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TRAFFIC MANAGEMENT VS. PUBLIC RESPONSIBILITIES IN PAKISTAN: A CRITICAL AND ANALYTICAL STUDY

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Abstract

Road traffic injury remains a preventable public-health and development crisis, yet road-safety discourse often places disproportionate responsibility on individual road users. This integrative document review critically examined how traffic management, institutional accountability, road-user conduct, and the Safe System approach interact to prevent deaths and serious injuries. We purposively reviewed core global policy documents and analytical reports published mainly from 2020 to 2026 by the World Health Organization, United Nations, World Bank, and International Transport Forum. Documents were coded across six domains: governance, infrastructure and speed, vehicles, road-user behaviour, post-crash care, and data and technology. The analysis found that lawful and considerate behaviour is necessary but insufficient when roads, speeds, vehicles, enforcement, and emergency systems are unsafe. Effective systems anticipate human error, protect vulnerable users, distribute responsibility among system designers and users, and use outcome and performance indicators for accountability. The review contributes an integrated responsibility framework that distinguishes citizens' immediate duties from institutions' higher-order duty to design forgiving transport systems. Four evidence-based priorities are proposed: accountable Safe System governance, speed and infrastructure reform, fair risk-based enforcement and education, and integrated data and post-crash response.

Keywords: road safety; traffic management; Safe System; public responsibility; vulnerable road users; enforcement; transport governance

1. Introduction

Road traffic injury is not an unavoidable by-product of mobility. It is a preventable systems failure with substantial human, social, and economic consequences. The World Health Organization (WHO, 2023) estimated 1.19

million road traffic deaths annually and reported that pedestrians, cyclists, and motorcyclists account for more than half of global fatalities. The burden is highly unequal: low- and middle-income countries experience the overwhelming majority of deaths despite owning a smaller share of the world's vehicles. Road traffic injury is also a leading cause of death among children and young adults, making road safety a public-health, equity, and development priority rather than merely a traffic-control matter.[1]

The United Nations General Assembly established the Second Decade of Action for Road Safety 2021–2030 and set a target of reducing road deaths and injuries by at least 50% by 2030 (United Nations General Assembly, 2020). The accompanying Global Plan calls for an integrated Safe System approach that combines multimodal transport and land-use planning, safe infrastructure, safe vehicles, safe road use, and effective post-crash response (WHO & United Nations Regional Commissions, 2021). This approach changes the central policy question. Instead of asking only why a road user made an error, it asks why the transport system allowed a predictable error to produce death or serious injury.[2]

Traffic management and public responsibility are frequently discussed in isolation. Traffic management is often reduced to signals, congestion control, parking, and police enforcement, while public responsibility is framed as obedience to laws, helmet and seat-belt use, and avoidance of speeding or distraction. These actions are important, but such a narrow formulation can obscure the responsibilities of governments, road authorities, vehicle manufacturers, employers, schools, health services, and technology providers.[3] It can also encourage victim-blaming where safe infrastructure, credible licensing, predictable enforcement, and timely trauma care are absent.[4]

This review addresses that conceptual and policy gap. Its objectives were to: (a) examine the relationship among traffic management, road safety, and public responsibility; (b) assess the relative roles of individual behaviour and system design; (c) identify institutional and technological conditions that support safer conduct; and (d) derive concise policy priorities from current

[1]Roger P. Roess, Elena S. Prassas, and William R. McShane, *Traffic Engineering*, 5th ed. (Pearson, 2019), 3.
[2]Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 12.
[3]C. Jotin Khisty and B. Kent Lall, *Transportation Engineering: An Introduction*, 3rd ed. (Pearson Education, 2018), 3.
[4]Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, *Principles of Highway Engineering and Traffic Analysis*, 7th ed. (Wiley, 2020), 12.

international evidence.[5] The guiding question was: How should responsibility be distributed among public institutions, private actors, communities, and individual road users within a Safe System? The paper's original contribution is an integrated responsibility framework that locates civic duties inside—rather than in place of—government accountability and system design.

