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Item 11 of the provisional agenda

**Improving road safety by using alternative measures**

**Submitted by Italy and Sweden**

This document argues that to demonstrate the full burden of road traffic injuries on individual lives, a focus shift is needed from premature deaths to injuries that cause disability with long-term consequences. The suggested approach, when implemented, would be more compliant and closer to the spirit of Agenda 2030.

## WP.1 guidance for Improving Road Safety by use of alternative measures showing the long term burden of road traffic injuries on global public health

1. Worldwide, injuries represent one of the leading causes of mortality, and nearly one-quarter of all injuries are road traffic related. Road traffic accidents also account for considerable socioeconomic costs in terms of medical expenses and lost production, Agenda 2030, an adopted resolution from 2020 UN General Assembly, proclaims a new goal of reducing fatalities and injuries by at least 50% between 2021–2030<sup>1</sup>.

2. Long time ago, road traffic-related crashes and injuries was often neglected as a public health concern as they were seen as random, unpreventable events. However, during the past few decades, injuries in general have been recognised as preventable and a public health approach<sup>2</sup> are often used to prevent them<sup>3</sup>. The first step in approaching injuries as a public health concern is to determine the scope and the characteristics of the problem traditionally, the scope of injuries has been described as the number of mortalities due to injuries. A problem from a global public health perspective with this is that mortality do not show the full consequences on health caused by road traffic injuries (RTIs). In order to come closer to showing the long-term burden of road traffic injuries, other disease, trauma and health measures need to be used in addition to mortality. This will enable to better determine the scope and characteristics of the problem and by this identify related risk and protective factors, later develop and test new prevention strategies and later assure widespread adoptions

3. The most common method for describing and diagnosing injuries and diseases is the International Classification of Disease. ICD4 but to classify the trauma, the Abbreviated Injury Scale, AIS, is most often used<sup>5</sup>. The AIS grades both the severity of the injury (1-6 where 1 is a mild injury and 6 is untreatable) but also where the injury is located on the human body. There are also variants of AIS, e.g. Maximum Abbreviated Injury Scale (MAIS) where MAIS is the injured person's highest AIS and Injury Severity Score (ISS) which was developed to estimate the total degree of severity on an individual level. The injury severity score (ISS) is calculated based on the type and location of the injuries and according to the abbreviated injury scale (AIS). ISS is calculated by squaring the three highest AIS values and then adding the sum, which gives a value between 1-75. A guideline is that ISS=40 give a 50-percentage risk of mortality at, the risk of mortality then increase rapidly by higher ISS.

4. As most individuals survive an accident, the aspect of long-term consequences and how these affect the individual's health and quality of life are important to consider when defining the problem. For this purpose, several measures and tools as International Classification of Functioning and Disease (ICF)<sup>6</sup>, Functional Capacity Index (FCI)<sup>7</sup>, Disability- and Quality Adjusted Life Years (DALY or QALYS), permanent medical impairment (PMI<sup>8</sup>), time at hospital, time to recover to go back to work, etc. are available.

<sup>1</sup> UN. (2020a, August 25). Improving global road safety | General Assembly of the United Nations. <https://www.un.org/pga/74/2020/08/25/draft-resolution-entitledimproving-global-road-safety/>.

<sup>2</sup> 1) define the problem, 2) identify risk and protective factors, 3) develop and test prevention strategies and 4) assure wide spread adoptions

<sup>3</sup> WHO. Injuries and violence: the facts 2014. 2014. <http://www.who.int/>

<sup>4</sup> WHO, World Health Organization (1993). International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10). Geneva, Switzerland

<sup>5</sup> AAAM (2005). Abbreviated Injury Scale 2005, Association for the Advancement of Automotive Medicine: Barrington, IL, USA, 2005.

<sup>6</sup> WHO, World Health Organization (2001). International Classification of Functioning, Disability and Health: ICF. Geneva, Switzerland.

