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Types of Accidents in Nineveh Governorate / Iraq

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Abstract---

Background: *Accidents are one of the leading causes of morbidity and mortality all over the world. They affect usually young people as they are more prone to the external environmental hazards leading to loss of the current and future working force in the community. Thus it is important to identify accidents' types and their victims in order to plan and apply the required interventions that can prevent or reduce some of these avoidable life threatening problems.*

Objective: *Identify the main types of accidents in Nineveh Governorate during the period 2008-2009 and 2018-2019.*

Methods: *A biometric study design was used in this research in which mortality data related to accidents for the whole governorate were utilized and formulated into meaningful tables. These data were obtained from the Forensic Medicine Department for the years 2008, 2009, 2018, and 2019. Several rates and proportions were measured to identify and rank various forms of accidents and their related data.*

Results: *This study demonstrated that explosions, shooting, and road traffic accidents were the main types of accidents in the governorate throughout the study period. They mostly affected young and male population. Making a comparison between two periods (2008-2009) and (2018-2019) showed that most of accidents' types were increasing by time except for slaughtering, shooting, and burns.*

Conclusion and Recommendation: *Nineveh was strongly loaded by terrorism related mortality for many years particularly by explosions and shooting that harvesting hundreds of young population's lives each year. So, it is important to focus attention to this governorate and its people who are greatly damaged by terrorism and violence.*

Keywords--- *Accidents, Nineveh, Explosions, Shooting.*

I. INTRODUCTION

Accident is "an unfortunate event that occurs unintentionally and usually results in harm, injury, damage or loss". The unintentionally is the core idea for accidents [(1)] i.e. any intended harm is not accident but it is considered injury, that is why injuries can be prevented but accidents may be not. Injuries are categorized into intentional when there is intention to produce harm and unintentional which include road traffic accidents (RTAs), burn, falls, poisoning, and drowning [(2)]. Victims of wars and terrorism are almost unaware to their exposure to injuries, thus their assaults are termed as accidents.

Almost 80% of injury's mortalities are unintentional as recognized by the World Health Organization (WHO) [(3)], and they were responsible for more than 3.5 million or 6% of the global deaths in 2001 [(4)].

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In 2004, around 68 deaths/ 100 000 population were due to accidents worldwide, while the worst rate had been registered in Iraq (486 deaths/100 000 population) during the same year [5], most of these deaths were due to violence and terrorism to which Iraq had been exposed after the American occupation in 2003, and this made accidents the 2nd leading cause of death (and in some years the 1st one) for more than one decade ago [6].

Explosions' related mortality is one of the modern conflicts affecting some countries like Iraq, Afghanistan, and Pakistan since the beginning of this millennium [7,8,9]. In Iraq, more than 95% of explosions' deaths occurred only in three governorates: Baghdad, Al-Anbar, and Nineveh, and the later had the largest proportion of these deaths as documented by Bilukha et al. [10].

The importance of this study comes from the fact that accidents were not only the 2nd leading cause of death but also they were responsible for almost one third of premature death that affected mostly the young working force in Nineveh Governorate during the period 2004-2013 [6].

In General, 90% of injury's mortalities existed in developing countries [11], this reflects the deficiency of simple lifesaving preventive and control procedures and the shortage in emergency care provision, thus performing such researches can help health planner to prioritize this problem and to put and implement the necessary interventions.

Aim of the Study

Demonstrate accidents' mortality by type in Nineveh Governorate during the years 2008, 2009, 2018, and 2019.

II. METHODOLOGY

Administrative Agreements

These agreements were obtained from the "College of Medicine/ University of Mosul" and from the "ethical and research committee in Nineveh Health Directorate (NHD)". The latter provided the required official permissions for Forensic Medicine Department from which the required data were taken.

Study Setting

This research was conducted in Nineveh, the 3rd largest land area and the 2nd most populous governorate in Iraq with population approximating 4 millions. Data on accidents' mortalities were obtained from the Forensic Medicine Department of NHD that provided decedents' information according to their death certificates for the years 2008, 2009, 2018, and 2019.

Study Sample

The inclusion criteria in this research involved all decedents with various types of accidents, all ages, and both sexes in the whole governorate during the years 2008, 2009, 2018, and 2019.

Study Design

Biometric study, a descriptive study design, was adopted in this research to analyze all mortality data due to accidents in Nineveh Governorate, and the results of such analysis will provide valuable data at local, national and even international levels regarding accidents' types, ranking, rates, and other information.

