

# Applying the five-pillar matrix to the decade of action for road safety in Qatar: identifying gaps and priorities

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► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/tsaco-2018-000233>).

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Received 5 September 2018

Accepted 22 October 2018

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**To cite:** Consunji R, Mekkodathil A, Abeid A, et al. *Trauma Surg Acute Care Open* 2018;**0**:e000233.

## ABSTRACT

**Introduction** Road traffic injuries (RTIs) are the leading cause of preventable death in Qatar; consequently, the country has participated in the Decade of Action for Road Safety (DoARS) coordinated by the United Nations Road Safety Collaboration (UNRSC). Its goal is to reduce the number of road traffic deaths and injuries by 50% by 2020, by implementing road safety activities, in the areas of road safety management, safer roads, safer vehicles, safer road users and postcrash response, the five pillars. This study will evaluate the initiatives and programs implemented in Qatar, during the initial period of the DoARS.

**Methods** A retrospective process evaluation of the compliance of national road safety activities in Qatar, with global indicators for the DoARS set by the UNRSC was conducted. A web-based online and electronic media search, in both official languages of Qatar: Arabic and English, for data and information on completed or ongoing road safety initiatives and activities implemented in Qatar, from January 1, 2011 to December 31, 2016, was supplemented by personal consultation with relevant stakeholders in the road safety field.

**Results** There was complete compliance for Pillars 1 (Road Safety Management) and 2 (Safer Roads), whereas Pillars 4 (Safer Road Users) and 5 (Postcrash Response) met most of the DoARS indicators, and Pillar 3 (Safer Vehicles) complied with none.

**Conclusion** Qatar must continue to implement its present road safety activities within the Action Plan for the DoARS to achieve its goals by 2020. It must, however, implement more new efforts to require safer vehicles and make road users safer, especially those at the highest risk, that is, young drivers, occupants and workers.

**Level of Evidence** Level IV.

## INTRODUCTION

Road injury is a recognized global public health problem. According to Global Burden of Disease estimates, there were 1.40 million global deaths from road traffic crashes in 2013, a 32% increase from 1990.<sup>1</sup> In response, The United Nations General Assembly Resolution 64/255 of March 2010 declared 2011–2020 the Decade of Action for Global Road Safety (DoARS).<sup>2</sup> The goal of the DoARS is to stabilize and subsequently reduce the forecasted number of global road traffic deaths by increasing activities at national, regional and global

levels. These activities are described in a Global Plan for the Decade, prepared by the WHO and the UN Regional Commissions, in cooperation with the United Nations Road Safety Collaboration (UNRSC) and other stakeholders and officially launched on May 11, 2011. This plan enumerates prevention activities to be conducted and the UNRSC has promoted its implementation in each member country of the United Nations.<sup>2</sup>

Road traffic injuries (RTIs) were identified as the leading cause of preventable mortality in Qatar in 2010, disproportionately affecting young males and causing more deaths than ischemic heart disease and cancer.<sup>3,4</sup> In 2011, the country opted to participate in the DoARS coordinated by the UNRSC.<sup>4,5</sup>

The DoARS goal is to reduce the number of road traffic deaths and injuries by 50% by 2020, by implementing activities, in the areas of road safety management, safer roads, safer vehicles, safer road users and postcrash, the five pillars.<sup>2</sup>

In Qatar, the toll from road traffic injuries has been reported to be decreasing, since their peak in 2006, but there are still high-risk groups that have not been adequately reached, like young drivers, workers and pedestrians.<sup>6–10</sup> Likewise, an inventory and evaluation of road safety interventions has not been objectively performed.

Based on official government figures, there has been a 13% reduction in the number of road deaths but a 43% drop in road death rates, per 100 000 population, from 2011 to 2016.<sup>11</sup> Other than using these outcome measures, a tool to analyze and evaluate the progress and process of DoARS has not been applied in Qatar. The objective of this study will be to apply a process evaluation tool to the road safety sector in Qatar and make recommendations for future priority activities in the remaining years of the DoARS.

