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Original article

Total Civilian Deaths During 2003-2015 and Post-Conflict Period in Iraq: Challenges and Achievements of the Medico-Legal Directorate (MLD) in Baghdad

وفيات المدنيين خلال الفترة 2003-2015م وفترة ما بعد النزاع في العراق: تحديات وإنجازات إدارة الطب العدلي في بغداد بالعراق

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Abstract

Iraq has been involved in several conflicts during the last five decades. The period between 2003-2015 witnessed a dangerous and highly unstable security situation in Iraq resulting in a huge number of civilian fatalities. Accordingly, the work load was also increased on the staff of the Medico-legal Directorate (MLD) of Iraq, which houses the only forensic medicine center for performing autopsies in Baghdad. The present report provides descriptive, statistic, and some demographic data of the total number of deaths during the period 2003-2015 and post-conflict period in Iraq.

Results showed that the total number of civilian dead bodies brought to the MLD for performing autopsies during the period 2003-2015 was 95,902, with an average of 7322.46 deaths per year with a mild fluctuation in the total number of deaths over all the years. The median value was 6,408 deaths. A marked elevation in the number of deaths was observed between 2004-2007 and 2014-2015. The highest number of causalities (16,867) was recorded in 2006, while the lowest number was in 2008 (4,063). Known to unknown and male to female ratio was 3.185 and 4.010, respectively. This study intends to highlight the challenges and achievements of the MLD during the conflict (2003–2015) and post-conflict period. The case load and identification issues presented the most important challenges for the staff at the MLD with rather limited facilities and co promised infrastructure.

Keywords: *Forensic Sciences, Iraq Body Count Project, Iraqi conflict 2003-2015, Mass graves, Unidentified cadaver, MLD.*

المستخلص

شارك العراق في عدة صراعات خلال العقود الخمسة الماضية. وشهدت الفترة ما بين عامي 2003 و 2015م وضعا أمنيا خطيرا وغير مستقرا للغاية في العراق ما أدى إلى وقوع عدد كبير من القتلى المدنيين، والذي انعكس سلبا على المجتمع والأفراد. وبناء على ذلك، زاد عبء العمل على موظفي دائرة الطب العدلي في العراق والتي تضم مركز الطب الشرعي الوحيد لإجراء عمليات تشريح الجثث في بغداد. ويقدّم هذا التقرير إحصائية وصفية وبعض البيانات الديموغرافية عن مجموع عدد الوفيات خلال الفترة بين 2003-2015م في هذه الدائرة.

وتظهر النتائج أن العدد الإجمالي لجثث الوفيات من المدنيين التي جلبت إلى دائرة الطب العدلي لإجراء عمليات التشريح خلال الفترة بين 2003-2015م كان (95902) حالة، وأن متوسط عدد حالات الوفاة سنويا يساوي (7322.46) حالة مع تغيُّرات طفيفة في إجمالي عدد الوفيات على مدى سنوات الدراسة. وبلغت قيمة الوسيط للحالات (6408) حالة وفاة. وقد لوحظ ارتفاع ملحوظ في عدد الوفيات بين عامي 2004-2007م و 2014-2015م. وسجل عام 2006م أكبر عدد من الإصابات حيث بلغ العدد (16867) حالة بينما كان أقلها في عام 2008م بعدد (4063) حالة.

وكانت النسبة بين الحالات المعروفة للحالات غير المعروفة وكذلك الذكور إلى الإناث تساوي (3.185) و (4.010) على التوالي. وهدفت هذه الدراسة إلى تسليط الضوء على التحديات والإنجازات التي حققتها دائرة الطب العدلي خلال النزاع في الفترة مابين 2003 – 2015م وفترة ما بعد النزاع. حيث كان موضوع العبء من ناحية كم الحالات وتحديد الهوية هما أهم التحديات التي واجهها الموظفون في دائرة الطب العدلي في ظل وجود مرافق محدودة نوعا ما وبنية تحتية مدمرة.

الكلمات المفتاحية: علوم الأدلة الجنائية، مشروع عَد ضحايا حرب العراق، الصراع في العراق، مقابر جماعية، جثة مجهولة الهوية، دائرة الطب العدلي.

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1. Introduction

Iraq has been involved in many major conflicts during the last 50 years, some with neighboring countries (1948, 1973 and 1980) and others internally (1991, 2003 and 2014). Enormous numbers of fatalities are often caused by wars [1-3].

Decades of conflict have left Iraq's infrastructure and healthcare facilities devastated [4-6]. In addition, the deterioration of security resulted in many kinds of crime such as robbery, organized crimes, assassinations, and kidnappings.

In 2006, Ahmed S. Hashim, a professor of Strategic Studies at the U.S. Naval War College, warned that prolonged conflict may push Iraq towards increasingly complex violence that may threaten the future of Iraq and its stability [5].