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Study Period

The total period needed for this study was 6 months started from the 1st of September 2019 up to the 1st of March 2020.

Data Collection Tool

Death certificate forms registered in the Forensic Medicine Department were used to obtain the needed information that cover all accidents' deaths during the study period regarding decedents' age, sex, time of death, and the type of accident.

Outcome Measures

To achieve the aim of the present work, various rates and proportions were used to identify the ranking for each type of accidents, in addition to clarify decedents' characteristics especially for age and sex, and finally measurement of % reduction rate for each type of accidents between two periods: 2008-2009 and 2018-2019 after calculating the average number of deaths for each period.

The % reduction rate can be computed through the following formula [12]:

$$\%\ reduction\ rate = \frac{\text{no. of deaths before} - \text{no. of deaths after}}{\text{no. of deaths before}} \times 100$$

III. RESULTS

Accidents' mortality data for the whole governorate are collected for the years 2008, 2009, 2018, and 2019 and the results are summarized in the following tables:

Table (1) demonstrates the main types of accidents in Nineveh during the study period. Explosions' victims were dominating with proportions ranging between 28.2% and 65.6% from all accidents' deaths being worst during 2008, followed by shooting (17.5% - 40.3%) being worst in 2009, road traffic accidents (2.4% - 14.4%) the worst in 2019, then burn (4.6% - 10.1%) and the worst in 2019. Additional forms of accidents that had lower proportions are electric shock, drowning, external trauma, slaughtering, and others.

Table 1: Types of Accidents' Mortality in the Studied Years in Nineveh Governorate, Iraq

Types of accidents	Proportionate mortality by type of accident for each year							
	2008		2009		2018		2019	
	No.	%	No.	%	No.	%	No.	%
Explosions	1353	65.6	431	28.2	1707	58.2	362	28.7
Shooting	360	17.5	615	40.3	590	20.1	220	17.5
Road traffic accidents	49	2.4	152	10.0	211	7.2	182	14.4
Burn	139	6.8	133	8.7	135	4.6	127	10.1
Electric shock	40	1.9	52	3.4	81	2.8	56	4.4
Drowning	46	2.2	35	2.3	64	2.2	184	14.6
External trauma	19	0.9	43	2.8	58	2.0	49	3.9
Slaughtering	33	1.6	21	1.4	22	0.8	6	0.5
Others*	22	1.1	45	2.9	63	2.1	75	5.9
Total	2061	100	1527	100	2931	100	1261	100

***Others like full from height, poisoning, suffocation, and suicide.**

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Table (2) explores the age and gender distributions of accidents' deaths. It reveals that most of victims were young at age range 15 – 35 years (38.3% - 60.7%). In contrast, the least proportions were among children under 5 years of age (less than 10%) and elderly at 65 years and more (less than 5%) throughout the study years. On the other hand, on average three quarters or more of deaths were males (ranged from 64.8% - 86.8%) being worst in 2008. The reverse was true for females.

Table 2: Age and Sex Distribution of Accidents' Deaths for each of the Studied Years in Nineveh Governorate, Iraq

Decedents' characteristics	Proportionate mortality by age and sex / year							
	2008 (n=2061)		2009 (n=1527)		2018 (n=2931)		2019 (n=1261)	
	No.	%	No.	%	No.	%	No.	%
Age (years)								
-5	65	3.2	72	4.7	158	5.4	99	7.8
5-15	144	7.0	138	9.0	461	15.7	204	16.2
15-25	495	24.0	351	23.0	560	19.1	282	22.4
25-35	756	36.7	520	34.1	580	19.8	200	15.9
35-45	329	16.0	228	14.9	360	12.3	146	11.6
45-65	236	11.4	177	11.6	433	14.8	135	10.7
65+	36	1.7	41	2.7	138	4.7	47	3.7
Undetermined	-	-	-	-	241	8.2	148	11.7
Sex								
Male	1788	86.8	1294	84.7	2164	73.8	817	64.8
Female	273	13.2	233	15.3	720	24.6	408	32.4
Undetermined	-		-		47	1.6	36	2.8

A comparison between the average mortality numbers for two periods (2008-2009) and (2018-2019) was made to exhibit the changes in mortality levels due to different forms of accidents. Table (3) shows that only shooting, burn, and slaughtering deaths were reduced (16.92%, 3.68%, and 48.15% respectively), whereas mortalities due to other causes of accidents were increased especially for drowning which raised in 2018-2019 for more than 2 times (-206.17%) than its levels at 10 years earlier.

