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Fatal, Non-Fatal Injuries, and Deaths Resulting from Traffic Accidents for the Years 2018-2023 in Iraq

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ABSTRACT

The recording of road traffic accidents (RTAs) data by the relevant ministries with high transparency provides a roadmap that enables the state to manage RTAs and develop solutions that reduce loss of life and mitigate health and economic burdens. Therefore, the study aimed to evaluate the recording of RTAs and their consequences, including road traffic injuries (RTIs) and road traffic deaths (RTDs) in the Iraqi Ministry of Health (IMH) and Iraqi Ministry of Planning (MoP) over a six-year period from 2018 to 2023. The data of this cross-sectional study were collected from the Central Statistical Organization (CSO) of the MoP and IMH. The statistical analysis of data was done using the Statistical Package for Social Sciences (SPSS). According to MoP, the highest percentage of RTAs in the years 2022 and 2023 was 18.5%, while the lowest percentage was 13.1% for the year 2020. Iraq recorded the highest percentage of RTDs estimated at 18.4% for the years 2022 and 2023, while the lowest RTDs percentage, at 12%, was recorded in 2022. The MoP data and shows an upward trend in RTIs from 2018 to 2023, except for 2020, which showed an exceptionally low percentage which was estimated at 12.6%. Among other indicators, it was noted that the year 2022 recorded 19.0%, which was the highest percentage of RTIs, followed by the year 2023, in which the percentage of RTIs reached 18.5%. According to IMH statistics, the year 2018 and 2019 recorded a percentage of 44.5%, Remarkably, the lowest percentage of fatal RTIs was 38.3% in the year 2020. The highest percentage of RTIs was recorded in the year 2021, at 59.3%, On the other hand, the lowest percentage of RTIs was documented, at 51.8%. Statistically, there was a relative difference in RTDs recorded between the IMH and MoP, ranging between 67.9 and 93.3%. The percentage in 2020 was estimated at 101.7%, with an extreme significant difference of P=0.0001. There was a relative difference in recorded RTIs between the IMH and MoP, ranging between 223.6 and 591.8, with a very significant difference of P=0.0025. Hence, it is imperative to consider the possibility of studying and analyzing some of the data recorded by the IMH and MoP assessing the reliability and transparency of documentation and recording, and enabling stakeholders to understand this serious issue, which continues to cause confusion regarding the true traffic accidents profile Unifying, updating and monitoring documentation sources will constitute a positive turning point in the credibility and reliability of national traffic accident registration systems, in order to formulate a systematic strategy to address what can be addressed according to available capabilities.

Keywords: Road traffic accidents, Fatal traffic injuries, Non-Fatal traffic injuries.

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INTRODUCTION

Acute myocardial infarction Globally, RTAs continue to cause serious health problems and are a source of concern for governments, communities, healthcare institutions, and individuals. Data shows that at least 1.35 million people are killed or injured each year. Globally, RTIs rank eighth in terms of causes of mortality, surpassing malaria, tuberculosis, diabetes, and other diseases [1]. They are the greatest cause of mortality among people aged 5—29 years, with injuries ranging from 20 to 50 million (non-fatal) but potentially causing physical and psychological disabilities, as well as economic damage [2]. As Iraq is one of the most active countries in the Arab region in terms of economic, commercial, knowledge, and cultural activity, this has been reflected in the physical activity on the Iraqi street, resulting in a high incidence of RTAs. Some studies have described the unfortunate consequences of RTAs in Iraq as more severe and violent than the terrorist attacks that have targeted Iraq in the last decade [3].

The development of the economic resources of any country or society is considered one of the important and basic pillars of comprehensive development. If the basic pillars of development are exposed to waste, damage, or extravagance in their exploitation or spending, this causes a deficit that may make them unqualified to meet the requirements of development, whether natural, financial, or human. The economic recovery and the recovery in transportation clearly affect the goals of comprehensive development, positively or negatively. Traffic safety aims to preserve human, financial, and natural resources to benefit from them [4].