The routine operation of the MLD in Baghdad was badly affected by an enormous increase in the referred number of war and terrorism-associated civilian victims. In addition, discovery of a large number of mass graves, whether made before 2003, like Al-Mahawil mass graves in 1991 [7] or after 2003 such as the Speicher massacre [8] both resembling any other kind of mass disaster [9], added extra burden on the MLD to conduct and ensure correct body identification and precise record maintaining.

In reality, the number of civilian fatalities overwhelmed the working capacity of the MLD during the crisis of 2003-2015, requiring extraordinary efforts to meet the challenge of body identification and record keeping. During the period of conflict, the MLD morgue had two theatres with only 12 professional forensic pathologists carrying out their routine duty of establishing the identity of the deceased, performing autopsy, determining the time, manner and cause of death and issuing the death certificate [10-11]. All those tasks were performed in daily routine work according to standard protocols using all the available resources and techniques [12-14].

Estimating the number of civilian casualties during and after the war in Iraq was a difficult and complicated task [4]. Many attempts were made to ascertain the total number of civilian deaths during (2003-2015) or after the war, mostly by non-governmental humanitarian organizations (NGOs), the United Nations (UN), electronic media, satellite TV channels and several agencies worldwide. However, most of those surveys were conducted in variable periods during 2003-2015 and, therefore, an exact figure was unlikely to be correctly estimated. Another independent agency that was and is still involved in counting Iraqi civilian casualties since 2003 is the Iraq Body Count (IBC) [15] project, which is a web-based effort to record civilian violent deaths after 2003. IBC maintains the world's largest public database of violent civilian deaths since the 2003 invasion, as well as a separate running total which includes combatants. IBC's data is drawn from cross-checked media reports, hospitals, morgues, NGOs, official figures, police records, US-coalition information centers, eyewitnesses, relatives and friends [16].

The civilian death data reported by MLD in this paper is based on authentic records kept and maintained at the MLD, Baghdad, and the data obtained from MOH official reports according to the total death certificates issued yearly for violent deaths of Iraqis. The present study looks at the number of civilian deaths during the period between 2003-2015, their distribution according to gender, identity testing and mortality rates. This report also looks at the practical role and efforts of the MLD in collecting civilian death data during a prolonged period of military war and civilian unrest.

2. Materials and Methods

A retrospective study was conducted in the Statistics and Planning Department of the MLD (Baghdad, Iraq) involving collection of detailed statistics of civilian deaths between 2003–2015. The data was drawn from three major departments: the Department of Death Investigation, the Department of Missing Persons and the Department of Mass Graves. Ante-mortem data were collected from the

families of the deceased by the Ministry of Human Rights (HRM). Reference blood stain samples were collected from claimed families in a special campaign in corporation with HRM and its sister agencies. The staff of the Mass Grave Department rendered full services in mass graves exhumation under the supervision of the International Commission on Missing Persons (ICMP). Human bodies and other humsn remains or skeletons were collected, photographed and identified using conventional morphological and anthropological techniques. Bone or tissue samples of unidentified human remains were sent to the Criminal and Mass Grave Laboratories in MLD for DNA analysis and identification. In addition, DNA from each identified corpse was also analyzed to confirm the results of visual identification, based upon imaging data, by the claimed family in Missing Persons Department.

Various parameters and techniques were used for the purpose of identification. These included fingerprints, visual identification based upon imaging data, DNA profiles, personal belongings, anthropological examination, and in some cases, dentition [12-13]. At the morgue in the Dead Investigation Department, all unidentified dead bodies at the time of their arrival were either identified by their families directly or after long time in the Missing Persons Department with the aid of images and DNA analysis. Once identified, unknown dead bodies were registered with their full names and other identification details on the basis of document records. Despite the heavy work load and compromised facilities, all identification tasks were carried out according to international standard protocols and well-recognized post-mortem human identification procedures [11-14].

The data was carefully collected, cross-checked, uploaded onto the computer and analyzed using Microsoft Office Excel.

3. Results

The main objective of this study was to estimate the total number of civilian deaths during the 2003-2015 war and the period after. Table-1 summarizes the gender, total number of civilian deaths, number of known and unknown bodies, and total number of identified and unidentified cadavers each year between 2003-2015. Figure-1 shows the yearly distribution of total civilian deaths documented by the MLD during 2003-2015.

The total number of documented deaths over a period of 13 years was 95,902, with an average of 7,377 deaths per year with a median value of 6,408, respectively. The number of male civilian deaths (n = 76,762) was considerably higher than females (n = 19,140) with an approximate male to female ratio of 4:1 (Table-1, Figure-2). The maximum number of deaths, 17.59% of the total, was recorded in 2006 (n = 16,867), while the minimum number (4.24%) was seen in 2008 (n = 4,063). The same yearly pattern of civilian death was seen in males, approaching the maximum (n = 15,575) in 2006 and then declining to the minimum (n = 3,021) in 2008, with a gradual upward trend till 2015 (n = 5,596). On the other hand, the minimum number of female civilian deaths (n = 861) was recorded in 2007 with a gradual increase to 2,196 in 2015.

