

Perspectives & Commentary



Occupational Health Prevention in Emerging Industries: Challenges for Platform, Remote and Outdoor Workers

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ARTICLE INFO

Article history:

Received 19 April 2026

Accepted 19 April 2026

Keywords:

Platform economy

Delivery riders

Remote work

Outdoor labor

Occupational safety and health (OSH)

Algorithmic management

Heat stress

ABSTRACT

The rapid expansion of the platform (gig) economy, remote work arrangements, and climate-driven outdoor labor has created new occupational health risks that traditional prevention frameworks are ill-equipped to address. Delivery riders and platform workers face elevated rates of traffic injuries, heat stress, and psychosocial strain, while remote workers contend with musculoskeletal disorders (MSDs) and mental health burdens from poor ergonomics and blurred boundaries. Outdoor laborers, including gig workers, are disproportionately affected by workplace heat stress, projected to cause the loss of 2–3.8% of global working hours by 2030. This Perspective synthesizes recent evidence and argues that public health prevention must shift toward inclusive, technology-aware, and climate-resilient strategies. Without presumptive employment protections, algorithmic transparency, ergonomic standards, and heat-action plans, emerging industries risk exacerbating health inequities. Urgent policy and practice innovations are needed to safeguard worker well-being in these evolving labor markets.

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1. Introduction

Emerging industries—platform-mediated gig work, post-pandemic remote employment, and climate-exposed outdoor labor—now employ hundreds of millions globally. While these categories differ in their specific risk profiles, they share common features: non-standard employment relationships, limited OSH coverage, and rapid growth that outpaces regulatory adaptation. The gig economy offers flexibility but often at the cost of precarious conditions, while remote work promised autonomy yet introduced new ergonomic and psychosocial hazards. Climate change intensifies these risks, particularly for outdoor and delivery workers exposed to extreme heat. In 2025, the World Health Organization (WHO) and World Meteorological Organization (WMO) highlighted that 2.41 billion workers (70% of the global workforce) face excessive heat annually, leading to nearly 23 million occupational injuries and 18,970 fatalities ^[1]. Traditional occupational safety and health (OSH) systems, designed for stable formal employment, lag behind these transformations. This Perspective examines key challenges and proposes prevention-focused pathways grounded in recent empirical data.

2. Platform Economy and Delivery Riders: Precarious Work Meets High-Risk Exposure

Platform workers, especially food delivery riders, exemplify the human cost of algorithmic management and piece-rate pay. A 2025 systematic review of 32 studies involving 38,682 last-mile delivery workers found consistent links between poor working conditions (economic insecurity, time pressure, algorithmic control) and negative psychosocial outcomes, including stress, fatigue, and burnout ^[2]. Motorized two-wheelers carry higher crash and injury risks than bicycles due to speed and traffic exposure. In New York City, 21.9% of delivery gig workers reported injuries and 20.8% assaults, with two-wheeled riders at over twice the prevalence ^[2]. Workload directly drives health hazards. Mao et al. ^[3], in a study of Chinese delivery riders, identified high workloads (measured by daily deliveries and working hours) as a primary risk factor for illness, mediated by job stress and unsafe behaviors. Climate change compounds this: Lu et al. ^[4], analyzing data from a major Chinese food delivery platform (over 580,000 orders and 1,272 couriers), showed that a 5°C temperature rise increased orders by 9.6% per hour, extending working hours by 6% during heat waves. Health costs (estimated at 501 CNY per worker over two months) often

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DOI: 10.64904/20260582



exceeded additional earnings (545 CNY), with uninsured workers facing far higher out-of-pocket burdens ^[4]. Gig workers frequently lack OSH protections, training, and equipment. Regression analyses indicate gig workers face three times the risk of minor occupational injury and eight times the risk of severe injury compared to traditional employees. These patterns underscore the need for regulatory reclassification and platform accountability.

3. Remote Workers: The Hidden Costs of Home-Based Labor

Remote work, adopted by millions post-COVID, has mixed but predominantly adverse health impacts. A 2026 scoping review of 24 studies found that 75% reported negative OSH outcomes, including elevated depression, anxiety, stress, insomnia, and musculoskeletal pain. Neck pain prevalence reached 20.3–76.9%, low back pain 19.5–74.1%, and shoulder pain 3.0–72.9% in work-from-home settings, often linked to inadequate ergonomic setups ^[5]. Remote workers showed 1.26 times higher odds of MSDs than office-based counterparts, with past digitalization adoption and future digitalization concerns further increasing risk (OR 1.76 and 1.08, respectively). Psychosocial burdens— isolation, blurred work-life boundaries, and constant connectivity—exacerbate burnout, particularly for women balancing unpaid care work. Notably, reduced commuting time has been associated with lower traffic injury risk, decreased exposure to air pollution, and improved work-life balance for some workers, though these benefits appear outweighed by adverse ergonomic and psychosocial effects in most populations. While some studies note minor mental health benefits from

reduced commuting, the weight of evidence points to net harm without supportive interventions.