The economic recovery has significantly contributed to increased population, commercial, and tourism activity, and it has been noted that the number of vehicles has increased at an unprecedented rate. The recovery, which has affected many different aspects of Iraq, occurred amid fragile security conditions, numerous political fluctuations, and urgent societal changes that have contributed to a direct and indirect increase in the number of RTAs [5, 6]. Consequently, it is important to consider the potential for researching and evaluating some of the factors that could have contributed to the rise in RTAs, and to enable stakeholders to understand this serious issue, which continues to cause severe losses in human and economic resources.

METHODOLOGY

Data on RTAs, both fatal and non-fatal injuries, were collected over a six-year period (2018-2023) from the annual reports of RTAs statistics issued by the IMH and the MoP [7]. The collected data were statistically analyzed using SPSS version 25.0 (IBM Corporation, New York).

RESULTS

According to MoP data for the six years under study, the highest percentage of RTAs in the years 2022 and 2023 was 18.5%, while the lowest percentage was 13.1% for the year 2020 [**Fig1**].

Deaths constitute one of the worst annual losses of human resources. Iraq recorded the highest percentage of RTDs during the six years under study, estimated at 18.4% for the years 2022 and 2023, while the lowest RTDs percentage, at 12%, was recorded in 2022 [**Fig 2**].

Fig [3] represents the MoP data and shows an upward trend in non-fatal RTIs from 2018 to 2023, except for 2020, which showed an exceptionally low percentage compared to the six years under study, which was estimated at 12.6%. Among other indicators, it was noted that the year 2022 recorded 19.0%, which was the highest percentage of non-fatal RTIs, Non-fatal RTIs are no less significant than fatal RTIs, due to the disabilities, economic losses, and increased healthcare and social care requirements they cause.

Fatal RTIs are no less significant and concerning than fatalities, as the likelihood of resulting death is very high. According to IMH statistics, the year 2018 recorded a percentage of 44.5%, followed by similar percentages of 43.5%, 43.4%, and 43% in the years 2021, 2019, and 2023, respectively. Remarkably, the lowest percentage of fatal RTIs was 38.3% in the year 2020, followed by 41.1% in the year 2022 [**Fig 4**].

The significant levels can be inferred from the observation that the highest percentage of non-fatal RTIs was recorded in the year 2021, at 59.3%, followed by the years 2022 and 2023, which recorded 57.8% and 57.3%, respectively. On the other hand, the lowest percentage of non-fatal RTIs was documented, at 51.8%, followed by the years 2019 and 2020, which recorded 54.3% and 56.2%, respectively [**Fig 5**]. followed by the year 2023, in which the percentage of non-fatal RTIs reached 18.5%.

According to the results presented in **Tables (1) and (2)**, there was a relative difference in RTDs recorded between the IMH and MoP, ranging between 67.9 and 93.3%. The percentage in 2020 was estimated at 101.7%, with an extreme significant difference of *P*=0.0001.

Tables (3 and 4) show that there was a relative difference in recorded RTIs between the IMH and MoP, ranging between 223.6 and 591.8, with a very significant difference of *P*=0.0025.

