

## Review on the Statuses of Road Safety in the Developing Countries: Case study of Middle East Countries

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**Abstract:** Road safety is considered an important issue by the World Health Organisation (WHO) and other global organisations which acknowledged the first steps towards reducing the annual road fatalities rate by applying global strategies. Despite the significant reduction in crash rate in the developed countries, the developing countries still has the majority of the reported road fatalities and injuries in the world. WHO has addressed the reasons behind this and some collaborated agencies started to conduct studies regarding the road safety issue in developing countries. This research will review the road safety management system in the developing countries. It will be focus on the regional scale of the problem, especially Middle East region. The results of the multi criteria analysis of the data collected from the countries profiles published by the WHO is presented. This analysis demonstrate that countries with unstable political and war condition have the worst road safety management system. This could be proved by the assessment of the crash rate which indicate that these countries have high rate of road fatalities. However, the High Income Countries in the middle East countries have unsuccessful and inactive strategic plan. This can be explained by the lacking of experience in road safety and lacking of collaboration with international agencies to imprive the level of road safety.

**Keywords:** Road Safety, Middle East countries, multi criteria analysis

### 1 INTRODUCTION

Traffic accidents rate is increasing yearly, especially in the low and middle-income countries (LMIC) as reported by the World Health Organisation (WHO) [1]. The latest WHO report shows that more than million people killed and about 20 to 50 million are injured yearly by traffic accidents [1, 2]. Therefore, a number of global organisations, such as WHO, World Bank and The United Nations Assembly have recognised and taken actions since 2004 and suggested interventions to improve the level of road safety in global, regional, and national scales as shown in Figure 1 [1-5]. More attention on the regional context has offered by WHO in their report [1-4] and gabs in the national road safety situations has been indicated in the Decade of Action for Road

Safety which proclaimed by the United Nations Assembly in 2010 and supported by WHO in 2013 [1,2]. Recently, the attention has increased adoption of the 2030 Agenda for Sustainable Development. In this agenda, The United Nations set a goal of reducing road traffic deaths and injuries by 50% by 2020 [5].

In this paper, a review of the level of road safety in the developing countries and the reasons behind the stable and declined level of road safety in the last current decade will be presented. It will be focused on the Middle East countries which their road safety situation will be evaluated using data reported in the country profile in the WHO global state report [1,3] and analysed using multi criteria analysis.

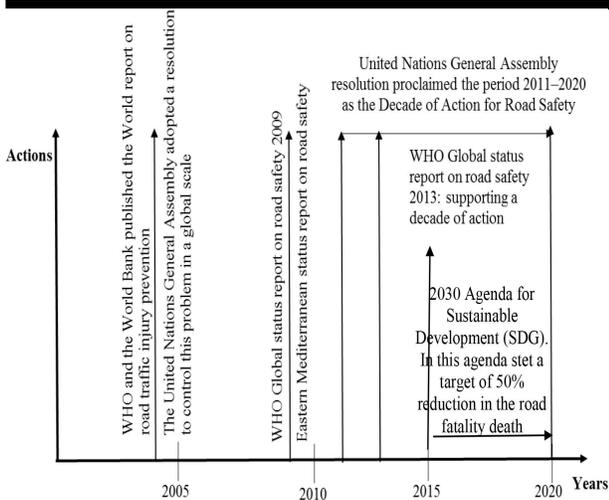


Figure 1: The Actions Taken by WHO, the World Bank and the United Nations from 2004 to 2013 [1-5]

The first part of this paper, an introduction showing the importance of the road risk problem in the global scale will be presented with the main aim of this research. Then, the classification of the world countries according to the regional and economic criteria will be shown. In the second part, the multi criteria analysis method will be used to analyse the data published in the WHO global state report for the Middle East Countries. The results of the analysis will be discussed then conclusion points will be drawn and recommendation to improve the level of road safety in the region will be presented in the last part

## 2 WORLD COUNTRIES CLASSIFICATION

According to the regional classification, WHO and the World Bank have different classification as shown in figures (2) and (3). Middle East countries in the World Bank classification are almost the same of the Eastern Mediterranean countries in WHO classification disclosing Afghanistan, Pakistan, and Somalia [6, 7].

According to the income level, World Bank has another classification which are used by WHO also, these are: low and middle-income countries (LMIC) and high-income countries. Middle East countries include the two classification of countries. The Low and Middle income countries are Iran, Iraq, Jordan, Lebanon, Syrian, Oman and Yemen. The High Income countries in the Middle East regions are: Bahrain, Israel, Kuwait, Qatar, Saudi Arabia, and The United Arab Emirates [6, 7].