<sup>7</sup> MacKenzie, E. J., Damiano, A., Miller, T., & Luchter, S. (1996). The development of the Functional Capacity Index. *J Trauma*, 41(5), 799-807

<sup>8</sup> Berg, H. Y., Ifver, J., & Hasselberg, M. (2016). Public health consequences of road traffic injuries – Estimation of seriously injured persons based on risk for permanent medical impairment.

Transportation research. Part F, Traffic psychology and behaviour, 38, 1-6. <https://doi:10.1016/j.trf.2015.12.007>

5. The consequences of non-fatal injuries can also reach beyond only the physical aspect of the injury and include psychosocial consequences following the injury as loss of quality of life, Post Traumatic Stress Syndrome (PTSD) etc.

6. The figures below show a new perspective but also three possible approaches on how to define the “problem”. Figure 1 and 2 are from a Swedish study by Amin et al. 2022<sup>9</sup>. Amin et al have studied injuries in the road transport environment and also included pedestrian single injuries which they name “pedestrian fall”, these injuries are not formal road traffic injuries as there is no moving vehicle involved but is now recognized as a very large problem in Sweden (and must be so in other countries as well). The result of the study show the number of fatalities and injured (in a database named STRADA) (figure 1 – no pedestrian fall included) and also the proportion of PMI>1% or >10%, MAIS 2+ and 3+ and ISS>1 by road user category figure 2 when introducing the number of “pedestrian fall” injuries. The study data includes road users who died or were injured with at least one injury classified as AIS 1 (minor) or higher between 2010-2019 in Sweden. If analysing the numbers in figure 1, one conclusion from a mortality perspective will be that car occupants are the major problem in Sweden (with pedestrians as number two and motorcyclists as number three). If defining the problem from an injury perspective (AIS 1 or higher) it is still car occupants who is the largest group but with pedestrians and bicyclists as two other large injury groups. It is also important to notice how much difference it is in number of injured persons when comparing data from two data sources (police reported and hospital reported injured persons).