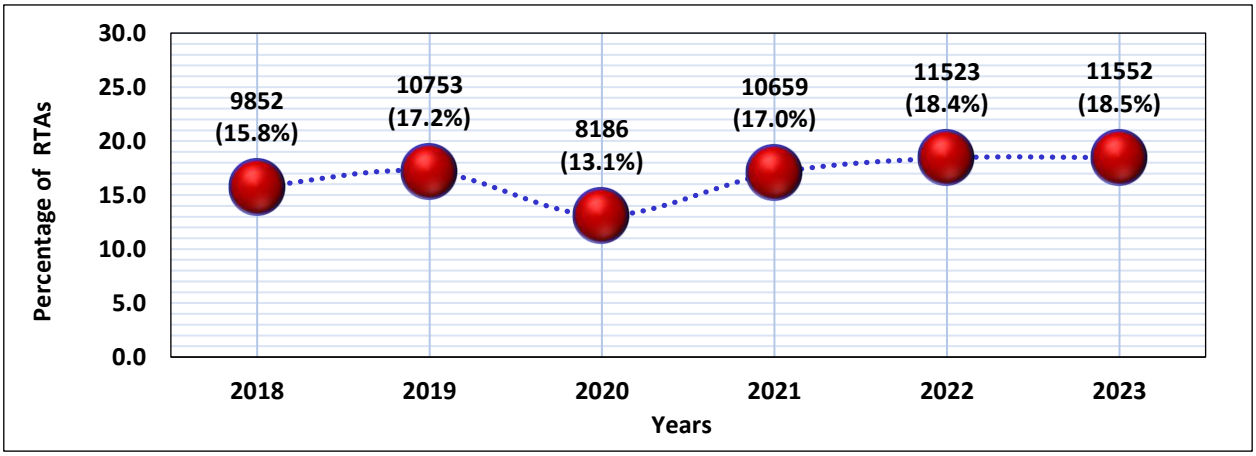

Figure 1. Distribution of RTAs in Iraq according MoP data over a six-year period.

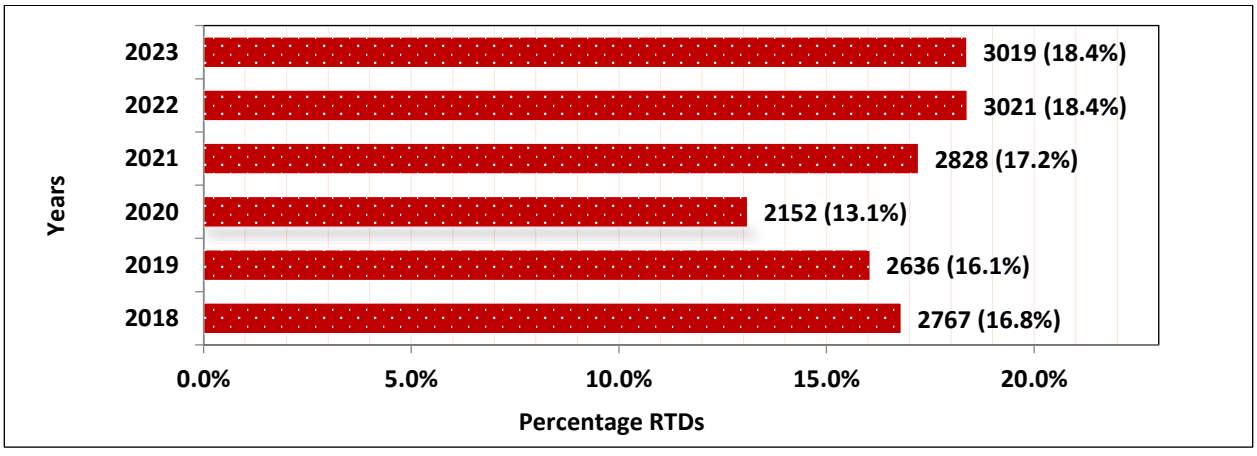

Figure 2. Distribution of RTDs according MoP data in Iraq over a six-year period.