Table 3: Percent Reduction Rate of Accidents' Mortality between the Two Periods (2008-2009) and (2018-2019) in Nineveh Governorate, Iraq

Types of accidents	Average no. of mortality (2008-2009)	Average no. of mortality (2018-2019)	% Reduction rate*
Explosions	892	1034.5	-15.98
Shooting	487.5	405	16.92
Road traffic accidents	100.5	196.5	-95.52
Burn	136	131	3.68
Electric shock	46	68.5	-48.91
Drowning	40.5	124	-206.17
External trauma	31	53.5	-72.58
Slaughtering	27	14	48.15

***Minus (-) rate means that there was increase in mortality level.**

Table (4) explores the age and gender disseminations of explosions' victims (the commonest form of accidents in Nineveh). It discloses that most deaths were young at age range 15-35 years and the vast majority of them (>

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90%) were males especially during the early era (2008-2009). However, during 2018-2019, most deaths present at ages 5-45 years with male predominance again.

Table 4: Age and Sex Distribution of Explosion Victims During the Studied Years in Nineveh Governorate, Iraq

Decedents' characteristics	Proportionate mortality by age and sex / year							
	2008 (n=1353)		2009 (n=431)		2018 (n=1707)		2019 (n=362)	
	No.	%	No.	%	No.	%	No.	%
Age (years)								
-5	26	1.9	12	2.7	88	5.2	21	5.8
5-15	80	5.9	43	10.0	308	18.0	75	20.7
15-25	313	23.1	86	20.0	323	18.9	79	21.8
25-35	554	40.9	175	40.6	312	18.3	45	12.4
35-45	213	15.8	50	11.6	184	10.8	44	12.1
45-65	151	11.2	56	13.0	282	16.5	31	8.6
65+	16	1.2	9	2.1	92	5.4	6	1.7
Undetermined	-	-	-	-	118	6.9	61	16.9
Sex								
Male	1226	90.6	401	93	1199	70.2	209	57.7
Female	127	9.4	30	7	464	27.2	122	33.7
Undetermined	-	-	-	-	44	2.6	31	8.6

Table (5) documents the age and gender dispersions of shooting deaths (the 2nd most common type of accidents in the Governorate). It shows that young people (15-45 years) were at the highest risk of death by shooting if compared with other age groups and males had the greatest share of mortality (around 90%) from all deaths throughout the study years.

Table 5: Age and Sex Distribution of Shooting Victims During the Studied years in Nineveh Governorate, Iraq

Decedents' characteristics	Proportionate mortality by age and sex / year							
	2008 (n=360)		2009 (n=615)		2018 (n=590)		2019 (n=220)	
	No.	%	No.	%	No.	%	No.	%
Age (years)								
-5	1	0.3	5	0.8	9	1.6	3	1.4
5-15	10	2.8	19	3.1	28	4.7	11	5.0
15-25	94	26.1	135	21.9	83	14.1	43	19.5
25-35	131	36.4	252	41.0	158	26.8	48	21.8
35-45	69	19.2	118	19.2	102	17.3	40	18.2
45-65	49	13.6	81	13.2	87	14.7	30	13.6
65+	6	1.6	5	0.8	19	3.2	12	5.5
Undetermined	-	-	-	-	104	17.6	33	15.0
Sex								
Male	334	92.8	561	91.2	525	89	183	83.2
Female	26	7.2	54	8.8	63	10.7	34	15.4
Undetermined	-	-	-	-	2	0.3	3	1.4

IV. DISCUSSION

Accidents or injuries derive public health consideration nowadays because they have serious life threat, affect all individuals and all body organs, their rates are increasing worldwide, and in most situations can be evaded [13]. In the

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recent years, some countries are heavily loaded with terrorism and wars' that make accidents among their primary causes of morbidity and mortality as in Iraq [14].

In the present study, explosions and shooting were the commonest causes of accidents' death throughout the study years forming around half to three quarters of these mortalities. Other forms of injuries were RTAs, burn, electric shock, drowning, external trauma, and slaughtering with lesser proportions. Similarly, in Baghdad these causes were present during 2010-2015 but with predominance of shooting or gunfire victims (36%) then followed by RTAs (20%), burns (10%), explosions (8%), and other unintentional injuries [15] although the Global Terror Database [16] registered that 87% of terrorism attacks in Baghdad were explosions and 12% were gunfire during the same period. However, Hagopian et al. [17] found that 63% and 28% of violence associated mortalities in Iraq were due to shooting and explosions respectively. These differences reflect how Nineveh's population were seriously burdened by explosions during the past years compared with other Iraqi governorates as documented also by Bilukha et al. during 2013 [10].