For the requirements of the global Sustainable Development Goal (SDG) database. The world countries are grouped basing on the United Nations geographical divisions into developed and developing regions. The developing countries are sub-grouped into sub-regions as shown in Figure (4). The map in this figure shows that the Middle East countries are grouped into Western Asia, and some countries of Southern Asia, all of them are in the developing countries group [8].



Figure 2: WHO Classification of the World Countries [6]

Figure 3: The World Bank Classification of the World Countries [7]

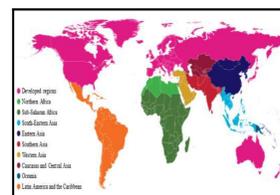


Figure 4: The United Nations Classification of the World Countries [8]

## 3 ROAD SAFETY SATUATION IN THE HIC AND LMIC

The reports published by WHO and other agencies and organisations interested in traffic safety issue have assess and evaluate the road safety in the world countries according to the regional and income level criteria. These reports show the difference in the road safety assessment and situation between Low and Middle Income countries (LMIC) and High Income Countries (HIC). Table 1 presents a summary of the difference in the road safety situation between these two countries groups. According to the consequences of actions taken by these countries, HIC produce a decline in the rate of traffic accidents while the LMIC produce increase in the rate of traffic fatalities [1,2,9,10].

Table 1 Road safety status in the HIC and LMIC Countries [1,2,9,10]

	HIC	LMIC
Traffic Fatalities	Less than 10% of the global rate per 100000 population	More than 90% of the global rate per 100000 population
Road users fatalities	4 wheeled vehicles	Vulnerable (pedestrians and 2 wheeled vehicles)
Historical crash and supporting data	Available	Not available
Action taken	Active/ inactive	inactive

However, these reports show also that not all HIC countries have active strategic plan and implemented intervention. HIC in the Middle East region, for example, has a rapid increase in the rate of traffic crashes due to the improvement in the income level within the last decades and the rapid expanding in the road construction projects which leads to increase the transport mobility, then decline the in the road safety level [1,2,9,10]. Therefore, it is required to consider the regional classification of world countries to address the factors of road risk each region.

#### 4 ROAD SAFETY SITUATION IN THE MIDDLE EAST COUNTRIES

The WHO presents in its Global states report on road safety [1,3] a profile for each member summarise the road safety state in terms of institutional framework, , legislation law and endorsement, reported data, road and vehicle standards, and the trend of traffic death. Tables 2 and 3 show a summary of the profiles of the Middle East Countries which classifies into LMIC and HIC. This table show that although some of the Middle East countries are HIC but they have a significant issue related to the national road safety plan funding, and setting of measurable targets such as Kuwait and Qatar in addition to the most of the remaining LMIC in the region. In Kuwait there also ineffective legislation low and enforcement for seat belts, children, and motorcyclist helmet laws. Motorcycle helmet law is not active in other Middle East countries due to the low percentage of these two wheeled vehicles used in the region. Child restraint law and enforcement is not apply in the region. Crash fatalities trend and data related to the road user groups are not available in most of the region countries.

For the requirement of data analysis, Multi criteria analysis method [11] is used in this paper to categorise the countries in terms of road risk management system requirements which can be represented by the total scores for each country. The

score is determined by setting 1 point for each positive factor. For example, availability of leading agency for road safety will gain 1 point and if it is funded nationally it will gain one point more. Tables 4 shows the scores computed for each criteria. The Total scores is shown in the last column of table 4. Figure 5 shows the categorising of the Middle East countries according to the total score. Each category is coded with individual colour.

#### 5 DISCUSSION

According to the results of the evaluation of road safety factors in the Middle East region, it could be reported that Yemen, Lebanon and Kuwait have the worst road safety system management among the Middle East countries. This may be resulted from the conflict and war condition in Lebanon and Yemen which leads to the weakness in the planning and implementation of national strategic plan [6]. Syria and Iraq also have the same political and bad security problem but the road safety management system there is better. However the other countries which have stable security situation are classified within poor performance. Said and Dipan show that the main reasons behind the low level of road safety situation some of HIC such as Kuwait, Oman and Saudi Arabia is the rapid motorization growth and road project expanding with poor design characteristics and vehicle regulations [10]. Othman et al reported that the fully funded national road safety strategies in HIC may be not successful in achieving the goal. For example, the strategy plan in the Saud Arabia resulted in increase the rate of road fatalities by 100% while such these strategies reduce the rate of traffic accidents by about 50% in France [12].

Previous studies prove that Iran has serious road safety problem because of the increase the rate of road fatalities [10]. However, the result of this research show that Iran has better requirements for road safety management system than others in the Middle East region.