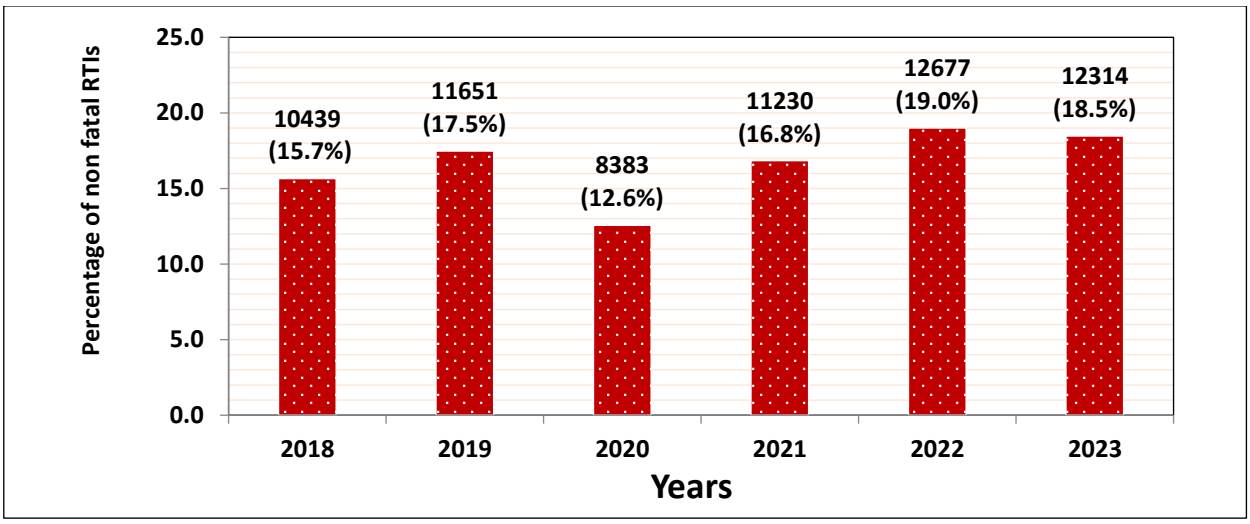

Figure 3. Distribution non-fatal RTIs according MoP data in Iraq over a six-year period.

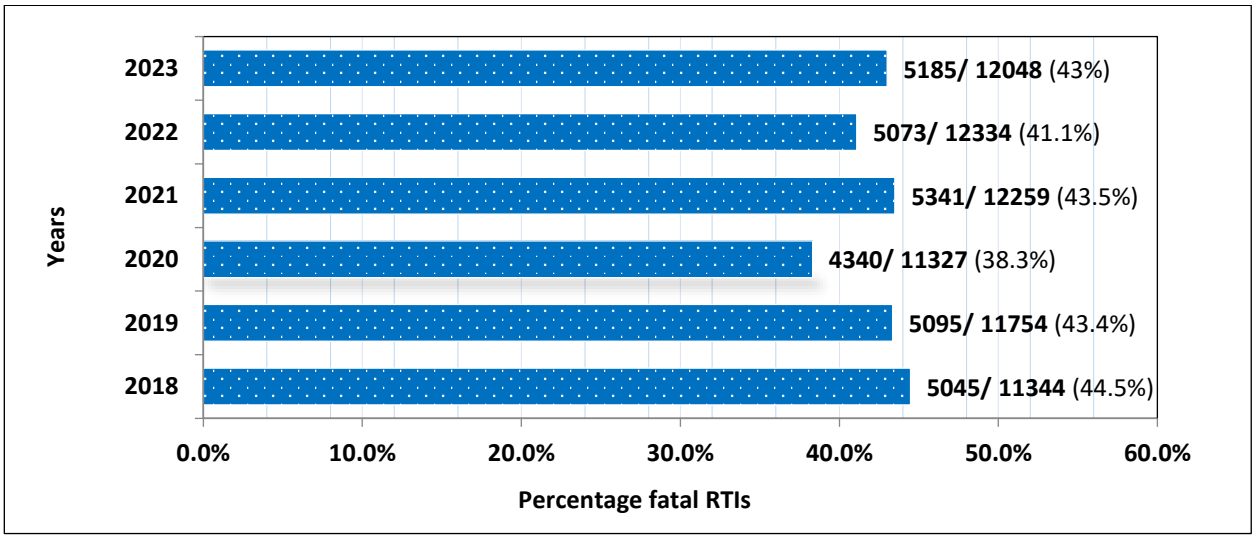

Figure 4. Distribution of fatal RTIs according to IMH data in Iraq over six years.