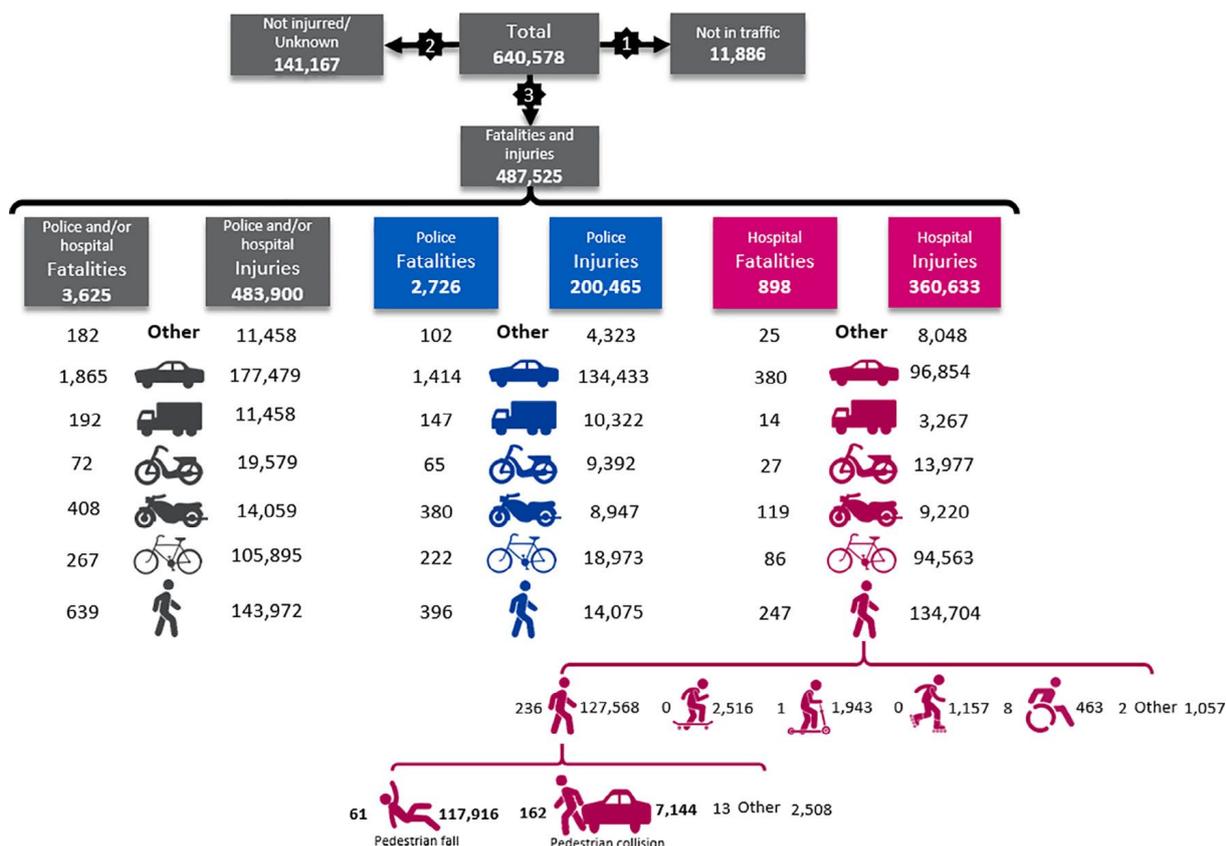


Fig. 1. Number of fatalities and injured by road user category, 2010–2019, STRADA (no pedestrian fall included).

7. However figure 2 from the Amin et al study also show a totally another picture when introducing the number of “pedestrian fall” injured and degree of the injuries are calculated in to long term consequences as PMI>1% or >10% or when severity MAIS 2+ and 3+ and ISS>1 are used. It is then obvious that “pedestrian fall”, “pedestrian collision” and “cyclist”,

<sup>9</sup> Amin, K., Skyving, M., Bonander, C., Krafft, M., & Nilson, F. (2022). Fall- and collision-related injuries among pedestrians in road traffic environment - A Swedish national register-based study. Journal of Safety Research. Volume 81, June 2022, PP. 153-165. <https://doi:10.1016/j.jsr.2022.02.007>

in other words, the most vulnerable road users (VRU) are the main road safety problem in Sweden.