## METHODS

This is a retrospective process evaluation of the compliance of national road safety activities in Qatar, with global indicators for the DoARS set by the UNRSC.<sup>2</sup> A web-based online and electronic media search, conducted in both official languages of Qatar: Arabic and English, for data and information on completed or ongoing road safety initiatives and activities implemented in Qatar, from January 1, 2011 to December 31, 2016, was conducted.

This search was supplemented by personal communications with key stakeholders and officials,

**Table 1** Five pillars Decade of Action for Global Road Safety (DoARS) matrix (abridged),<sup>2</sup> 2011–2016, Qatar

Activity	Pillar 1: Road safety management (6/6)	Pillar 2: Safer roads and mobility (5/5)	Pillar 3: Safer vehicles (0/7)	Pillar 4: Safer road users (5/8)	Pillar 5: Postcrash response (6/7)
1	<b>Adhere to and/or fully implement the major UN road safety related agreements and conventions<sup>10</sup></b>	<b>Promote road safety ownership and accountability<sup>10 13 16 18</sup></b>	<i>Apply UN motor vehicle safety regulations</i>	<b>Road safety awareness and social marketing campaigns<sup>22–24</sup></b>	<b>Develop prehospital care systems<sup>31</sup></b>
2	<b>Establish a lead agency<sup>12 13</sup></b>	<b>Promoting the needs of all road users<sup>16 18</sup></b>	<i>Use new car assessment programme</i>	<b>Speed limits and rules<sup>25 26</sup></b>	<b>Develop hospital trauma care systems<sup>32 33</sup></b>
3	<b>Develop a national strategy<sup>10 14</sup></b>	<b>Safe operation, maintenance and improvement of existing road infrastructure<sup>10 16 18</sup></b>	<i>New motor vehicles are equipped with seat belts and anchorages</i>	<b>Drink-driving laws and evidence-based standards and rules<sup>27 28</sup></b>	<b>Provide early rehabilitation and support to injured patients<sup>34</sup></b>
4	<b>Set realistic and long-term targets based on national traffic crash data<sup>10 15</sup></b>	<b>Promote the development of safe new infrastructure<sup>16 18</sup></b>	<i>Universal deployment of Electronic Stability Control and Anti-Lock Braking Systems</i>	<b>Standards and rules for motorcycle helmets<sup>29</sup></b>	<b>Establishment of appropriate road user insurance schemes<sup>28</sup></b>
5	<b>Ensure that funding is sufficient for activities<sup>10 16</sup></b>	<b>Encourage capacity building and knowledge transfer<sup>19 20</sup></b>	<i>Incentivize motor vehicles that provide high levels of road user protection</i>	<i>Standards and rules for seat belts and child restraints to reduce crash injuries.</i>	<b>Crash investigation and an effective legal response to road deaths and injuries<sup>35 36</sup></b>
6	<b>Establish and support data systems<sup>15 17</sup></b>	<b>Encourage research and development in safer roads and mobility<sup>19 21</sup></b>	<i>Pedestrian protection regulations and safety technologies</i>	<b>Standards and rules for commercial freight and transport vehicles, and other public and private vehicle fleets<sup>30</sup></b>	<i>Encouragement and incentives for employers to hire and retain people with disabilities.</i>
7			<i>Fleets with vehicles that offer advanced safety technologies and high levels of occupant protection.</i>	<i>Policies and practices to reduce work-related road traffic injuries in the public, private and informal sectors</i>	<b>Encourage research and development into improving postcrash response<sup>37</sup></b>
8				<i>Establishment of Graduated Driver Licensing systems for novice drivers.</i>	
<b>DoARS compliance</b>	100%	100%	0%	62%	86%

Traffic Department, Ministry of Interior, National Traffic Safety Committee, Ministry of Public Works, Ministry of Public Health and Hamad Medical Corporation. Non-compliance with indicators is shown in italics. Compliance with indicators is shown in boldface.

representing the academic (Qatar University, Weill Cornell College of Medicine, Northwestern University), governmental (Hamad Medical Corporation, Traffic Department-Ministry of Interior, Ministry of Public Health, National Traffic Safety Committee (NTSC), Public Works Authority) and non-governmental sectors (Kulluna—National Health and Safety Campaign, community organizations) involved in road safety.