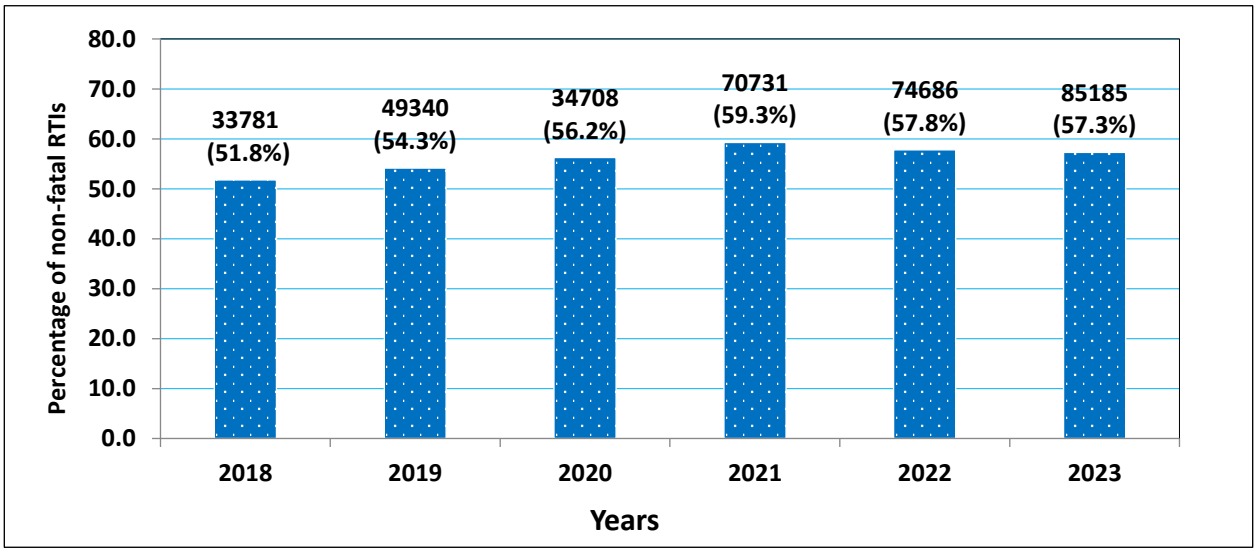

Figure 5. Distribution of non-fatal RTIs according to IMH data in Iraq over six years.

Table 1. Relative difference in RTDs rates according to the IMH and MoP for the six years under study.

Year	RTDs according IMH	RTDs according MoP	Numerical difference	Relative difference (%)
2018	5045	2767	2278	82.3
2019	5095	2636	2459	93.3
2020	4340	2152	2188	101.7
2021	5341	2828	2513	88.9
2022	5073	3021	2052	67.9
2023	5185	3019	2166	71.7
Total	30079	16423	13656	505.8

Table 2. Statistical tests to measure differences between RTDs rates according to IMH and MoP for the years under study.

Group	Mean	SD	SEM	N	DF	SE	T-test	*P*-value
IMH	5013.17	346.83	141.59	6	5	72.957	31.1964	0.0001***
MoP	2737.17	323.04	131.88					

SD, Standard deviation; SEM, Standard error of the mean; ***, Extremely statistically significant; N, Number of data pairs; DF, Degree of freedom; SE, Standard of error; T-test, Student's t-test; *P*-value, Probability value.

Table 3. Relative difference in RTIs rates according to the IMH and MoP for the six years under study.

Year	RTIs according IMH	RTIs according MoP	Numerical difference	Relative difference (%)
2018	33781	10439	23342	223.6
2019	49340	11651	37689	323.5
2020	34708	8383	26325	314.0
2021	70731	11230	59501	529.8
2022	74686	12677	62009	489.1
2023	85185	12314	72871	591.8
Total	348431	66694	281737	2471.9

Table 4. Statistical tests to measure differences between RTIs rates according to IMH and MoP for the years under study.

Group	Mean	SD	SEM	N	DF	SE	T-test	*P*-value
IMH	58071.83	21833.77	8913.60	6	5	8415.647	5.5796	0.0025**
MoP	11115.67	1555.56	635.05					

SD, Standard deviation; SEM, Standard error of the mean; **, Very statistically significant; N, Number of data pairs; DF, Degree of freedom; SE, Standard of error; T-test, Student's t-test; *P*-value, Probability value.

DISCUSSION

Data of IMH relies primarily on admissions to major hospitals in governorate centers, which document incoming cases, the cause and type of injury, and the details of the injured person and data often compares fatal and non-fatal traffic accident injuries with other types of RTAs, such as burns, gunshot wounds, fights, electrocution, drowning, and criminal incidents. The statistical documentation of fatal and non-fatal injuries in hospitals is based on the physiological cause of death, regardless of the cause or type of accident. For example, the physiological cause of death is listed on the death certificate as a result of a brain hemorrhage, lacerations, pulmonary failure, or damage to liver or kidney tissue. On the other hand, deaths resulting from RTAs occurring after a period of time are not recorded, and the physiological cause of death is stated, affecting the accuracy and reliability of the data. In addition, some minor injuries are treated in hospitals, private clinics, and secondary healthcare centers, which do not care about statistics or their type, and whose primary mission is to provide emergency care without regard to the cause of the injury. The Central Administration of Statistics also uses different methods and standards to compare fatal and non-fatal RTIs resulting from RTAs with the total number of RTAs annually, unlike the IMH's statistics, which use a standard comparison between fatal and non-fatal RTIs and the total number of various RTAs. They focus only on the treatment of emergency cases admitted to the hospital and the type of medical services provided. Furthermore, hospitals and medical institutions cannot count the number of RTAs because these procedures are a priority for the field police, who record the number of RTAs, RTDs, and RTIs at the scene. Also, the field statistics center lacks strategies for following up on accident injuries after they are transferred to hospitals, making comparison difficult, if not impossible.