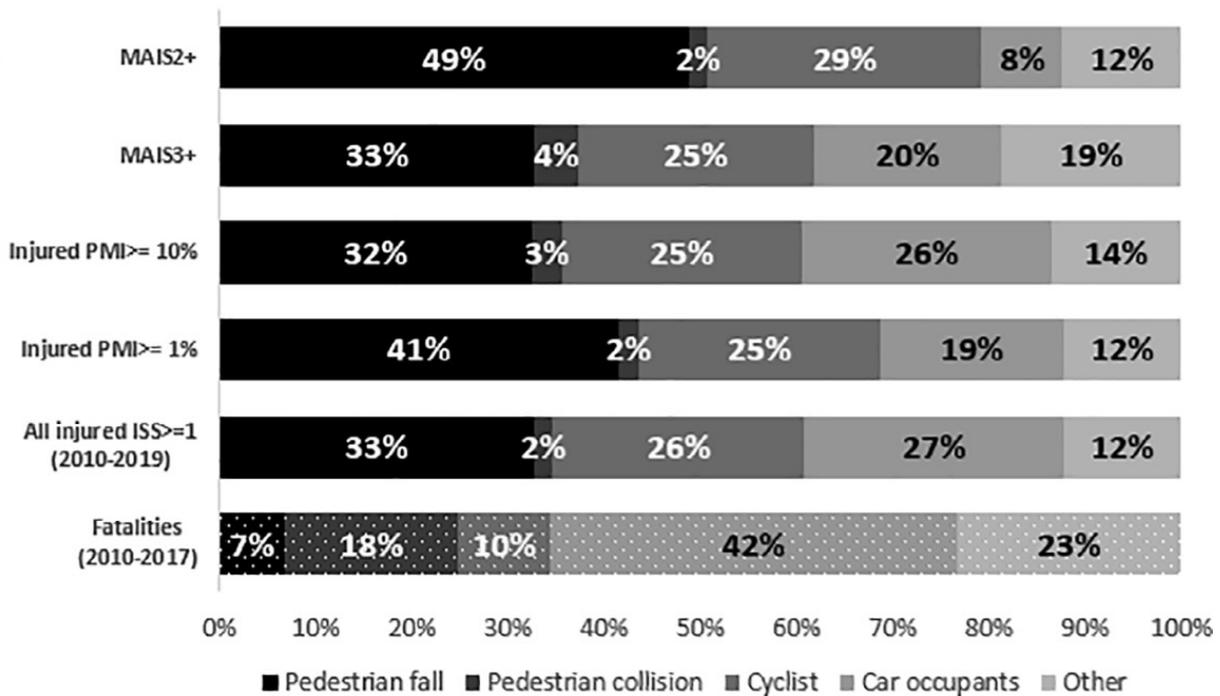
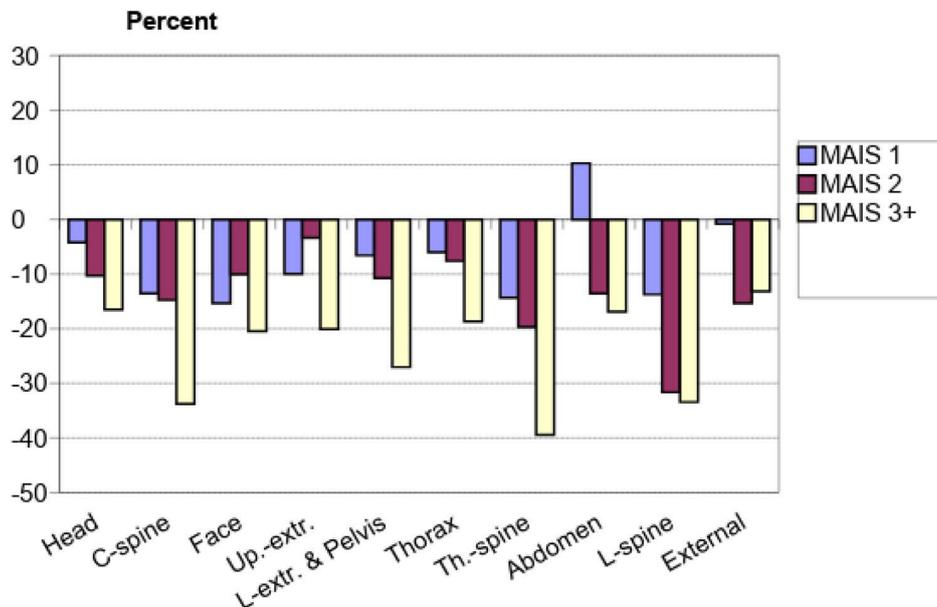


Figure 2. Proportion of injured (2010–2019) by degree of injuries and road users category.

8. The impact of road traffic injuries on long-term life consequences can also be described by using DALY<sup>10</sup>, QALY<sup>11</sup>, Health Related Quality of Life (HRQoL) etc. Figure 3 and 4 shows an example of loss of HRQoL following from a road traffic injury (RTI) by a variety of different injured body parts, severity (MAIS) of the injury and gender compared with a sample of non-injured referent individuals<sup>12</sup>.



