$  (shot himself) came forward.

## Conclusion

Most of the accidents are preventable. In fact most of the deaths can be prevented by using basic safety rules [30-32]. In addition to education and training programs, prevention strategies should emphasize creating safer environments [33]. Firearms at home should be unloaded, locked in a secure cupboard and ammunition should be separated from the firearm. To prevent the firearm injury or death, firearm safety education/training should be given to firearm owners and users about how to carry and use a gun. Besides, they have to obey the rules of gun safety.

## References

1. Dodge GG, Cogbill TH, Miller GJ, Landercasper J, Strutt PJ. Gunshot wounds: 10-year experience of a rural, referral trauma center. *Am Surg* 1994; 60: 401-404.
2. Buyuk Y, Eke M, Dinç AH, Kir Z. Ankara'da Otopsi Yapılmış Atesli Silah Kaynaklı Olumler (21-24). *Türkiye Klinikleri J Foren Med* 2008; 5: 6-12.
3. Erkol Z, Çolak B, Yayci N, Inanici MA. Kahramanmaraş'ta Meydana Gelen Atesli Silah Yaralanmasına Bağlı Olumler. *J For Med* 2011; 25: 1-10.
4. Aydın B, Çolak B. Samsun'da Atesli Silahlara Bağlı Olumler: 1999-2003. *Adli Tip Dergisi* 2005; 19: 11-16.
5. Kafadar H. Yasamsal Tehlikeye Maruz Kalan 78 Olgunun Tartisilmasi. *Mustafa Kemal Universitesi Tip Dergisi* 2013; 4.
6. Karagoz YM, Karagoz SD, Atılgan M, Demircan C. Atesli Silah Yaralanmasına Bağlı 133 Olum Olgusunun Incelenmesi. *Adli Tip Bulteni* 1996; 1: 122-126.
7. Tıraşçı Y, Goren S. Diyarbakır'da 1996-98 Yılları Arasında Saptanan Medikolegal Ölümlemlerin Tanımlanması. *Dicle Tip Dergisi* 2005; 32: 1-5.
8. Tugcu H, Ozdemir Ç, Dalgıç M, Ulukan MO, Celasun B. GATA Adli Tip Anabilim Dalı'nda 1995-2002 yılları arasında düzenlenen adli raporların yeni Türk Ceza Kanunu açısından değerlendirilmesi. *Original Research, Gulhane Med J.* 2005; 47: 102-105.

9. Chang LY, Wang HY. Analysis of traffic injury severity: an application of non-parametric classification tree techniques. *Accident Anal Prevention* 2006; 38: 1019-1027.
10. Zhang C, Zhang S. *Association Rule Mining: Models and Algorithms*. Springer 2002.
11. Liao CW, Perng YH. Data Mining for occupational injuries in the Taiwan construction industry. *Safety Science* 2007; 46:1091-1102.
12. Mirabadi A, Sharifian S. Application of association rules in Iranian Railways (RAI) accident data analysis. *Safety Science* 2010; 48: 1427-1435.
13. Zhao Q, Bhowmick SS. *Association Rule Mining: A Survey*, Technical Report, CAIS, Nanyang Technological University, Singapore, No. 2003-116, 2003; 1-20.
14. Bothorel G, Serrurier M, Hurter C. Utilisation d'outils de Visual Data Mining pour l'exploration d'un ensemble de règles d'association. *IHM'11 23rd French Speaking Conference on Human-Computer Interaction* 2011; 24-27.
15. Marukatat R. Structure-Based Rule Selection Framework for Association Rule Mining of Traffic Accident Data. *Computational Intelligence and Security Lecture Notes in Computer Science* 2007; 4456: 231-239.
16. Song-bai H, Ya-jun W, Yue-kun S, Wen-wei G, QiangAn C, Ya-qin A. Their search of multidimensional association rule in traffic accidents. 4th Conference on "Wireless Communication, Network and Mobile Computing", Dalian, China 2008.
17. Zhang C, Wang S. Application of Data Mining in Urban Traffic Accidents Governance Based on Association Rules. *Advances in Information Sciences and Service Sciences (AISS)* 2012; 4.
18. Chae YM, Ho SH, Cho KW, Lee DH, Ji SH. Data mining approach to policy analysis in a health insurance domain. *Int J Med Informa* 2001; 62: 103-111.
19. Tsay YJ, Chiang JY. CBAR: an efficient method for mining association rules. *Knowledge-Based Systems* 2005; 18: 99-105.
20. Cherfi H, Touissaint Y. Adequation d'indices statistiques à l'interprétation de règles d'association. *Proceeding of Acte des 6<sup>ème</sup> Journées Internationales d'analyse Statistiques des Données Textuelles* 2002.
21. Guillet F, Hamilton HJ. *Quality Measures in Data Mining*. Springer-Verlag, New York, Inc., Secaucus 2007.
22. Plasse M, Niang-Keita N, Saporta G. Utilisation conjointe des règles d'association et de la classification de variables. *Conference Nationale avec Comité de Lecture*. Pau, France 2005.
23. Gülce AC. Veri madenciliginde apriori algoritması ve apriori algoritmasının farklı veri kümelerinde uygulanması. *Trakya Üniversitesi Fen Bilimleri Enstitüsü Bilgisayar Mühendisliği ABD Yüksek Lisans Tezi*, Edirne 2010.
24. Sever H, Oğuz B. Veri tabanlarında bilgi keşfine formal bir yaklaşım. *Kisim I: Eyleştirme sorguları ve algoritmalar*. *Bilgi Dünyası* 2002.
25. Witten IH, Frank E. *Data Mining: Practical Machine Learning Tools and Techniques*, Third Edition. Morgan Kaufmann Publishers 2005.
26. Coburn AF, MacKinney CA, McBride TD, Mueller KJ, Slifkin RT, Wakefield MK. *Choosing Rural Definitions: Implications for Health Policy*, Rural Policy Research Institute Health Panel 2007; Issue Brief 2.
27. OECD. *Regional Typology*. Directorate for Public Governance and Territorial Development 2011.
28. Péquignot F, Le Toullec A, Bovet M, Mellah M, Jouglu E. *Données sur la mortalité par arme à feu en France (statistique nationale des causes médicales de décès 1979-1999)*. Suicides, accidents, homicides, causes indéterminées quant à l'intention. *Rapport final*. Cepid et Inserm 2004.
29. David H, Solnick SJ. Children and unintentional firearm death. *Injury Epidemiology* 2015; 2: 26.
30. Darcin M, Darcin ES. Relationship between quality of life and child traffic fatalities. *Accid Anal Prev* 2007; 39: 826-832.
31. Darçın M. Mortality from Road Traffic Accidents. *SAÜ Fen Edebiyat Dergisi* 2012; 14: 1-16.
32. Darçın M. Traffic fatalities among children that is causing extensive economic damages. *Int J Res Commerce Econom Manag (IJRCM)* 2013; 3: 5-9.
33. Darçın ES, Darçın M. Falling from a height injuries in Agriculture: a 8-year experience with 173 samples. *Biomed Res* 2016; 27: 825-828.

**\*Correspondence to**

Murat Alkan  
Ministry of Interior Affairs  
Ankara  
Turkey