The current study focused on six years of data, from 2018 to 2023, due to its simultaneous availability from both the IMH and MoP. This contrasts with data for the years prior to 2018 and the years following 2023, as data from the IMH was not systematically available. This posed a significant obstacle to analyzing data within a broad timeframe. Analyzing the six-year data revealed a slight and gradual increase in RTAs, RTDs, and RTIs between 2018 and 2023, with the exception of 2020, which witnessed a slight decrease in RTAs rates and their consequences due to the COVID-19 pandemic. Although this increase is slight between the years under study, it remains interesting because its consequences are related to people's lives, livelihoods, and economic and social conditions. Unfortunately, it has become known that RTAs in Iraq cause more human losses than those caused by terrorist acts [3, 8]. Studies have addressed factors that may have played a role in the increase in RTAs. These include state policy-related causes, such as the absence of a clear strategy for managing traffic services; the large importation of various vehicles that are incompatible with Iraq's traffic infrastructure; the apparent laxity in enforcing traffic laws; the importation of used or low-cost vehicles that lack adequate safety standards; and

citizens' declining commitment to law enforcement due to a loss of trust in successive governments, regardless of their credibility [9, 10]. Traffic awareness has also declined due to the prevalence of a culture of violence resulting from years of political instability, wars of attrition, and extremist terrorism [9]. This is not to mention the rise of tribes and clans in managing citizens' affairs in most aspects of their lives, which has overshadowed the role of the state and the law [10]. Furthermore, a positive change has occurred in the economic system since the fall of the regime, with greater openness and increased per capita income, allowing Iraqi families to own at least one car [9, 11].

Returning to the previous results, it is worth noting that 2020 was the only year to witness a relative decline in RTAs rates and their consequences compared to other years, as the world was severely impacted by the COVID-19 pandemic. Lockdowns and curfews restricted the movement of individuals, transportation, travel, education, tourism, trade, and work. However, the rate of RTAs, despite the restrictions imposed by the curfew, showed a slight decline that does not match the strictness of the lockdown and its enforcement [8, 10, 12]. This result requires further investigation to determine the underlying reasons that have kept this problem at such a high level despite the global lockdown and travel ban.

In general, the data of this investigation recorded that the rates of RTIs are higher than the RTDs rates, according to data from both the IMH and the MoP. These results appear to be consistent with global statistics, as it is known that RTIs are often higher than RTDs because RTAs do not necessarily lead to death, especially if the RTA was caused by low speeds or the vehicle is equipped with safety devices [2]. Since adolescents and young people are the group most exposed to accidents, they have good physical capabilities that enable them to survive and bear the effects of accidents, which may take the form of disabilities or injuries. It is logical that this would result in a higher RTIs rate than a RTDs rate [13]. Other reason, there are RTAs resulting from simple friction that cause minor injuries such as wounds and fractures without leading to the death of road users (14). Also, vehicle safety technologies have increased the chances of survival and reduced the possibility of death, as non-fatal injuries are estimated at 20 to 50 million injuries annually [2].