<sup>10</sup> <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/158>

<sup>11</sup> [https://en.wikipedia.org/wiki/Quality-adjusted\\_life\\_year](https://en.wikipedia.org/wiki/Quality-adjusted_life_year)

<sup>12</sup> Rissanen R, Ifver J, Hasselberg M and Berg H-Y (2020). Quality of life following road traffic injury: the impact of age and gender. Quality of Life Research. <https://doi.org/10.1007/s11136-020-02427-3>

Figure 3. Percentual difference in HRQoL, divided by MAIS and injured body part for females compared to a reference group, represented by 0%

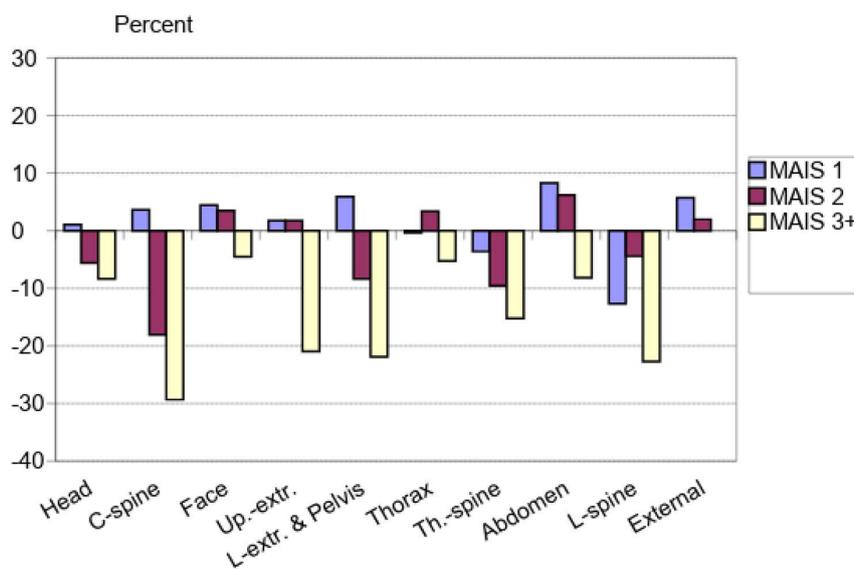


Figure 4. Percentual difference in HRQoL, divided by MAIS and injured body part for *males* compared to the reference group, represented by 0%

9. The results show that even relatively minor road traffic injuries can lead to a significantly lower of HRQoL, especially for women, compared to the non-injured reference group. Moreover, when the inherent reduction of HRQoL over age was considered, the results indicated that younger individuals have a larger difference from the reference group in HRQoL, independent of the injury severity, compared to the older individuals

## Conclusion and suggestion

10. As written above, the immediate outcome of a road traffic injury might differ from the long-term outcomes and use of data source is important to consider (eg. police vs. hospital). To be able to understand the burden of injuries it is important to define the problem, to have as good data as possible and to use a measure(s) that captures aspects of long-term consequences following an injury. For policy making and regulation it is essential to pay attention to the fact that negative consequences of RTIs can be long-term and can arise even for apparently minor non-fatal injurious events (if a measure is used that can give this information). In terms of the actual health impact of RTIs, it is important to produce, complement, or improve the available measures by moving from the concept of trauma severity to that of life consequences in an attempt to prevent all health losses (a true “vision zero”) and by this more accurate picture of the actual health losses resulting from traffic injuries than today.

11. Many countries vision today are to achieve a society without health losses from road traffic injuries. The goal is usually that no one should be killed or seriously injured as a result of a traffic accident. In Agenda 2030 health is also increased as a central goal, which includes better traffic safety incorporated in the societal development as a natural part of achieving a future transport system without health losses. However, as mortality and the direct severity on humans still is the main definition of a consequence of road traffic injuries in many countries the full burden of road traffic injuries are not able to be assessed and used as input to a preventive work. For being able to show the full burden of RTIs on individual lives a focus shift is needed from premature deaths to injuries causing disability with long-term consequences. The suggested approach would be therefore more compliant and closer to the spirit of Agenda 2030, and to the transformational role of safe mobility would have once implemented across the globe.

12. WP1 is invited to discuss this proposed changed of perspective, as well as further elaborate with the authors alternative measures and related policies showing the long-term burden of road traffic injuries as contribution to the global public health analysis.

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