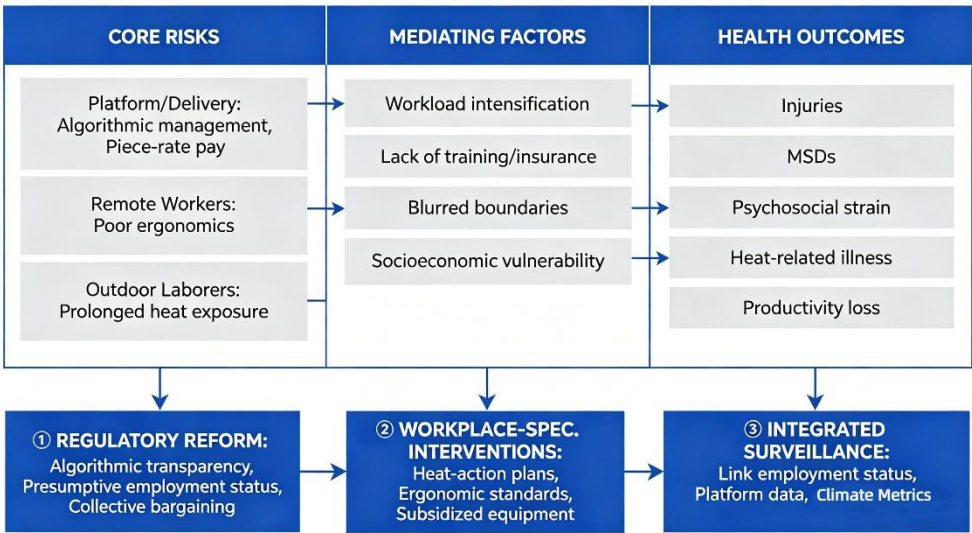
4. Climate Change and Outdoor Laborers: Heat Stress as a Growing Public Health Threat

Outdoor workers, including agricultural, construction, and gig delivery riders, bear the brunt of climate-driven heat stress. The International Labour Organization (ILO) estimates that by 2030, excessive heat could erase 80–136 million full-time job equivalents globally through lost working hours ^[6]. Heat exposure impairs productivity, raises injury risk (relative risk 1.09 during heatwaves), and contributes to cardiovascular events, kidney injury, and mental health deterioration. In 2025, WHO/WMO guidance emphasized physiological, socioeconomic, and mental health impacts, calling for evidence-based prevention ^[1]. Gig delivery riders face compounded risks: higher order volumes during heat waves force longer exposure without adequate rest or hydration. Vulnerable groups—migrant, temporary, and low-income workers—lack adaptive capacity, widening health inequities.

5. Perspective: Toward Proactive, Inclusive Prevention

These challenges reveal systemic gaps: misclassification of gig workers as “independent contractors” denies them OSH coverage; remote work lacks standardized ergonomic mandates; and climate adaptation rarely integrates occupational health. Public health prevention must evolve beyond reactive injury reporting to anticipatory, multi-level strategies.

Fig.1 - Emerging Industries Occupational Health Prevention Framework



First, regulatory reform is essential. Models like the EU Platform Work Directive (transposition deadline December 2026) offer algorithmic transparency, presumptive employment status (based on control indicators), and collective bargaining rights—steps that could extend workers’ compensation, training, and insurance to platform workers ^[7].

Second, workplace-specific interventions are needed. For delivery riders: heat-action plans, vehicle maintenance subsidies, and algorithmic adjustments to cap workloads during extreme weather. For remote workers: mandatory ergonomic assessments, subsidized equipment, and mental health support programs. For outdoor laborers: WHO-recommended heat stress monitoring, rest breaks calibrated to Wet Bulb Globe Temperature (WBGT), and sector-specific training.Implementation of these strategies

faces notable barriers. Platform enterprises may resist algorithmic transparency requirements citing commercial secrets or competitive disadvantage. Mandatory ergonomic standards could impose costs on small and medium enterprises, while heat-action plans are difficult to enforce in the informal gig economy due to fragmented employment and limited oversight. Regulatory enforcement through labor inspections, financial incentives (e.g., tax credits for compliance), and worker-led monitoring mechanisms (e.g., union or app-based reporting) may help mitigate these barriers. Third, data and research gaps must be closed. Current OSH statistics under-capture gig, remote, and climate-related risks. Integrated surveillance linking employment status, digital platform data, and climate metrics is critical for evidence-based policy. Finally, health equity demands attention. Migrant, young, and female workers are over-represented in high-risk roles yet under-protected. Prevention must incorporate participatory approaches—worker input on platform design, community-based heat resilience programs—to avoid one-size-fits-all solutions.

6. Conclusion

Emerging industries offer economic opportunities but pose preventable occupational health threats. Recent evidence from 2024–2026 underscores the urgency: without bold prevention—spanning policy reclassification, ergonomic standards, climate-resilient OSH frameworks, and platform accountability—worker morbidity and mortality will rise. Public health and preventive medicine must lead by championing inclusive, forward-looking strategies that treat worker well-being as integral to sustainable development. Journals, policymakers, and platforms should prioritize these

perspectives to translate evidence into action before the costs become irreversible.

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