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Perspective

Occupational diseases: The prototype of all syndemics?

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Abstract: Labour laws play critical roles in people's lives but rarely are they associated with health risk factors or outcomes. Yet, labour represents, directly and indirectly, the key driver of our health, as dramatically confirmed by the COVID-19 pandemic. This viewpoint discusses how syndemic thinking can explain a link between labour laws and occupational health. Syndemics are synergistic factors among epidemics, which provide a structured way to think about what conditions emerge epidemiologically, interact in the body, and are driven by shared social, structural, political, or ecological factors. Thinking syndemically about these conditions can explain the ways in which legal determinants, such as safety, work hours, wages, and leave, may be associated with poor health, particularly among those lower in social hierarchies. Workplaces can be a critical space for social and financial mobility as well as an opportunity to intervene in the major risk factors that promote poor health.

Keywords: syndemics; occupational health; public health; occupational diseases; socioeconomic factors; social sciences

Labor laws play a critical role in people's lives, but rarely are they considered within clinical contexts. Labor laws affect critical risk factors, including safety, work hours, wages, and leave. Yet, health practitioners often respond to this risk through a damaged limb, excess stress contributing to diabetes, or an infection or exhaustion of a sick mother. Thinking about how occupations affect health upstream can inform our thinking about workplace health and social policy.

Syndemics can explain a relationship between labor laws and occupational health. The theory of syndemics focuses both on disease concentration (the where) and disease interactions (the how) in order to understand population health and disease drivers, as well as possible interventions [1,2]. For instance, weak labor laws may fuel stress and cardiovascular disease among lower-wage workers (as was observed in the Whitehall Studies [3]) and/or depression, anxiety, type 2 diabetes, infections, or workplace accidents. One example is the VIDDA Syndemic, a syndemic observed among Mexican immigrant women in the United States where violence, isolation, depression, diabetes, and abuse come together to cause more ill health than a person would have with type 2 diabetes alone; part of these variables are closely tied to fear and personal insecurity people face without labor protection, which are compounded by the threat of deportation [4]. A recent study in *Nature Human Behavior* demonstrated how powerful such ethnographic data is in predicting epidemiological trends of social distress caused by work and family life; they are more powerful predictors of poor quality of life than clustered health conditions may be alone [5]. This is particularly important among states that have weaker labor laws or among

workers who are least protected, even in contexts where labor laws are relatively robust [6].

Syndemic theory is a useful framework for thinking about occupational risk in part because the upstream drivers of such risk can be easily masked. An estimated three percent of all deaths are attributed to some form of occupational risk [7], although these numbers obfuscate indirect aspects of chronic stress and personal insecurity associated with uncertain and possibly unsafe work environments. In many cases, work-related morbidity and mortality is associated with physical injury, even though occupations are critical conduits of well-being indirectly through jobs, housing, security, and social mobility. In factory work, for example, work may be performed by people considered more politically vulnerable, such as immigrants, refugees, and less educated individuals, which would produce lower social control and more deleterious impacts on one's health [8]. It is the clustering of these health conditions that sets syndemic thinking apart from other epidemiological studies of social determinants of health. These risks are amplified tenfold when workers have limited public options for health coverage, particularly when healthcare coverage is linked to work.

Syndemic relationships with occupational health must consider disease concentrations and drivers and reveal the utility of applying syndemic thinking to occupational health. For instance, the where may be within more stringent hierarchical workplaces, and the how may be linked to a lack of control over workplace activities or protections of one's safety. Legal structures can create environments where chronic stress, distress, and injury are common, particularly among those who have limited power to confront authority when they feel unsafe [2]. This type of work has long been associated with certain health risk factors, like smoking and nutrition, which synergistically interact with workplace exposures in damaging health (**Figure 1**).