Of the total 95,902 civilian deaths, 72,987 (76%) were known cases while 22,915 (24%) consisted of unknown dead bodies with a known to unknown ratio of 3.2:1, which reduced to a net identified (n = 85,901) to unidentified (n = 10,001) ratio of 8.6:1 after completing the identification process. Figure-3 shows the distribution of total civilian deaths according to the identity of deceased from 2003 to 2015. After the initial screening of MLD records, 22,915 (24%) of the total deaths (n = 95,902) were declared "unidentified". Finally, this number reduced to 10,001 (10.43%) after performing identification procedures (Table-1, Figure-4).

Figure-5 shows civilian mortality rate per year according to the gender during the 2003-2015 war. The average mortality rate among civilian males was 77.64, being highest (92.34) in 2006 followed by 88.64 in 2007 and 87.27 in 2005. The minimum mortality rate among males (68.93) was seen in 2012. The average mortality rate among fe-

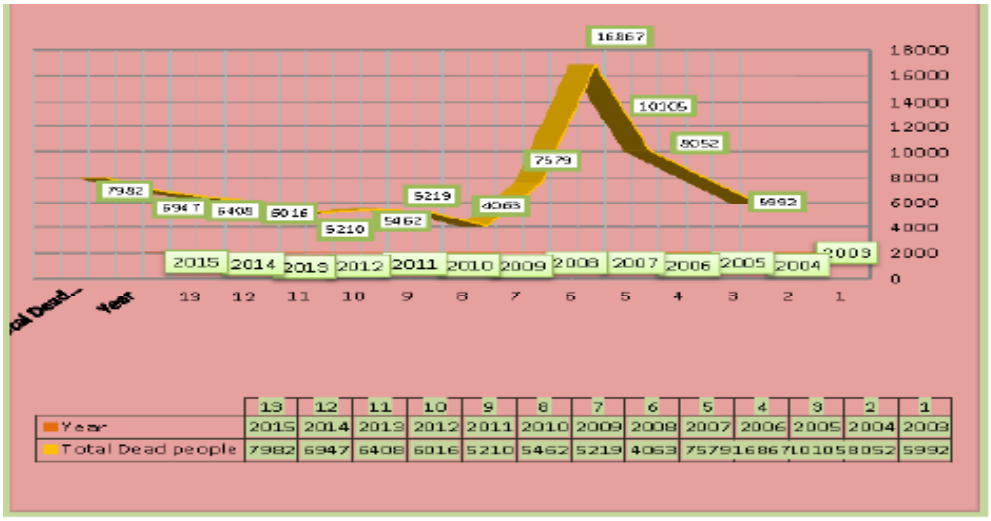


Figure 1- *Distribution of total civilian deaths documented in MLD between 2003-2015.*

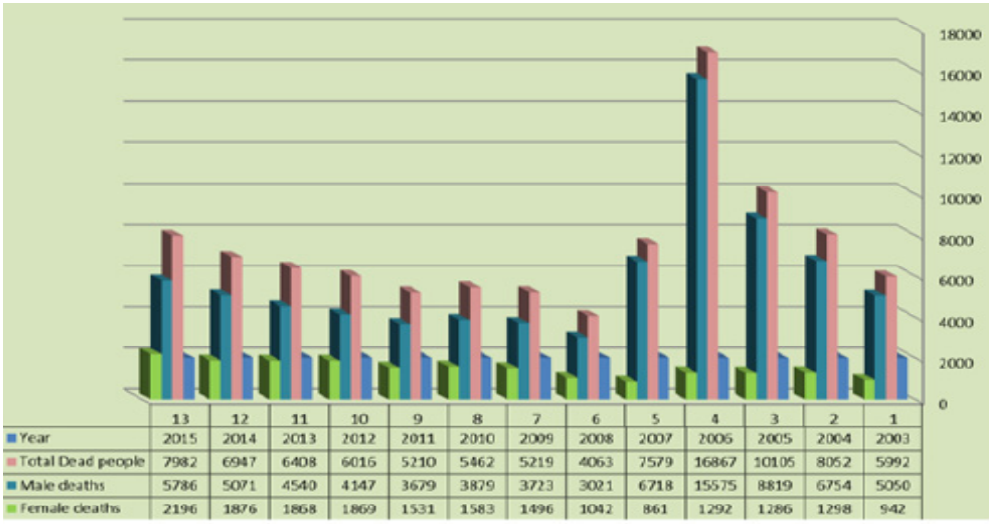


Figure 2- *Distribution of total civilian deaths during 2003-2015 according to the gender.*