2. Literature Review and Conceptual Framework

Earlier road-safety practice often treated crashes as isolated events caused mainly by driver error. Contemporary evidence rejects that single-cause view. The Safe System rests on four linked principles: people make mistakes; the human body has limited tolerance to crash forces; responsibility is shared between those who design and those who use the system; and all parts of the system must be strengthened so that failure in one part is compensated by another (International Transport Forum [ITF], 2022, 2023). Its ethical premise is that death and serious injury are unacceptable outcomes of ordinary mobility. This does not remove personal accountability; it prevents personal accountability from becoming the sole intervention.[6]

Traffic management therefore has a dual function. Operationally, it organizes movement through signals, lane allocation, intersection design, parking management, information systems, and incident control. Strategically, it manages exposure and kinetic energy through land-use decisions, public transport, safe walking and cycling networks, road hierarchy, speed limits, vehicle standards, and enforcement. Congestion efficiency and safety may overlap, but they are not identical. A system can move motor vehicles quickly while increasing danger for pedestrians, cyclists, children, older people, and persons with disabilities. Safety performance must consequently be evaluated through fatality and serious-injury outcomes, conflict and speed indicators, equity, and accessibility—not travel time alone.

Speed is a decisive link between traffic operations and injury severity. Higher speeds reduce the time available to detect hazards and increase both stopping distance and crash energy. A credible speed-management system aligns limits with road function, roadside activity, and the vulnerability of users; supports those limits through self-explaining street design; and applies

[5]Jean-Paul Rodrigue, *The Geography of Transport Systems*, 5th ed. (Routledge, 2024), 25.
[6]"Modern transportation systems are essential for economic growth and social interaction." Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 4.

consistent enforcement (World Bank, 2024). Merely displaying a limit on a road engineered for much higher speeds creates a conflict between formal law and environmental cues. Responsibility is therefore reciprocal: drivers must comply, while road authorities must establish limits that are safe, legible, and credible.

Urban case evidence reinforces this relationship between design and conduct. Cities that combine lower operating speeds with protected facilities, intersection redesign, and network-level treatment address risk before a crash occurs instead of relying solely on corrective action afterward (ITF, 2020). This proactive orientation also helps authorities move beyond isolated black-spot treatment toward systematic protection wherever similar road features and exposure patterns create comparable risk.[7]

The literature also distinguishes education from behaviour change. Awareness campaigns can communicate risks and build legitimacy, but information alone cannot neutralize unsafe street design, weak licensing, poor vehicle condition, or inconsistent enforcement. Effective behavioural policy combines clear law, visible and procedurally fair enforcement, supportive infrastructure, vehicle safety technology, and sustained communication. Seat belts, child restraints, motorcycle helmets, sober driving, attentive driving, and compliance with safe speeds remain essential road-user duties.[8] However, institutions determine whether protective equipment meets standards, whether violations are detected, and whether safe alternatives are realistically available.

Technology can strengthen each layer of protection, but it is not an independent substitute for governance. Intelligent transport systems, automated speed and red-light enforcement, collision-avoidance features, geospatial crash analysis, and coordinated emergency dispatch can reduce risk when deployed against clearly defined safety objectives. Their benefits depend on data quality, maintenance, legal authority, transparency, privacy safeguards, interoperability, and equitable coverage. Technology deployed only to increase road capacity or issue penalties, without correcting hazardous design, may improve administrative efficiency without producing an equitable Safe System.[9]

[7]Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 15.
[8]Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 48.
[9]Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, *Principles of Highway Engineering and Traffic Analysis*, 7th ed. (Wiley, 2020), 14.

Public responsibility is best understood at three levels. Individual responsibility concerns lawful, attentive, and considerate conduct. Organizational responsibility applies to fleet operators, schools, employers, media organizations, manufacturers, and civil-society groups whose policies shape exposure and behaviour. Institutional responsibility belongs to public authorities that legislate, finance, design, regulate, enforce, measure, and provide emergency care.[10] The power to control risk is greatest at the institutional level; therefore, accountability should be proportionate to decision-making authority. This layered model provides the conceptual framework for the review.

3. Methodology

The study used an integrative document-review design with directed qualitative content analysis. This design was appropriate because the research question required synthesis and critical interpretation of policy frameworks, implementation guidance, and comparative evidence rather than estimation of a new causal effect.[11] The unit of analysis was an authoritative document that defined road-safety responsibilities, described implementation mechanisms, or reported cross-national safety evidence.