All national road safety programs, policies and laws that were implemented in conjunction with the DoARS and within the study period were identified. These were then encoded and classified according to a five-pillar matrix, based on the DoARS Action Plan.<sup>2</sup>

The primary outcome measure was the existence of road safety activities that could be classified within the DoARS recommendations, demonstrated by the presence of programs or activities that were classified under the ‘Pillar’ column heading and/or the specific ‘Activity’ data cell row/s. A ‘percent compliance’ measure was computed and used to categorize the degree of completion or compliance for each of the five DoARS pillars.

This study was registered with the Hamad Medical Corporation Medical Research Center. This secondary data analysis using publicly accessible information from official government and non-governmental agencies did not require institutional review board approval.

## RESULTS

The results of the classification of all identified national road safety activities and programs for the DoARS in Qatar are shown

in table 1.<sup>10 12–37</sup> The cells in boldface have been identified as having activities that fall within the Pillar heading of the column and were started before or during the study period. Table 1 is an abridged evaluation matrix; for a more detailed description of the findings that includes DoARS subactivities and core indicators, please refer to the online supplementary appendix 1.

Pillar 1 (road safety management) had a 100% DoARS activity compliance rate. Qatar was a signatory of major UN road safety agreements, had an established NTSC that had crafted a national road safety strategy that set realistic targets based on national data systems with adequate funding for all data gathering activities.<sup>10 12–17</sup>

Pillar 2 (safer roads and mobility) had a 100% DoARS activity compliance rate. Under the leadership of the NTSC and the Traffic Department of the Ministry of Interior have consistently worked on ownership of road safety as a national priority although promoting the needs of all road users, they have collaborated and worked with the Public Works Authority to improve the safety of their road work sites although they upgrade existent road infrastructure. The national university, Qatar University and the National Priorities Research Program of the Qatar Foundation have existent activities that encourage capacity building and encourage research in safer roads and mobility in Qatar.<sup>10 13 16 18–21</sup>

Pillar 3 (safer vehicles) had a 0% DoARS activity compliance rate. There was no evidence found or information that demonstrated activities under this classification were ongoing or had started during the study period.

Pillar 4 (safer road users) had a 62.5% DoARS activity compliance rate. There was clear evidence of activities that increased road safety awareness through social marketing campaigns, more stringent speed limits were implemented and enforced, drink driving laws, standards for motorcycle helmets and for vehicle fleets have also been in place during the study period.<sup>22–30</sup> There was no evidence found or information that demonstrated activities to set standards for seat belts or child restraints, reduce work-related road traffic injuries or establish graduated driver licensing systems were ongoing or had started during the study period.

Pillar 5 (postcrash response) had an 85.7% DoARS activity compliance rate. There was clear evidence that showed the development of prehospital, trauma and rehabilitation care for road traffic injuries, an established road user insurance scheme, crash investigation and legal response and support for research that improves the postcrash response.<sup>28 31–37</sup> There was no evidence found or information that demonstrated activities to incentivize employers to hire people with disabilities, but the Qatari law requires that 2% of all jobs in government agencies and public institutions be set aside for disabled persons. Private businesses employing a minimum of 25 staff are also required to hire persons with disabilities.<sup>38 39</sup>

## DISCUSSION

This interim process evaluation of the implementation of the safe systems approach (five-pillars framework) to reducing the toll of road deaths during the DoARS has clearly identified Pillar 3 (safer vehicles) as the priority pillar in need of new activities and policies in Qatar. The paucity of evidence showing any focused activities that improve vehicle safety highlights the need for this to be a priority for future road safety efforts. Pillars 1 (road safety management) and 2 (safer roads and mobility) have demonstrated full compliance with UNRSC and WHO recommended activities for DoARS. Although there are still more activities needed to fully comply with those for safer road users and postcrash response, these two pillars have documented contributions to the decreased death toll from road traffic injuries in Qatar.<sup>6</sup>

