

## Commentary

## Enhancing Injury Prevention and Control in China: Establishment of Evidence System

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Injuries, alongside communicable and chronic non-communicable diseases, represent significant public health challenges impacting global population health (1). The World Health Organization (WHO) reports that in 2019, approximately 4.4 million deaths were attributed to unintentional injuries and violence, constituting 8% of all deaths worldwide (2–3). Moreover, each year, countless individuals suffer from non-fatal injuries. The Global Burden of Disease Study 2019 (GBD 2019) highlights this concern, revealing an injury-specific standardized mortality rate of 54.65 per 100,000 and injury-specific standardized disability-adjusted life years (DALYs) of 3168.70 per 100,000. The economic impact of injuries is profound, costing billions of dollars annually in healthcare, lost productivity, and law enforcement across various nations. Particularly in China, a rapidly developing country, injuries pose a significant health threat. In 2021, China's injury mortality rate stood at 46.90 per 100,000, representing 6.61% of total deaths. Notably, the rate of injury mortality was higher among males and in rural areas. Unsettlingly, injuries have become the leading cause of death for children aged 1–14 in China (4).

There is compelling evidence that injuries are both preventable and manageable. Consequently, injury prevention and control are garnering global attention. The United Nations and World Health Assembly have proposed several resolutions focusing on road traffic safety, drowning prevention, and child injury prevention. Increasingly, countries and regions are formulating action plans for injury prevention and control, elevating it as a critical public health priority. Furthermore, there is a consensus on the implementation of evidence-based strategies for injury prevention and control, adopting public health-related methodologies. The public health approach to injury prevention is multidisciplinary, underscoring the need for multisectoral collaboration to effectively tackle injury issues. This approach encompasses four essential steps: conducting injury surveillance, analyzing risk factors, developing effective interventions, and

reviewing implementation and residual problems. China's efforts in injury prevention and control trace back to the 1980s. Health sectors have been instrumental in injury data collection and surveillance, applying epidemiological techniques to health policy, and initiating high-quality comprehensive healthcare services. Additionally, these sectors are involved in multisectoral collaborations, implementing preventive and control practices targeting key injury types and vulnerable groups, with the ultimate goal of transforming project outcomes into policies for the benefit of the entire population.

### Emphasizing Injury Surveillance and Prioritizing Injury Prevention and Control

Effective injury prevention and control hinge on the fundamental collection of injury data, with injury surveillance being a pivotal method for this data collection. Since the inaugural World Conference on Injury Prevention and Control in 1989, global efforts have been concentrated on enhancing injury surveillance as a cornerstone of injury prevention and control. The main goal of injury surveillance is to delineate the specific disease burden of injuries, their epidemiological distribution, characteristics, and evolving trends (5–6). It seeks to address fundamental questions: “What is the problem?” and “Why does it occur?”. Additionally, injury surveillance is vital for assessing the efficacy of intervention strategies, shedding light on “What works?” and “How can it be implemented?”. An effective injury surveillance system should embody key attributes such as simplicity, flexibility, acceptability, reliability, usefulness, sustainability, and timeliness, while ensuring high levels of safety and confidentiality.

China has been proactively developing a comprehensive, national injury surveillance system (7–8). Initiated in 2008 by the National Center for Chronic and Noncommunicable Disease Control and Prevention (NCNCD) of the China CDC, this system is conceptualized on the injury pyramid theory. It

combines the National Injury Surveillance System (NISS) with data from the existing National Disease Surveillance Points (DSP), medical records related to injuries, and periodic population-based epidemiological surveys. This integration offers a thorough national overview of injury incidents. Established in 2005, the NISS is the first specialized Chinese injury surveillance system, tracking injury cases in over 310 health facilities. The DSP System, operational since 1978 with 605 sites, monitors population mortality and disease patterns, providing health indicators like mortality rates and life expectancy. Over the past decade, NCNCD has furthered the use of this comprehensive system. For example, in 2013, a collaborative report on child road traffic injuries was released with the Ministry of Public Security. Epidemiological surveys on child injuries and elderly falls were conducted in 2016 and 2022, respectively. The China Injury Status Report 2019 was published in 2019. From 2023 onwards, population-based epidemiological injury surveys are part of the Population Health and Health Services Monitor and the National Health Services Survey. These advancements largely stem from the development and ongoing enhancement of the national injury surveillance system. Notably, Zhejiang and Guangdong Provinces have seen successful implementations of provincial-level comprehensive injury surveillance systems (9–10). Zhejiang Province, for instance, has developed a system that encompasses cause-of-death monitoring, hospital injury surveillance, and community surveys, significantly aiding local injury prevention and control initiatives. In Guangdong Province, product injury surveillance findings are leveraged for in-depth investigations into product quality, substantially aiding in the recall of defective products.