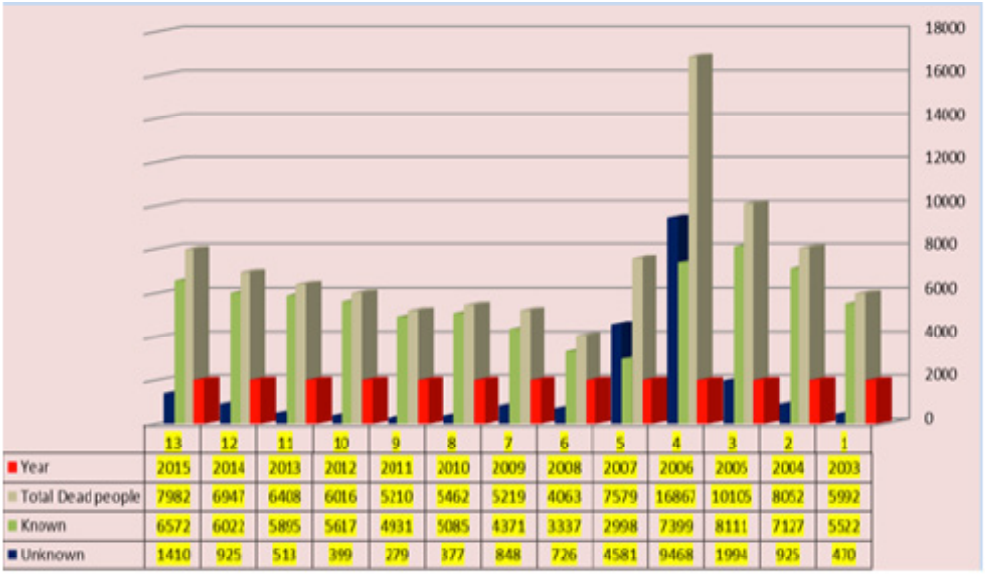


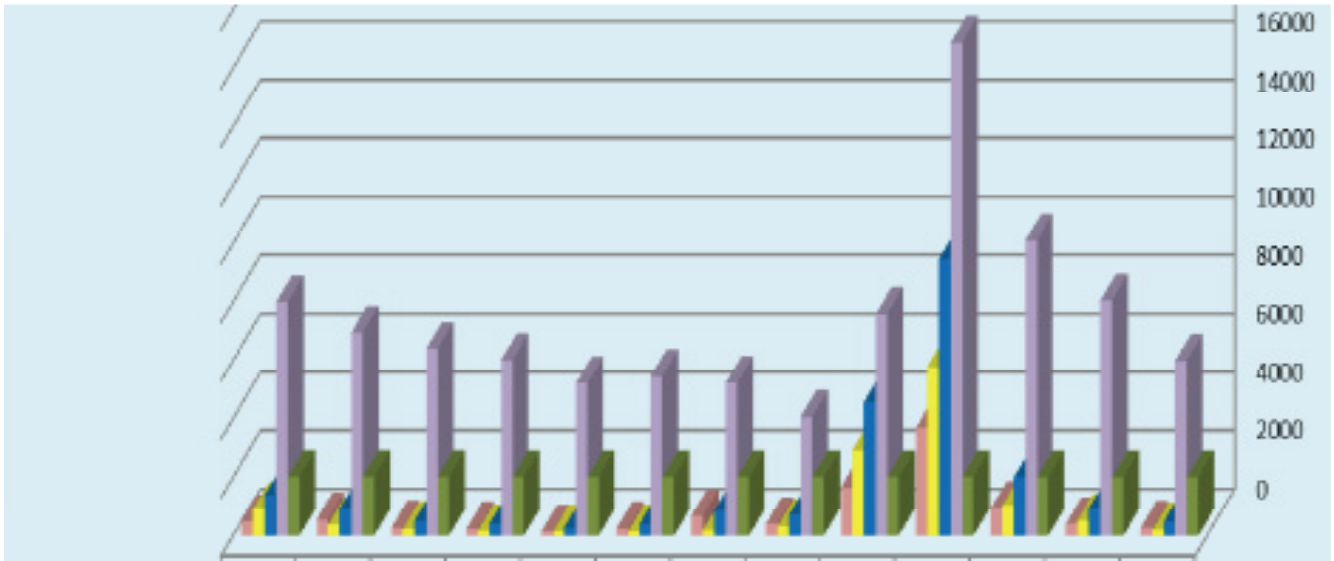
Figure 3- *Distribution of total civilian deaths according to the identity of deceased between 2003-2015.*

Table 1- *Distribution of civilian deaths according to gender and identity status during 2003-2015.*