Table 2 the Summary of the Country Profiles Presented By Who in the Global Status Report on Road Safety in terms of Institutional framework and National Legislation [1, 3]

Middle East Countries	Income classification	Institutional framework		National Legislation				
		Lead Agency /Funded in National Budget	National measurable strategy target/funded	Speed Limits set /Enforcement	Drink driving law /Enforcement	Motorcycle helmet /Enforcement law	Seat-belt law /Enforcement	Child restraints law/ Enforcement
Bahrain	Upper middle income	yes/yes	no/no	yes/not effective	yes/not effective	yes/effective	yes/not effective	no
Iran, Islamic Rep.	Lower middle income	yes/yes	no/no	yes/effective	yes/not effective	yes/effective	yes/highly effective	no
Iraq	Upper middle income	yes/no	no/no	yes/effective	yes/effective	no	yes/highly effective	no
Israel	High income	yes/yes	yes/yes	yes/effective	yes/effective	yes/highly effective	yes/highly effective	yes/effective
Jordan	Upper middle income	yes/no	no/no	yes/effective	yes/not effective	yes/not effective	yes/effective	no
Kuwait	High income	no/no	no/no	yes/effective	yes/highly effective	yes/not effective	yes/not effective	no
Lebanon	Upper middle income	no/no	no/no	yes/not effective	yes/not effective	yes/not effective	yes/not effective	no
Oman	Lower middle income	yes/yes	no/no	yes/effective	yes/effective	yes/highly effective	yes/highly effective	no
Qatar	High income	no/no	no/no	yes/effective	yes/effective	yes/effective	yes/effective	no
Saudi Arabia	High income	yes/yes	no/no	yes/effective	yes/effective	yes/not effective	yes/effective	yes/not effective
Syrian Arab Republic	Lower middle income	yes/no	no/no	yes/highly effective	yes/highly effective	yes/not effective	yes/highly effective	no
United Arab Emirates	Lower middle income	yes/yes	yes/yes	yes/effective	yes/effective	yes/highly effective	yes/effective	no
West Bank and Gaza	Lower middle income	yes/yes	yes/yes	yes/effective	yes/effective	yes/highly effective	yes/effective	no

Table 3 the Summary of the Country Profiles Presented By Who in the Global Status Report on Road Safety in terms of Data Availability, Deaths statistics, vehicle and road standards, and hospital care system [1, 3]

Middle East Countries	Income classification	Data availability		Deaths by road users group		trend in traffic deaths availability within the last two decades	Vehicle standards	Road safety audits	Promoting alternative transport public transport/ walking and cycling	Post-crash care pre-hospital care system/ national universal access number
		reported fatal/non-fatal crash data	registered vehicle4 wheeled/2 wheeled/ buses	4wheeled /2or 3wheeled %	Cyclists /pedestrians %					
Bahrain	Upper middle income	yes/yes	yes/yes/yes	59%/05%	7%/29%	yes	No car manufacturers	yes	yes/no	yes/yes
Iran, Islamic Rep.	Lower middle income	yes/yes	yes/yes/yes	45%/11%	0%/11%	no	yes	yes	yes/yes	yes/yes
Iraq	Upper middle income	no/no	yes/yes/yes	n/a	n/a	yes	No car manufacturers	no	yes/no	yes/yes
Israel	High income	yes/yes	yes/yes/yes	58%/9%	2%/9%	yes	No car manufacturers	yes	yes/no	yes/no
Jordan	Upper middle income	yes/yes	yes/yes/yes	75%/1%	n.a/25%	yes	No car manufacturers	no	yes/no	yes/yes
Kuwait	High income	yes/yes	yes/yes/yes	n/a	n/a	n/a	No car manufacturers	no	no/no	no
Lebanon	Upper middle income	yes/yes	n/a	n/a	n/a	n/a	No car manufacturers	no	no/no	no
Oman	Lower middle income	yes/yes	yes/yes/yes	n/a	n/a	yes	No car manufacturers	yes	no/no	yes/yes
Qatar	High income	yes/yes	n/a	44%/04%	all 27%	yes	No car manufacturers	yes	yes/no	yes/yes
Saudi Arabia	High income	yes/yes	n/a	n/a	n/a	n/a	yes	yes	yes/no	yes/yes
Syrian Arab Republic	Lower middle income	yes/yes	n/a	n/a	n/a	yes	yes	yes	yes/no	yes/yes
United Arab Emirates	Lower middle income	yes/yes	yes/yes/yes	70%/4%	no/28%	yes	No car manufacturers	yes	yes/yes	yes/yes
West Bank and Gaza	Lower middle income	yes/yes	yes/yes/yes	70%/4%	no/28%	yes	No car manufacturers	yes	yes/yes	yes/yes
Yemen, Rep.	Lower middle income	yes/yes	n/a	n/a	n/a	yes	No car manufacturers	no	no/no	yes/yes