Data of IMH on RTAs have long been inaccurate. The WHO [2] report noted that Iraq still lacks a unified system for recording accidents and their consequences, as well as a strategy to ensure road user safety. Official Iraqi data often relies on unconsolidated and unconnected institutions such as forensic medicine, hospitals, and the police. This creates a significant gap between official and actual data. The IMH carried out a comparative analysis of RTD rates in a few Iraqi governorates between 2010 and 2013. Therefore, data collection was limited to specific geographical areas of Iraq and therefore the data does not provide a true and comprehensive picture of RTAs and their consequences [15]. Leidman's study [5] found that the IMH reported 4,863 deaths in 2021. This number was higher than the total number recorded from 2010 to 2013, indicating administrative confusion, exaggeration, or a lack of documentation and registration. Another study, also based on IMH data, indicates that Baghdad recorded 10,959 RTAs in 2022, without indicating the type of accident or road type [16]. This confirms the randomness of the linking factors related to RTAs and the difficulty of tracking a specific pattern in the registration mechanism. Traditional registration methods cannot be relied upon to determine RTDs and RTIs rates without addressing the causes and consequences, or proposing strategic plans that might contribute to overcoming obstacles and providing alternatives. On the other hand, unqualified roads, speeding, lack of traffic supervision, and the absence of a unified national analysis prevent us from determining the true number of traffic accidents

and their consequences. There is no specific methodology that can serve as an official, irrefutable reference, and this is subject to many factors that affect the credibility and reliability of the data [10]. The rate of RTAs is also influenced by individual societal behavior, such as movement and mobility. This has been confirmed by some studies, while spatial distribution or infrastructure had no impact on the levels of decline or increase in the rate of RTAs. It has been noted that these factors do not receive attention in the recording and analysis of the IMH and MoP [8, 10]. A study addressed the health aspect and compared cases that received a systematic response from a trained ambulance team with others that did not receive a systematic response. It found that the death rate in RTAs (≥ 9 injuries) decreased from 44% to 8% upon the arrival of the trained team. This indicates that RTAs are almost non-existent when an unsystematic response arrives at the scene of an RTA [17].

The data of MoP did not reflect the traffic reality, whether it was RTAs or RTDs, and RTIs, because it relied on the number of RTAs without a precise spatial or temporal determination of the RTAs recorded, which increases the difficulty of conducting a detailed analysis or comparison [18]. The second reason is the lack of advanced technological capabilities and digital documentation. Police records and paper manuals are often relied upon, affecting the accuracy of recording. Studies have confirmed that police record RTAs that result in immediate death and accidents that end up in court [19]. The low number of academic reports, specialists, and researchers capable of analyzing traffic data, the dispersion of human resources across multiple sectors, and the lack of tools to organize the geographic information necessary to analyze RTAs by location and time have created a gap in the efficiency and quality of the statistical system [20]. It is believed that the decline in official registration of RTAs is due to political reasons such as sit-ins, demonstrations and terrorist attacks, and the decline in RTAs documentation is not necessarily due to an actual decline [19, 21]. Globally, Iraq is classified among the countries that do not publish their data as primary records that can be analyzed or downloaded by the public and researchers. The MoP also publishes annual reports without clarifying the recording methodology and without providing the raw data. The difficulty of accessing data for use in scientific studies is an indicator of weak partnerships with civil society, universities, and research institutions [18].

The statistical results of the relative and numerical differences in RTDs and RTIs rates clearly reveal fundamental discrepancies in documentation and recording, particularly by the IMH. This is a dangerous indicator that portends the collapse of traffic accident documentation systems and their outcomes. It also demonstrates the fragmentation and lack of coherence of documentation sources, and the absence of a unified methodology and strategy for archiving and recording data. This reflects the lack of seriousness and transparency on the part of official bodies in establishing a unified national system operating as a team, and sends unsettling messages to international organizations about the true traffic situation in Iraq.

CONCLUSIONS

Iraq's statistical system for RTAs is ununited and relies on undiversified and unrelated sources. There is a severe lack of effective monitoring of RTAs, and there are clear disparities in percentages. Consequently, official records do not reflect the true rates of RTAs, RTDs, and RTIs. Both IMH and MoP face real challenges, but the IHM's data often suffers from incomplete registration, especially in conflict-affected or rural areas, while the MoP data is often more consistent and organized. Addressing RTAs in Iraq requires institutional cooperation between the ministries of health (improving ambulance services), planning (infrastructure development), transportation (road safety), and police (law enforcement). Effective solutions include

implementing smart traffic systems, tightening controls, and raising community awareness.

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