Year	Total Deaths	Gender		Identity Status			
		Male	Female	Known	Unknown		
					Total	Identified	Unidentified
2003	5992	5050	942	5522	470	197	273
2004	8052	6754	1298	7127	925	520	405
2005	10105	8819	1286	8111	1994	1041	953
2006	16867	15575	1292	7399	9468	5776	3692
2007	7579	6718	861	2998	4581	2922	1659
2008	4063	3021	1042	3337	726	322	404
2009	5219	3723	1496	4371	848	181	667
2010	5462	3879	1583	5085	377	141	236
2011	5210	3679	1531	4931	279	134	145
2012	6016	4147	1869	5617	399	162	237
2013	6408	4540	1868	5895	513	236	277
2014	6947	5261	1876	6022	925	373	552
2015	7982	5596	2196	6572	1410	909	501
Total	**95902**	**76762**	**19140**	**72987**	**22915**	**12914**	**10001**

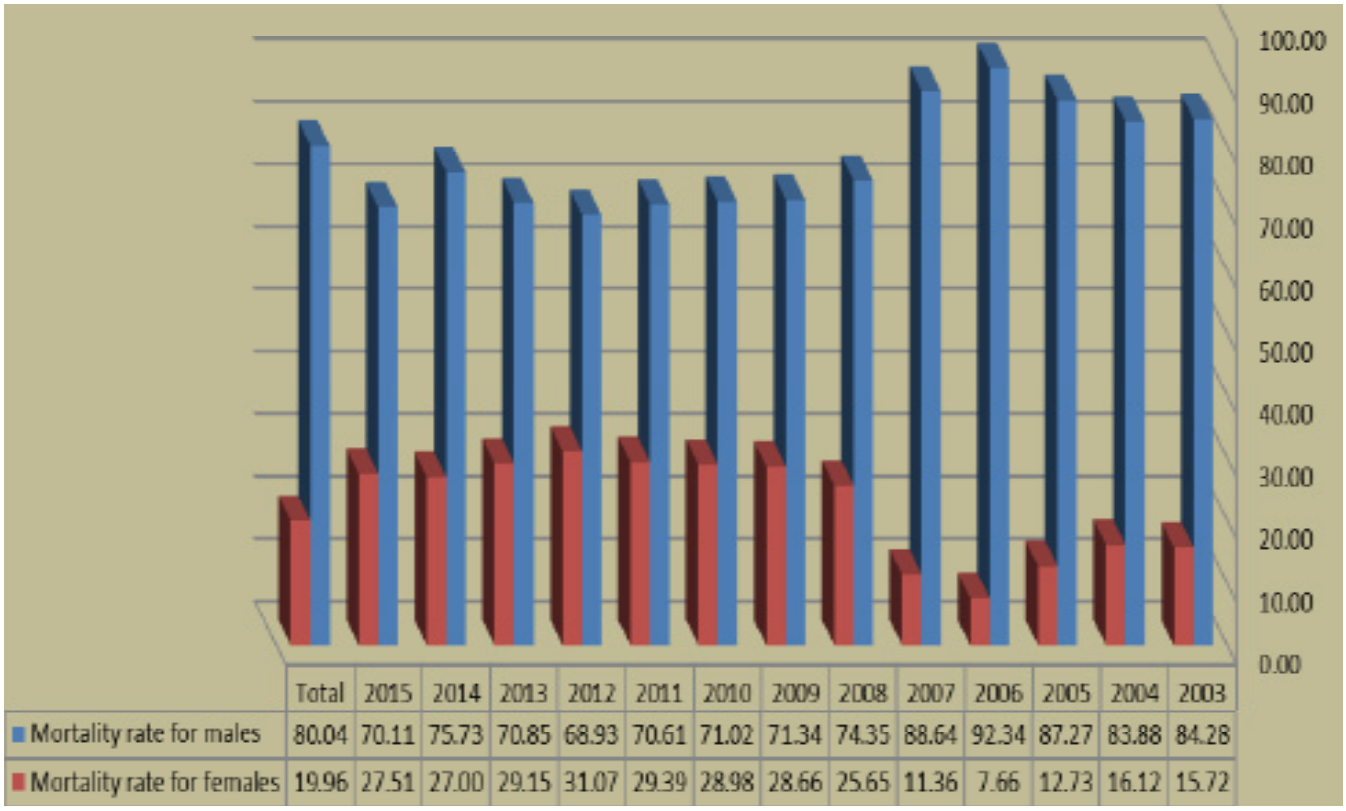
Table 2- *Total number of cases and biological samples tested for DNA analysis during 2008 - 2015 in the Criminal Laboratory, MLD.*