A purposive search was conducted for English-language documents available through the official websites and repositories of WHO, the United Nations, the World Bank, and the ITF/OECD. Search concepts included road safety, traffic management, Safe System, shared responsibility, speed management, vulnerable road users, safety performance indicators, enforcement, and post-crash response. Priority was given to documents published from 2020 to 2026 so that the analysis reflected the Second Decade of Action. Seminal earlier institutional sources were retained only where they supplied economic or conceptual foundations not replaced by a newer source. News items, commercial webpages, documents lacking identifiable institutional authorship, and material that addressed traffic efficiency without a safety dimension were excluded.

The final analytical corpus comprised the WHO Global Status Report on Road Safety 2023; the Global Plan for the Decade of Action; United Nations Resolution 74/299; the WHO Road Safety Strategy 2025–2030; WHO's Eastern Mediterranean strategic framework; the ITF Safe System implementation report, urban road-safety guidance, and safety-performance-

[10]Roger P. Roess, Elena S. Prassas, and William R. McShane, *Traffic Engineering*, 5th ed. (Pearson, 2019), 1–2.

[11]C. Jotin Khisty and B. Kent Lall, *Transportation Engineering: An Introduction*, 3rd ed. (Pearson Education, 2018), 18.

indicator report; World Bank guidance on safe speeds and road-safety management; and the World Bank analysis of the economic burden of traffic injury. These documents were selected for policy authority, geographic scope, methodological transparency, and direct relevance to responsibility allocation.

A coding matrix was developed deductively from the five action areas of the Global Plan and expanded to six analytical domains: (1) governance and accountability; (2) safe infrastructure and speed; (3) safe vehicles and organizational responsibility; (4) safe road-user behaviour and enforcement; (5) post-crash response; and (6) data, technology, and performance monitoring. Within each domain, statements were coded for the actor responsible, intervention proposed, mechanism of effect, target population, equity implications, and indicator of implementation or outcome. Comparative analysis then identified areas of convergence, unresolved tensions, and policy dependencies across documents.

Credibility was strengthened by triangulating claims across institutions and distinguishing documented evidence from the author's interpretation. An audit table linked each conclusion to one or more coded domains and source documents. Because the study analysed public documents and did not involve human participants or identifiable private data, research-ethics approval was not required. The design nevertheless has limitations. It was not a statistical meta-analysis; the purposive corpus may omit relevant national studies, English-language selection may underrepresent local evidence, and global recommendations require adaptation to legal, cultural, fiscal, and transport conditions. Accordingly, the findings identify defensible policy principles rather than universal estimates of intervention effect.

4. Findings and Analysis

4.1 Road safety is a governance outcome, not only a road-user outcome

Across the reviewed documents, the strongest point of convergence was that road safety requires government-led, multisectoral governance. Fragmented responsibility produces predictable gaps: a transport agency may build roads without public-health input; police may enforce limits that road design encourages drivers to exceed; vehicle regulators may permit unsafe fleets; and health services may receive crash victims without integrated location and dispatch data. The Safe System responds by assigning a lead agency, measurable targets, sustainable financing, defined institutional roles, and regular public reporting (WHO & United Nations Regional Commissions, 2021; World Bank, 2021).

This finding changes the meaning of public responsibility. Citizens have duties, but government possesses the legal and financial authority to structure choices and control systemic risk. Where safe crossings are absent,

public transport is unreliable, licensing is compromised, or emergency response is delayed, appeals for responsible behaviour address only the final link in a longer causal chain. Institutional accountability is therefore a precondition for meaningful civic responsibility. The relevant test is not simply whether rules exist, but whether agencies can demonstrate reductions in fatal and serious injuries and improvements in intermediate safety indicators.

4.2 Safe infrastructure and speed management protect against predictable error

The evidence consistently treats human error as foreseeable. People may misjudge distance, become distracted, or make an incorrect decision; children and older road users may move differently from the assumptions embedded in vehicle-oriented design. A forgiving system prevents those errors from becoming fatal through median barriers, safe roadsides, protected walking and cycling facilities, well-designed crossings, intersection treatments, access control, and speed environments compatible with likely conflicts. The distribution of road space is therefore a distribution of risk and protection.

Speed management emerged as the central integrator. Enforcement is more credible when street geometry, land use, and posted limits communicate the same safe operating speed. Conversely, wide lanes and long uninterrupted corridors invite speeds inconsistent with pedestrian activity. This mismatch transfers the burden to the most vulnerable person. Safe-speed selection, infrastructure treatment, and automated or officer-based enforcement must operate as a single policy package rather than as separate projects (World Bank, 2024). The analytical implication is that compliance data should be interpreted alongside road design and exposure, not used as proof that road users alone caused poor outcomes.