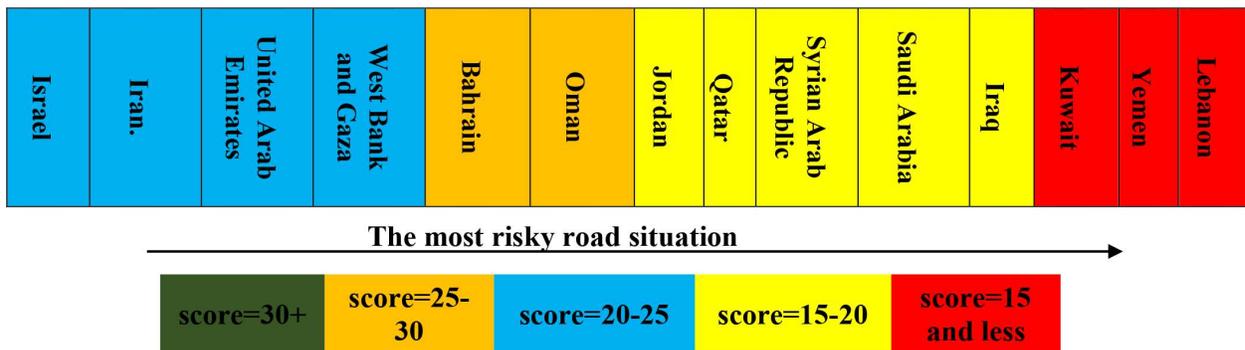
Table 4 the Summary of the multi criteria analysis

Middle East Countries	Lead Agency /Funded in National Budget	National measurable strategy	Speed Limits set	Drink driving law	Motorcycle helmet	Seat-belt law	Child restraints law	reported fatal/non-fatal crash data	registered vehicle4	4wheeled /2or 3wheeled %	Cyclists / pedestrians%	trend in traffic deaths availability	Road safety audits	Promoting alternative	Post-crash care pre-hospital	Total scores
Bahrain	2	0	1	1	2	1	0	2	3	2	2	1	1	1	2	21
Iran, Islamic Rep.	2	0	2	1	2	3	0	2	3	2	2	0	1	2	2	25
Iraq	1	0	2	2	0	3	0	0	3	0	0	1	0	1	2	15
Israel	2	1	2	2	3	3	2	2	3	2	2	1	1	1	1	28
Jordan	1	0	2	1	1	2	0	2	3	2	1	1	0	1	2	19
Kuwait	0	0	2	3	1	1	0	2	3	0	0	0	0	0	0	12
Lebanon	0	0	1	1	1	1	0	2	0	0	0	0	0	0	0	6
Oman	2	0	2	2	3	3	0	2	3	0	0	1	1	0	2	21
Qatar	0	0	2	2	2	2	0	2	0	2	2	1	1	1	2	19
Saudi Arabia	2	0	2	2	1	2	1	2	0	0	0	0	1	1	2	17
Syrian Arab Republic	1	0	3	3	1	3	0	2	0	0	0	1	1	1	2	19
United Arab Emirates	2	2	1	2	3	2	0	2	3	2	1	1	2	2	2	25
West Bank and Gaza	2	2	1	2	3	2	0	2	3	2	1	1	2	2	2	25
Yemen								2	0	0	0	1	0	0	2	7

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Figure 5: the final ranking of Middle Income countries according to the result of the Multi criteria analysis



**6 CONCLUSION**

In this paper, a review of the road safety situation in the Middle East countries is presented. The paper depends on the regional and income classification by WHO and the World Bank which indicate that Middle East countries could be categorized into low

and Middle Income and High Income countries. This region is considered developing region according to the United Nation classification.

The Middle East countries have serious road safety problem. In this paper, an evaluation of the requirements for successful road safety management

and strategic plan have been conducted using data extracted from the countries profiles in the WHO reports. The results of the data analysis by Multi criteria analysis show that the countries with unstable security and conflict condition have worst requirements. However other countries with stable condition and full funded strategic plan have poor road safety performance. The reasons behind this are lacking of experience in such these plans and inactive and the rapid motorization increase which leads to more road built and more transport mobility negative consequences [13].

Iran has serious issue related to the rate of roads fatalities but the results of this paper show high score in compare with the other countries. This indicate that this analysis needs to be validate using real crash rate details which can be found in the developed countries studies. Strong collaboration with international agencies especially with whom have successful management system.

Multi Criteria analysis method could be used in setting a measurable target of strategic plan. To improve the level of road safety in the devolving countries, it is essential to take lessons from the developed countries which have successful and active plan. Deferent sectors might be involved to control the increasing in road accidents rate such as health, education, police, and transportation sector. Road engineer has active role by design road to standards of high road safety level which could be setting using quantifying values.

Developing a road data collection system may help in conduct more studies in road safety and address specific factors for different regions and income level.

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