Year	No. of cases	No. of biological samples tested
2008	99	686
2009	191	783
2010	246	891
2011	402	1306
2012	412	1327
2013	473	1482
2014	612	1527
2015	526	1512
Total	**2961**	**9514**



	13	12	11	10	9	8	7	6	5	4	3	2	1
Year	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Total Dead people	7982	6947	6408	6016	5210	5462	5219	4063	7579	16867	10105	8052	5992
Unknown	1410	925	513	399	279	377	848	726	4581	9468	1994	925	470
Identified	909	373	236	162	134	141	181	322	2922	5776	1041	520	197
Unidentified	501	552	277	237	145	236	667	404	1659	3692	953	405	273

Figure 4- *Distribution of total civilian deaths during 2003-2015 according to the final identity testing of the deceased.*



	Total	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003
Mortality rate for males	80.04	70.11	75.73	70.85	68.93	70.61	71.02	71.34	74.35	88.64	92.34	87.27	83.88	84.28
Mortality rate for females	19.96	27.51	27.00	29.15	31.07	29.39	28.98	28.66	25.65	11.36	7.66	12.73	16.12	15.72

Figure 5- *Civilian mortality rate between 2003-2015 by gender and year.*

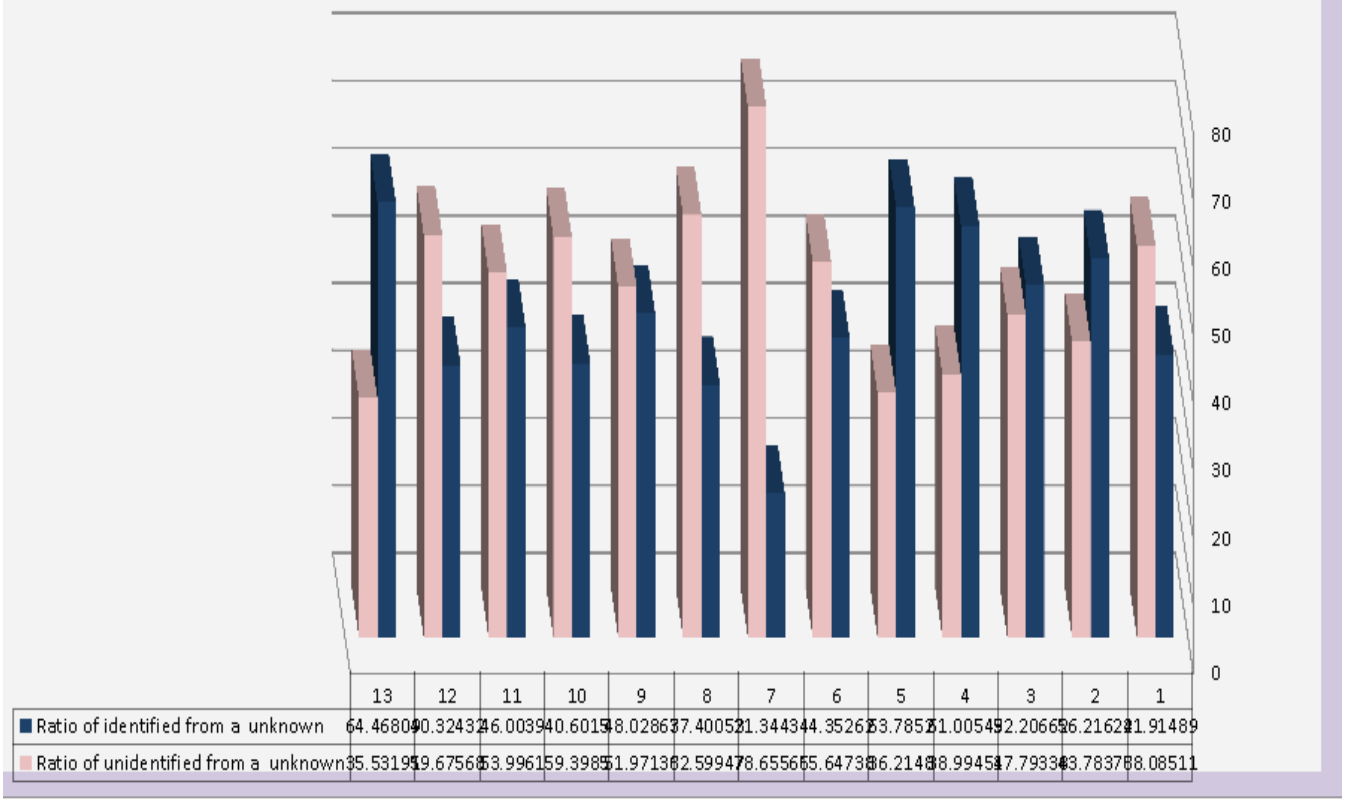


Figure 6- *Civilian mortality rate between 2003-2015 by identity of deceased and year.*