4.3 Behaviour, enforcement, and education are interdependent

Road-user conduct remains indispensable. Drivers and riders are responsible for obeying safe speeds, avoiding alcohol and drug impairment, resisting mobile-phone distraction, yielding to vulnerable users, maintaining vehicles, and using helmets, seat belts, and child restraints. Pedestrians and cyclists should use available safe facilities and comply with signals. Yet behavioural obligations become effective only when laws are understandable, protective equipment is affordable and standards-compliant, enforcement is predictable, and roads make safe choices practicable.

The review identified two weaknesses in enforcement-centred approaches. First, episodic campaigns may produce temporary compliance without changing underlying norms or road conditions. Second, discretionary enforcement can become inequitable or lose legitimacy if penalties appear revenue-driven, selective, or corrupt. Risk-based

enforcement should focus on behaviours most strongly associated with death and serious injury, apply transparent procedures, and publish both activity and outcome measures. Education should explain the protective purpose of law, address specific audiences and behaviours, and reinforce—not replace—engineering and enforcement.

4.4 Data, technology, and post-crash care complete the safety chain

Reliable data connect responsibility to results. Police records alone may undercount deaths or omit injury severity, while hospital data may lack precise crash locations and circumstances. Linking police, health, transport, insurance, and emergency-service data allows authorities to identify high-risk locations, road-user groups, times, and behaviours. Performance indicators—including mean and 85th-percentile speeds, helmet and seat-belt use, safety ratings, emergency response times, and infrastructure coverage—provide earlier evidence of implementation than annual fatality totals (ITF, 2023).

Technology is most valuable when it closes a defined safety gap. Automated enforcement can increase certainty and consistency; intelligent signals can manage conflict and emergency priority; and advanced vehicle systems can prevent or mitigate collisions. However, algorithms and cameras require calibration, maintenance, due process, security, and evaluation. Similarly, survival after a crash depends on rapid detection, accessible emergency numbers, coordinated dispatch, trained responders, trauma capacity, and rehabilitation. Treating post-crash care as separate from traffic policy ignores the final opportunity to prevent a crash from becoming a death or lifelong disability.[12]

5. Discussion

The findings support the Safe System literature while clarifying a recurring ambiguity in the phrase "shared responsibility." Shared responsibility does not mean equal responsibility. A child crossing a road, a professional driver, a fleet operator, a road designer, and a national regulator do not possess equal knowledge, authority, or capacity to control risk. The party with greater control over system design carries a correspondingly greater preventive duty. Individual responsibility remains real, but it operates within conditions created by public and private institutions.

This interpretation differs from traditional narratives that attribute crashes mainly to carelessness. Such narratives are appealing because they identify a visible final action, but they are analytically incomplete. A

[12]Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, *Principles of Highway Engineering and Traffic Analysis*, 7th ed. (Wiley, 2020), 87.

speeding-related fatality, for example, may involve a driver's unlawful choice, an inappropriately high limit, road geometry that encourages speed, weak deterrence, a vehicle lacking protective technology, and delayed trauma care. Critical analysis must trace these interacting conditions rather than select one moral cause. The ITF (2022) similarly emphasizes that redundancy across system components is necessary because no single protective layer is completely reliable.

The analysis also explains why awareness campaigns frequently produce limited results when implemented alone. Knowledge does not automatically become safe behaviour under time pressure, weak enforcement, unsafe infrastructure, or organizational incentives that reward speed. Commercial drivers may understand fatigue risk while facing schedules that encourage excessive hours. Pedestrians may know where to cross while the nearest protected crossing is inaccessible or distant. Effective policy must align rules, incentives, design, and organizational practice so that the safe action is also the convenient and realistic action.