This study makes use of a systematic search of national and electronically accessible databases and a strong national stakeholder network of road safety stakeholders from a diversity of disciplines and institutions to identify and classify the road safety programs and activities that were previously existent or were implemented during the initial period of DoARS in Qatar from 2011 to 2016. To our knowledge, there are no other national process evaluations of DoARS activities that have been published.

A dichotomous indicator tool for compliance with UNRSC DoARS recommendation may lack the nuance and sophistication of more complex process evaluation tools but, in contrast to the very blunt measure ‘number of road deaths’, it serves the more pragmatic purpose of identifying gaps in present activities and directions for future ones.

An analysis of global trends in road traffic mortality since 2010 reported modest reductions (–1.43% to –0.99%) in global age-adjusted mortality from RTIs. It was limited by the availability and quality of the global estimates as well as the disparities between developed and low-income and middle-income countries.<sup>40</sup> A focused assessment of the traffic fatality reporting capacity in the Eastern Mediterranean region reported that reporting problems could easily undermine the evaluation of any future preventive efforts, specifically the DoARS.<sup>41</sup>

Neither of these limitations affected this study because measures of compliance with DoARS were not reliant on the quality and availability of road death data. The relatively small number of significant stakeholders and the limited geographic distribution of their locations, in governmental and non-governmental agencies, were factors that contributed to the ability to conduct consultations and meetings.

There are a number of national evaluations of road mortality during the initial years of the DoARS but none have addressed compliance with the UNRSC DoARS Action Plan as an indicator for evaluation.

Mexico has two recent evaluations of the DoARS half-decade to date. Cervantes-Trejo *et al* reported significant progress towards the goal of a 50% reduction in RTI deaths within the first 3 years of the DoARS. They pointed to the lack of a national road safety agency as a key gap in the implementation of the DoARS plan of action but cite the national drink driving program as contributory to reductions in road deaths of young males. They reported that issues with aggregating data from all road user types and geographical variations due to differences in economic and road infrastructure were also contributory to national trends seen.<sup>42</sup> An outcome evaluation published using projections and statistical models that cite uneven improvements in death rates, dependent on the states in question and the road user type within the DoARS. They recommended not using aggregate road death rates; more so with future efforts focused on the more vulnerable road user groups, that is, motorcyclists and pedestrians.<sup>43</sup>

In Uganda, a systematic review of a 5-year trend for RTIs, within the time frame of the first half of DoARS, reported that ‘more needs to be done to promote the road safety education and awareness, fixing affordable trauma care centers and putting in place a national traffic crash database system if we are to attain the five pillars enshrined in the United Nations Decade of Action for Road Safety’.<sup>44</sup> An evaluation of the postcrash care system identified that factors that affect the prehospital emergency care for victims of RTIs basically emanate from the absence of predefined and organized EMS systems in Uganda.<sup>45</sup>

The national road safety agency (NTSC) has made great strides in reducing the toll from road traffic injuries in Qatar. Despite a 40% increase in total population from 2011 to 2016, there has been a 13% reduction in the number of road deaths and a 43% decrease in the road death rate, per 100 000 population. There were more RTIs, by 14.3 %, but their incidence rate dropped by 25.1%. A reduction in the number and rate of prehospital deaths were the highest among all indicators analyzed. And the number of in-hospital deaths also decreased during the study period. This has been achieved through the vigorous implementation of a national road safety action plan that was based on the ‘Safe Systems’ framework set by the UNRSC and guided by the five-pillars approach of the DoARS. The full compliance with Pillars 1 and 2 and near complete compliance with Pillars 4 and 5 are process indicators that have been contributory to the improvements in road safety seen in Qatar. Conversely, the identified gaps or non-compliant pillars must be the focus of future efforts during the remaining years of the DoARS.