Unintentional injuries were responsible for 57% of all injury's deaths globally and for 61% in developing countries during 2001, they involved RTAs, poisoning, burn, falls, and drowning [4], they were one of the leading causes of death in USA with annual mortality rate of 6.83/100 000 population [18]. According to WHO [19], about 1.35 million individual die each year due to RTAs alone of which more than 90% occur in developing countries. In Iraq, RTAs are common causes of death with a rate of 20.7/100 000 population during 2016 [19]. Burns, on the other hand, are common causes of death in the Middle East [20] and suicide in the Western countries like in Norway and California [21,22]. Thus, various types of accidents are present worldwide depending on the security situation, socio-economic and other factors.

Young people are more vulnerable to the external ecological hazards compared with other age groups and males are specifically involved. In the present study, most of accidents victims were young aging between 15-35 years and almost three quarters or more were males. Similarly, in Iran around three quarters of accidents' victims (73.1%) were males and 75% were young aging 15-44 years with median age of 30 years [23]. Globally, there is a wide difference in M:F ratio regarding accidents' victims ranging from (1.15:2) in developed nations [24] to (2.6:9) in the developing ones [25].

Making a comparison between mortality levels overtime for each type of accident is essential to quantify the success of intervention programs and identify the gaps that need interference. In the current study, measurement of % reduction rates between 2008-2009 and 2018-2019 revealed that most of accidents types were increased between the two periods as drowning, RTAs, external trauma, electric shock, and explosions, whereas the best improvement was for slaughtering followed by shooting and burns. Drowning victims were increased by more than two times (-206.17%) due to the famous catastrophe "Al-Abbara" that happened in Mosul City during March 2019.

The "Institute for Economics and Peace" [26] documented that terrorism related mortalities reduced in several countries between 2015 and 2016 as in Nigeria by 63%, Yemen 58%, Egypt 56%, Syria 24%, and Afghanistan 14%, but Iraq witnessed the greatest increase during the same period followed by South Sudan and Turkey. Later on, Iraq reported the greatest reduction in terrorism mortality by 75% between 2018 and 2019 [27].

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Geors et al. [15] found that between 2010-2012 and 2013-2015, there was an increase in shooting mortality rate in Iraq but reduction in RTAs by 52%. In Iran, RTAs mortality also reduced from 41.5 to 20.4/100 000 population between 2006 and 2016 [28]. Other studies in USA revealed that unintentional injury mortality was raised by 11% from 1992 to 2002 especially for falls, poisoning, and RTAs [29], and in Canada, the rates of RTAs, drowning, and burn were reduced while falls and poisoning increased between 2001 and 2007 [30]. Thus, there are great variations in the trends of mortality in different countries depending on the types of accidents prevalent in each area.

In the present study the commonest form of accidents that harvested hundreds of people's lives annually were explosions. Their victims were young aging 15-45 years and more specifically 25-35 years. Males were disproportionally had the greatest share of these mortalities. Similarly, at the national level, Hagopian et al. [17] found that males were died more by explosions with M:F ratio of 8.5:1. Bilukha et al. [10] revealed that 9 of each 10 explosions' deaths (90.2%) were males and more than three quarters of them (87.8%) were adults with mean age of 30.5 years. Also, 95.18% of explosion victims in Karachi [8], 81.7% in Istanbul [31], and 78% in Nepal [32] were males and in all localities young people were heavily involved.

Shooting, on the other hand, was the 2nd most common type of accidents in the present study affecting again young people (15-45 years) and the vast majority of them were males. Parallel results were registered by Nerlander et al. [33] in Iraq where 86% of shooting's deaths were males and 83.4% were adults. Nevertheless, higher rates of mortality (83.8%, 92.2%, and 94.4%) were demonstrated among males at earlier time in Diyarbakir [34], Dammam [35], and Tehran [36] respectively, most of those victims were young in all the mentioned countries. Thus, at local, national, and international levels young people are more damaged by accidents that required age focused interventions and education to protect this important sector in the community.

V. Conclusions And Recommendations

Nineveh's population are profoundly damaged by various types of accidents particularly explosions and shooting which indicate that they are victims and not harbours of terrorism as somebodies claim. Most of these deaths were young males. Thus, improving security status, putting and reinforcing legislations, offering proper emergency services, and providing proper education are strongly needed to save lives of those young deprived seriously affected people.

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