The global evidence further demonstrates that safety and mobility should not be treated as competing objectives. Well-designed public transport, compact land use, connected walking and cycling networks, and appropriate speed management can reduce exposure to high-energy conflicts while improving access. By contrast, a narrow emphasis on vehicle throughput may externalize delay and danger onto people who walk, cycle, use public transport, or live beside major roads. This equity dimension is particularly important in low- and middle-income settings, where the road-death burden is high, and many road users lack the protection of a private vehicle (WHO, 2023).[13]

Recent regional and global strategies also underline that implementation capacity is now the decisive challenge. WHO's Eastern Mediterranean framework calls for a whole-of-government and whole-of-society approach, while the WHO Road Safety Strategy 2025–2030 emphasizes national strategies aligned with the Global Plan (WHO, 2024, 2025). These positions support the present analysis: durable improvement depends on institutions that can coordinate, finance, monitor, and correct implementation, not on the publication of policy commitments alone.[14]

Economically, prevention is not simply a welfare expense. Road deaths and serious injuries remove working-age people from households and labour

[13]"Safe road systems contribute directly to sustainable development and improved quality of life." World Road Association (PIARC), *Road Safety Manual*, 15.

[14]Roger P. Roess, Elena S. Prassas, and William R. McShane, *Traffic Engineering*, 5th ed. (Pearson, 2019), 45.

markets, create treatment and care costs, and deepen vulnerability. The World Bank (2018) found that reducing traffic deaths can produce substantial long-term gains in per-capita income. Although economic valuation cannot capture grief or human dignity, it strengthens the policy case for sustained financing and counters the assumption that safety treatments are optional additions to transport projects.[15]

The paper's integrated responsibility framework contributes to the literature by connecting three levels of action. At the citizen level, it specifies observable duties such as safe speed, protective-device use, attention, and respect for vulnerable users. At the organizational level, it assigns duties to employers, schools, manufacturers, media, and civil society to manage fleet risk, teach practical safety, supply compliant products, and shape norms.[16] At the institutional level, it requires authorities to create a forgiving system, enforce fairly, coordinate post-crash care, and publish performance. This hierarchy makes the concept of public responsibility more precise and prevents it from becoming a general appeal unsupported by institutional reform.[17]

6. Conclusion and Policy Recommendations

Road safety is produced by the interaction of governance, street and vehicle design, speed, behaviour, enforcement, data, and post-crash care. The review found that responsible road use is necessary but cannot compensate for a system that exposes ordinary human error to lethal energy. The most defensible model is therefore a Safe System in which governments lead, organizations manage the risks they create, and citizens comply with clear and protective rules. Responsibility should be shared, but accountability should be proportionate to each actor's control over risk.

The study met its objectives by integrating traffic management and public responsibility within a single analytical framework; distinguishing individual conduct from institutional duty; identifying the conditions under which enforcement, education, and technology work; and showing that vulnerable-user protection and post-crash care are core elements of traffic policy. Its central contribution is to replace a behaviour-only account with a

[15]Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 85.
[16]Fred L. Mannering, Scott S. Washburn, and Walter P. Kilareski, *Principles of Highway Engineering and Traffic Analysis*, 7th ed. (Wiley, 2020), 175.
[17]Nicholas J. Garber and Lester A. Hoel, *Traffic and Highway Engineering*, 6th ed. (Cengage Learning, 2019), 48.

layered responsibility model that can guide policy design, performance assessment, and public communication.

Four recommendations follow directly from the analysis:

1. Establish accountable Safe System governance. Designate a lead agency with legal authority, stable financing, time-bound fatality and serious-injury targets, named responsibilities across sectors, and annual public reporting using outcome and performance indicators.
2. Align speed, infrastructure, and land use. Set speeds by road function and human injury tolerance; prioritize protected facilities and accessible crossings for pedestrians, cyclists, children, older people, and persons with disabilities; and use crash and exposure data to treat high-risk corridors and intersections.
3. Combine fair enforcement with targeted education and organizational controls. Focus on speeding, impairment, distraction, helmets, restraints, licensing, and commercial-fleet risk; apply transparent and consistent procedures; and evaluate changes in behaviour and injury outcomes rather than campaign reach alone.
4. Integrate data, technology, and post-crash response. Link police, health, transport, insurance, and emergency datasets; deploy technology against defined safety problems with privacy and due-process safeguards; and improve crash detection, dispatch, trauma care, and rehabilitation.

Future research should test this framework with national and city-level crash, exposure, enforcement, and health data; compare responsibility allocation across legal systems; and assess whether institutional accountability measures improve safety equitably. Such work would extend the present document review from policy synthesis to context-specific causal evaluation.

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