Table 3-*Total number of referred families, bodies, and remains after 4 big explosions happened in Baghdad from 2009-2010 and the final results of DNA matche in criminal laboratory, MLD.*

Places of Explosion in 2009 and 2010	Number of Families	Number of Human Remains	Number of Bodies	Total *no.* of tested samples	Match	No. of Bodies without Families	No. of Families without bodies
Foreign Ministry	26	18	18	62	6	12	20
Justice Ministry	76	68	50	194	22	28	54
Near Judicial Institute	10	7	4	21	1	3	9
Near Iranian Embassy	5	15	8	28	4	4	1
Total	**117**	**108**	**80**	**305**	**33**	**47**	**84**

males was 22.84 with a median value of 27.0. The highest mortality rate (31.07) among females was seen in 2012, while the least (7.66) was observed in 2006.

Table-2 summarizes the total number of forensic cases referred to the criminal laboratory (MLD) and the number of biological samples analyzed for DNA typing from 2008–2015. A total of 2,961 forensic cases were referred to the criminal laboratory over a period of 8 years (2008-2015) with an average of 370 cases/year. A gradual rise in the number of samples/year was seen from 99 (2008) to 612 cases (2014). In 2015, there was a slight decline in the number of cases referred to the DNA laboratory. A total of 9,514 biological samples were processed for DNA typing with an average of 1,189 cases/year. The same trend of a gradual rise in the number of biological samples was seen until 2014, from 686 (2008) to 1,527 samples (2014).

Table-3 shows statistics of four major explosions that occurred during 2009-2010 in Baghdad. A total of 117 families were affected and donated their reference blood samples for the identification of the deceased. Human DNA profiling was performed on 305 biological samples of various types, with the explosion at the Ministry of Justice producing the highest number of biological samples for DNA analysis (n=194). A total of 80 bodies were recovered from these explosions of which only 33 could be identified.

4. Discussion

The present report shows a considerable civilian death toll of 95,902 over a period of 13 years (2003-2015) with an average of 7,377 deaths per year (Table-1, Figures-1, & 2). The maximum number of civilian deaths occurred in 2006 (n=15575) because of violent domestic conflicts and in 2015 when the MLD received victims of the Spicheir camp. During all those years, the MLD had been under immense workload and strove hard to face the challenge of handling about 614 cadavers per month with only 12 forensic pathologists who worked round the clock to perform 21 autopsies per day. The National Association of Medical Examiners (NAME) recommends that the maximum number of autopsies allowed per year is 250, and that a forensic pathologist should not perform more than 325 autopsies in a year [17]. Whereas, forensic pathologists at the MLD performed autopsies 87% above the maximum standard limit during and after the period 2003-2015. This became necessary to meet the challenge of identification and forensic investigation of the increased number of civilian deaths referred to the MLD. It is, therefore, necessary to have a plan and preparedness for working under extreme conditions of heavy work overload and highly compromised conditions.

There was a considerable rise in civilian deaths between 2004 and 2007. Such a high number of fatalities was due to the lack of proper planning and preparedness for the post-invasion situation and a lack of security following the initial military assault on Iraq, particularly in Baghdad where law and order situation worsened after the fall of the regime [6]. The initial military assault resulted in friendly fire and collateral damages were huge. In addition, road traffic accidents caused by military convoys and at checkpoints or deaths caused by U.S. and coalition forces contributed significantly to the total civilian death toll [4]. In addition, resistance or insurgency against the U.S. military and then counter-insurgency operations started to begin soon after one year of occupation.

Among other contributors to the civil unrest and fatalities included criminals who escaped from jails and exploited the chance to work as paid mercenaries. Sectarian clashes [18], suicide attacks and improvised explosive devices (IEDs) planted in vehicles and along the roadside to target police stations, army convoys, and innocent people caused an enormous number of civilian deaths. Post-traumatic shock of war associated with anger, grief, worry, stress, poverty and fear lead to violent tribal mobilization and ethnic un-mixing resulting in massacres and assassinations by unknown perpetrators. Law and order situation deteriorated and reached its worst in 2006 [4-6, 8-9, 16, 18-19] when a shrine in Samara was blown up by unknown attackers leaving 16,867 dead whose bodies were brought to the MLD in Baghdad for identification.

Consequently, in 2007, the USA brought additional troops to Iraq and implemented a strict security plan by building a series of concrete barriers all over the main roads and their collaterals. This led to a significant decline in violence from 2007-2008 [18], which is reflected in MLD statistics showing a considerably reduced number of deaths in 2008 (n = 4063) as compared to the years before and after 2008 (Table-1, Figures-1 and 2).