The identification of Pillar 3, safer vehicles, as a gap in the implementation of the DoARS Action Plan in Qatar has important local implications. In Qatar, more than 40% of RTIs occur in the context of rollover crashes with 33% of these being ejected from the vehicle.<sup>46</sup> Many of these rollover crashes and more of the attendant injuries could be prevented through the universal deployment of improved vehicle safety technologies, that is, Electronic Stability Control (ESC), for both passive

and active safety through a combination of harmonization of relevant global standards, consumer information schemes and incentives to accelerate the uptake of new technologies.<sup>47</sup> Full compliance with the four core indicators for Pillar 3 (see online supplementary appendix 1), should be a goal for the remaining years of the DoARS. These four indicators include application of motor vehicle safety regulations developed by United Nation; participate in 'New Car Assessment Program'; laws prohibiting use of vehicles without front and rear seat belts and enacting laws on prohibiting manufacturing or importing of vehicles without ESC feature (online supplementary appendix 1).

Identifying priority goals and targets that are easily achievable and will not require extensive work, among the pending indicators for Pillars 4 and 5 should be the next step. Given the acknowledged disproportionate risk borne by young drivers in Qatar,<sup>6, 8</sup> strong consideration for the establishment of Graduated Driver Licensing systems for novice drivers should be prioritized.

One in five RTIs in Qatar is classified as work related.<sup>48</sup> To reduce the number of workers injured or dying on the roads, activities to research, develop and promote comprehensive policies and practices to reduce work-related road traffic injuries in the public, private and informal sectors must be included in the priority list.

Qatar is one of the countries in the Eastern Mediterranean that does not have a comprehensive child passenger restraint law<sup>49</sup> but child restraint systems (CRS) are available and all found in a market survey were Economic Commission for Europe (ECE) certified.<sup>50</sup> To further improve the safety of road users (Pillar 4), future considerations must be made to implement standards and rules for seat belts and child restraints, as recommended activities in the DoARS plan.

The compliance percent was 86% in Pillar 5 (postcrash response) leaving one out of seven activities unaddressed in Qatar, that is, encouraging employers to hire and retain people with disabilities after injuries. There are many programs to enhance the skills and job skills of disabled persons in Qatar but there are no activities targeted at providing incentives for employers to hire them.

A discussion of whether these recommended activities are proven to reduce road deaths and disabilities is beyond the scope of this paper but we agree with Della Rocca *et al* who, on reviewing the UNRSC DoARS recommended activities stated that 'substantial research has provided practical evidence regarding the interventions that can improve road traffic safety across all of these 'pillars', but substantial further work remains to be performed.<sup>51</sup>

More specifically, evaluations of globally 'proven' road safety interventions must be applied and evaluated in economically, geographically and culturally diverse environments. This is the evidence needed to disseminate and sustain best practices for road safety on a global scale.

## CONCLUSION

To build on the initial gains of DoARS, Qatar must go beyond activities and programs that are already existent. This study has shown great compliance with the DoARS Action Plan, specifically in road safety management, safer roads, safer road users and the postcrash response. It must focus on future efforts to require safer vehicles and make road users safer, through new vehicle technologies and interventions proven to work for identified high-risk populations.

**Contributors** RC made substantial contributions to design, data collection, data analysis and interpretation and was the main author involved in drafting and finalising the manuscript. AM was involved in data collection, analysis and interpretation. TS was involved in data collection and analysis. AEM and AA contributed to data analysis and its interpretation. AEM, A-TH and RP were involved in drafting the article. AM, AA, AEM, HAT, TS and RP were involved in revising the manuscript critically and have given final approval of the version to be published.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** According to the Institutional Review Board, the study was not subject to the Medical Research Involving Human Subjects Act and therefore the necessity of informed consent was waived.

**Provenance and peer review** Not commissioned; internally peer reviewed.

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