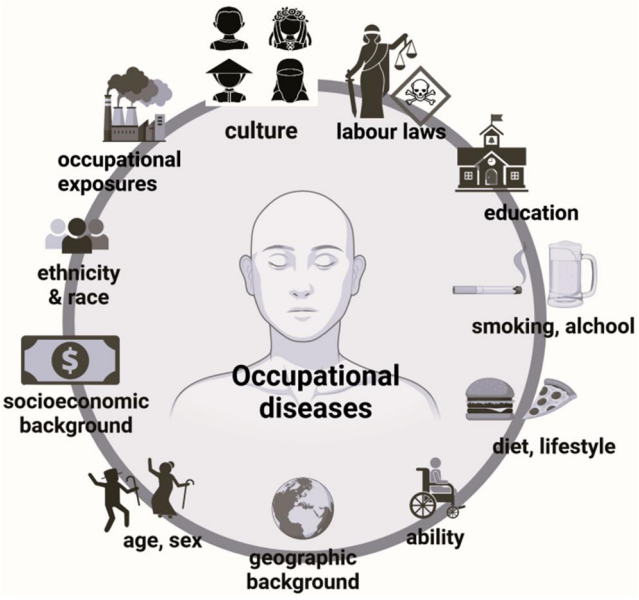

Figure 1. Synergistic determinants of occupational diseases.

The recent COVID-19 pandemic exemplifies how workplaces are critical conduits of syndemics. Frequency and severity of COVID-19 infections were

associated with occupation, workplace, and pandemic policies [9]. Some workers never left their posts, particularly frontline healthcare workers as well as those keeping the food and energy sectors afloat and public transport drivers [10]. When COVID-19 outbreaks in certain factories, such as in meat processing plants, spread like wildfire, many workers were disproportionately affected because of their work but also due to poor shared crowded living conditions of their workers, mainly immigrants; in many cases, isolation if exposed to the virus was impossible at both home and work. Regrettably, many essential workers felt let down by their governments due to inadequate health and safety measures, personal protective equipment, and occupational injury/disease compensation [10]. Some remain incapacitated by long Covid due to infection in 2020 and feel cast aside [11].

Yet, addressing workplace safety is beyond the purview of clinicians and beyond their capabilities—particularly with the overscheduling and stress the clinical staff faces daily. Instead, clinicians remain stuck in a cycle of attending to subsequent emergencies: broken appendages, memory loss due to chemical exposure, or chronic metabolic dysregulation. Recognizing how such conditions may affect health, however, is a critical clinical tool, particularly for access to disability for patients who may no longer feel safe engaging in arduous physical or cognitive work. The best prescription, in some cases, may be access to the disability system and/or legal and housing assistance.

Given the synergistic causal pathways underlying occupational diseases (**Figure 1**), a multi-pronged approach is needed for medical, educational, and societal dialogue. While universal healthcare is critical, so too are occupational health surveillance programs to identify early signs of adverse health effects due to workplace exposures. While this should address physical risk—such as injury and chemical exposures—it also must integrate emotional risk, elevating social support within and beyond the workplace as well as policy solutions such as universal childcare, affordable health food and housing solutions, and opportunities for intergenerational living close to a workplace. Bundled with health promotion programs, such as for smoking cessation and healthy meal planning based on cultural tastes and financial limitations.

Possibly the most critical intervention is clear guidelines for what types of occupational health outcomes are deserving of disability and in what ways workplace exposures are responsible. This is particularly relevant for mental health care, as emotional well-being so often goes underrecognized and chronically underserved, particularly when people work long hours and have limited finances. Substantial evidence suggests that money spent on prevention will outweigh the money spent on treating and managing the subsequent diseases and disability burden [12]. This is particularly salient in mental health care, which is so closely tied to physical medical conditions. In this way, "cost-effectiveness" of healthcare interventions for workplaces may be understood to be higher wages, comprehensive childcare, and increased sick days, as well as informal or formalized social support groups for those who are struggling most. Thus, workplaces can be a critical space for social and financial mobility as well as an opportunity to intervene in the major risk factors that promote poor health to begin with.

Some argue that syndemic interventions are too expansive and inclusive, thereby making such approaches difficult to measure impact. It's true that no singular approach

will be a quick fix to the challenges at the nexus of labor and occupational health. Thinking expansively about how to integrate syndemic thinking into governmental public health policies, for example, must focus on how disability is constructed and what types of financial programs are available to support injured workers. Even more, multidimensional interventions to promote education and health among workers are difficult to measure, even when they may serve well to protect a people's health at work and prevent the associated individual and societal costs. A very discrete intervention would be systematic periodic vaccination programs among workforces that could help prevent the spread of dangerous infective diseases among the entire population community by reaching the most at-risk vulnerable categories, such as migrants that could have no access to general healthcare. A more expansive approach involves challenging disability laws and protecting workers so that they may recover and live well after injury.

Conflict of interest: The authors declare no conflict of interest.

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