### **Enhancing the Evaluation of Effectiveness and Identifying Optimal Strategies and Measures for Injury Prevention and Control**

The prevention and control of injuries necessitate the identification of risk and protective factors and the determination of the best intervention methods. This process is informed by data derived from injury surveillance and epidemiological surveys. The complexity and diversity of injury causes and risk factors, coupled with the uneven distribution of injuries across various regions and populations,

underscore the importance of conducting researches on injury prevention and control. The Haddon Matrix, a prevalent research model, deconstructs the process of injury occurrence in terms of timeline and contributing factors, aiding in the analysis of causes and influences. The “5E” intervention strategy — encompassing education, enforcement, engineering, environment, and evaluation — offers scientific guidance for developing preventive measures for different injury types. Evaluation is a crucial component in this context, with a comprehensive evaluation system (including formative, process, and effectiveness evaluation) being essential for project implementation. Such a system plays a pivotal role in demonstrating project value, refining project plans, showcasing achievements, and elevating both theoretical and practical aspects. Health economic evaluations based on effectiveness provide governmental sectors with vital economic data, facilitating more scientific and effective resource allocation, thereby enhancing investment returns. For instance, a study on the use of smoke alarms in preventing scald injuries indicated that each dollar spent on smoke alarms could prevent 28 US dollars (USD) in related healthcare costs (11).

The WHO has published various thematic reports on cross-national research and practical achievements in major injury types, such as road traffic injuries, drowning, and falls. These include the World Report on Road Traffic Injury Prevention, Global Report on Drowning, and Global Report on Falls Prevention in Older Adults. These reports guide countries in developing effective, locally tailored strategies for injury prevention and control, transforming these strategies into practice, and sustaining efforts in this domain. In China, health sectors, drawing from international injury prevention experiences, have established an evidence-based, problem-oriented, target population-focused, multisector-collaborative, and society-wide participatory injury intervention model. Since 2005, several pilot studies have been initiated, exploring various intervention patterns for different injury types and target populations, such as road traffic injuries, falls among older adults, drowning, animal bites, and child injuries. Enhanced international cooperation has led to numerous initiatives and deliverables, including the Global Road Safety Program and the Child Injury Prevention Project 2016–2020. Deliverables encompass injury intervention toolkits, models for child drowning intervention (e.g., Qujiang and Zhejiang models), and the “Tadpole Model” for fall prevention among older

adults. Additionally, these initiatives have culminated in the creation of various guidelines, such as the published Technical Guidelines for Falls Prevention and Control in Community-Dwelling Older Adults, Technical Guidelines for Drowning Prevention and Control in Children, and the draft Technical Standards for Falls Prevention and Control in Community-Dwelling Older Adults. These efforts significantly contribute to guiding nationwide injury prevention and control strategies.

### Enhancing Policy Consultation and Upholding the Role of Health Guardianship

The development of policies for the prevention and control of injuries, as advocated by the WHO (12), is a critical strategy. This approach ensures coherence and clarity in the execution of injury prevention efforts at a political level. It fosters a unified perspective and shared values, brings together stakeholders from various sectors, and delineates the roles and responsibilities of each involved party. In some high-income countries, injury mortality rates have been halved over a period of 10–20 years, primarily due to the implementation of robust injury prevention policies and a series of related initiatives. Health sectors play a pivotal role in injury prevention and control. Their responsibilities encompass policy development, data gathering, providing services to victims, capacity building, and advocacy. Policy development should be multifaceted, and tailored to the national context and specific injury issues. Key roles include leadership, catalyzing actions, coordination, and support. Additionally, health sectors must enhance monitoring systems, analyze and disseminate data that impact health, promote preventive measures, conduct intervention trials and health education, provide healthcare services such as emergency response, treatment, and rehabilitation, advocate for government leadership, and foster an environment conducive to the development of injury prevention policies (13).

China has recently integrated the principle of Health in All Policies into its health policy framework. Several policies encompassing injury prevention and control have been enacted, including the Healthy China 2030 Blueprint, the China Children's Development Program (2021–2030), the National Disability Prevention Action Plan (2021–2025), and the 14th Five-Year Plan for National Health. The Healthy China 2030 blueprint explicitly emphasizes

“preventing and reducing injuries” and “promoting road traffic safety”. The China Children's Development Program (2021–2030) outlines ten major objectives and twelve strategic measures in its “Children and Safety” section, focusing on preventing child injuries and violence. The enactment and implementation of these policies provide a solid foundation for the high-quality development of injury prevention and control in China.

Injury prevention and control is an extensive social project. While China's rapid socioeconomic growth and heightened public health awareness present opportunities for the implementation of injury prevention and control strategies, challenges such as rapid urbanization, motorization, and an aging population pose significant hurdles. It is crucial for China's health sectors to transform these challenges into opportunities, focusing on promoting multisectoral cooperation, ensuring policy implementation, strengthening monitoring and evaluation, enhancing capacity building, deepening scientific research, engaging in extensive dissemination and education, and coordinating social resources. Looking forward, it is anticipated that China will develop a distinctive “Chinese paradigm” in injury prevention and control strategy, contributing this model to the global community.

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