The period between 2009-2014 was relatively stable after the 2nd general elections in March 2010, when the people received threats for participating in election. The safety and security situation at that time appeared visually stable but it was actually still very fragile [9]. For instance, many major explosions occurred at important official ministries causing many deaths. Crimes and kidnappings for ransom never stopped. In fact, sectarian violence resulted in political enticements, and conflicts between ethno–sectarian guerrillas and militias led to various forms of violence. This situation was further precipitated by public resentment and the migration of Iraqi experts abroad [18-19]. These factors led to the weakness of the infrastructure, especially the security sector. This is reflected in a steady elevation in the number of civilian deaths, 5000–6000/year, documented at the MLD from 2009-2013. The yearly civilian death rate rose to its maximum in 2015 [19] when 710 unidentified bodies from the Spicheir camp and other paramilitary associates were discovered. Those victims were killed directly after the ISIS invasion in early 2014. Their bodies were discovered and identified during and after 2015 [8]. With the continuation of the Liberate Iraqi Land operation, more mass graves and civilian dead bodies are likely to be discovered.

Initially, of the total 95,902 civilian deaths, 72,987 (76%) of them were identified and classified as "known", while the remaining 22,915 (24%) were declared "unknown", with a ratio of 4:1. Later, using various types of forensic identification techniques available at that time, such as family information, fingerprints, biometrics, dental records and DNA typing, the MLD was able to identify 12,914/22,915 (56.4%) of the unknown bodies, while 43.6% still remains unidentified. Thus, despite several administrative, professional shortcomings and compromised facilities, the MLD was able to improve the total number of identified cases from 76% to 89.6%, which, indeed, is a big achievement. The remaining 11.4% unidentified bodies are declared as "open case" and will be worked on using all the available resources. These unidentified bodies were extremely disfigured to such an extent that their families could not recognize or identify them, or they did not have any family to follow-up their missing loved ones.

In order to identify these unidentified bodies and many other cases of missing persons, a DNA databank has been established at the MLD. The entire identification data of all the unidentified bodies and DNA profiles of reference blood samples from the families will be entered and stored in the databank. It is hoped that this databank will be extremely useful in identifying missing persons or unidentified bodies through DNA matching analysis.

Some explosions in 2009 and 2010 have been chosen in this study to show the bulk of evidence which might be referred to the DNA laboratory for DNA typing (Table-3). In the case of the Ministry of Justice explosion, 194 biological samples (families, remains and dead bodies) were processed for DNA typing. This was a great challenge for the MLD laboratory to carry out identification task under highly compromised working conditions.

Explosions remained common throughout all the thirteen years covered in this study, yielding many more disfigured bodies and human remains, particularly between 2008-2013. This may explain why the mortality rate of unidentified/unknown victims is higher than the mortality rate of identified ones (Figure-6). For example, the mortality rate in 2009 was 78.7% versus 21.3%, and 62.6% versus 37.4% in 2010. That happened in contradiction to the post invasion periods after 2003 and 2014 in which the number of identified victims was more than the unidentified ones, probably due to the rapid response of families to search for their missed loved ones during and shortly after the war.

The civilian death toll data for the Iraq war during the period 2003-2015 presented in this report is based on very authentic information from the MLD in Baghdad, the MOH, the MOI and other organizations responsible for collecting such information. Therefore, we may conclude that the number of civilian deaths and the corresponding fatality rates presented in this paper are very precise and are based on the number of death certificates issued by the MLD [15-16]. However, there may have been some victims seriously injured in explosions who died in hospital and whose corpses were released directly to their relatives from the concerned hospital without seeking permission from the MLD. That explains why in table-3 there were many families without bodies and many bodies without families. However, further social, humanitarian and more applied research is needed to study such phenomenon.

Furthermore, the current study has shown (Figures-2 & 3) that the number of deaths among males were approximately four times higher (4:1) than in females. This also resulted in thousands of orphans and widows who suffered from post-war atrocities.

Our results are comparable with the Iraq Body Count (IBC) project that published data covering the war period from January 2003 to November 2008 [15-16]. Our figures regarding the number of civilian deaths during the war period of 2003-2013 are also in agreement with a study published by Boston University [4], and with those documented and announced by the Geneva Declaration Secretariat for Iraq and many other countries as well between 2004-2012 [19].

5. Conclusion

The data presented in this report reflects the agony and misery of a 13-years of war (2003-2015) that resulted in nearly 100,000 civilian deaths including victims from all genders and age groups. This data is based upon the records carefully maintained at the Medico-Legal Department (MLD) in Baghdad, Iraq. The case load and identification issues presented the most important challenge to be faced by a very limited number of professionals who worked around-the-clock to carry out their duties with perfection and according to international standards and protocols.

Further studies are needed to identify and discuss the leading causes of death in detail in relation with many parameters like age, sex, type or mode of death among civilian victims of the Iraq war.

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Conflict of interest

None.

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