

Silica Trails:

Turned Soils, Dusty Lungs

Juliana Ramos Boldrin

Dr Carlos, a pulmonologist who worked at a public teaching hospital located in a medium-sized Brazilian city,¹ told me that diagnosing pneumoconiosis can be quite challenging. Pneumoconiosis is a chronic and incurable lung disease caused by inhalation of harmful substances in the workplace, such as coal dust, phosphate rock particles, lead, asbestos, beryllium, cobalt, mercury or silica. To a large extent, the challenge mentioned by Dr Carlos relates to the fact that the symptoms of this disease – cough, decreased respiratory capacity, shortness of breath and fatigue, among others – often manifest years or even decades after initial exposure to these toxic substances. For this reason, investigating the patient's past becomes an indispensable diagnostic tool. It is necessary to carefully recall the various professional occupations that the patient has held in order to identify where and which toxic substance was inhaled. Taking as a starting point these slow and chronic respiratory illnesses caused by exposure to harmful substances in the workplaces, in this article I focus on the production and circulation of silica – a mineral widely used in numerous industrial applications which causes silicosis, the prevalent type of pneumoconiosis in Brazil (Capitani 2006). My aim is to make visible how this process of illness articulates different temporalities as a direct and predictable effect of the industrial infrastructures that shape modern

¹ The hospital is part of the Unified Health System (SUS), a public health model that provides free and universal healthcare.

life. Arguing that these industrial projects are founded on structural violence that turn poor workers' bodies into toxic storage (Graeter 2020; Graeter 2022; Welcome 2021; Kopf 2024), I explore the central and specific place that silica occupies in the construction, maintenance and operation of infrastructures. This line of enquiry reveals that the production of toxicities, far from being limited to the undesirable byproducts generated through industrial processes (Brown 1997; Taylor 2014; Landa 2016; Reno 2016), also involves the materials used to build the infrastructures themselves and the raw materials employed to manufacture their products (Howe et al. 2016; Murphy 2017; Álvarez et al. 2024).



Silica is utilized in metallurgy, steelmaking, foundries, the chemical industry, and in the production of ceramics and glass, among various other segments of industry. The applications of this mineral are quite multifaceted. Silica can, for instance, be a raw material in the manufacture of chips that make up our electronic devices, but it can also be a component added to other materials mobilized in the construction of infrastructures, such as in cement and rubber. Thus, from small chips to enormous concrete structures, silica occupies a central place in the materialization and operationalization of the techno-industrial complex, emerging as a component that supports infrastructures themselves.

Silica dust.
Photo: [Tuaindeed / Getty Images](#).

Making up sixty percent of the Earth's crust, silica is the world's most abundant mineral. Thus, when soils are turned over, exploded, fractured, ground, crushed and sifted in the extraction processes of various minerals, dust containing minute particles of silica is released into the air—this also occurs during other activities, such as concrete manufacturing, steelmaking, civil construction and sandblasting. Due to their small size, these particles remain suspended in the air and are inhaled by miners, bricklayers and other workers involved in these activities. It is no coincidence that silicosis is also known as *asma dos mineiros*, or 'miner's asthma' (Heloani 2005) in Brazil, one of the world's leading producers and the largest exporter of so-called metallurgical silica. In addition to generating ruined landscapes and its countless environmental and social impacts, mining is the activity that bears the greatest responsibility for workers falling ill with this disease in the country (Souza and Monteiro 2019).

Over time, this particulate matter inhaled daily and invisibly by workers accumulates in their lungs and, as Dr Carlos pointed out, symptoms often do not begin to manifest until years later. In many cases, regulations and inspections to control exposure to the dust are not sufficiently rigorous and even though workers undergo regular check-ups, as Magdalena Górska (2016) shows, the disease's gradual, insidious development means that pneumoconiosis is frequently only identified when the person is already having difficulty breathing.

These silica-saturated lungs bring to light the permeability of bodies and the ways in which toxicities persist across different times and spaces (Müller and Ohman Nielsen 2022), operating as mechanisms of "slow violence" (Nixon 2011) through an act so mundane and so vital as breathing. Silently and routinely, workers' lungs are converted into toxic storage and their lives are gradually and irreversibly altered by lack of air. Following the trails of silica—from turned soils to damaged and dusty lungs—reveals the "asthmatic quality" that characterizes the air of late industrialism (Ahmann and Kenner 2020: 418). As Ahmann and Kenner (2020) contend, airborne toxicity is not an unforeseen or accidental side-effect of industrial activity. On the contrary, as the case of silica makes plain, toxicity is a constitutive dimension of industrial extraction infrastructures that transform exposure into a condition of employment. Moreover, silica elucidates the fact that toxicity is to be found not only in otherwise undesirable byproducts of industrial processes.

As several authors have shown, although toxicity has become a constitutive condition of our modern world, it is not equally distributed (Fortun 2012; Braun 2014; Chance 2018; Sharpe 2016; Garnett 2020; Mbembe 2021). Apropos silicosis, this issue becomes especially evident when we pay attention to the fact that, in Brazil, this disease primarily affects male, poor and racialized bodies performing poorly regulated, precarious, low-paid and physically demanding labor. In short, it is poor workers who are exposed to the risk of illness and whose futures are compromised by shortness of breath. This profoundly unequal distribution of risks demonstrates that race, gender and class are fundamental to understanding the slow and chronic dimensions of "infrastructural violence" (Rodgers and O'Neill 2012). In fact, inequalities seem to be an "economic convenience" (Miguel, Taddei and Figueiredo 2021: 4).

In a country like Brazil, deeply marked by social inequalities inherited from colonialism, this infrastructural violence is inseparable from the geopolitics of power. One example of this is that metallurgical silica produced in Brazil is exported and undergoes purification processes carried out by countries in the Global North to obtain silicon, a semiconductor material that, as mentioned above, is used in the manufacture of chips that make up electronic devices. In other words, the silica particles that accumulate in workers' lungs are entangled with this dynamic of production and circulation of raw materials, showing that infrastructural violence cannot be thought of separately from the "unequal geographies of racial capitalism and colonial extraction" (Ahmann and Kenner 2020: 1). Countries in the Global South so often pay the environmental, social and respiratory costs of the extraction enterprises that nurture the comforts and privileges of the Global North. At the same time, it is noteworthy that the poorest segment of the population also has little access to the benefits generated by infrastructure, which is often precarious or even absent, especially when we think about access to electricity, potable water, public transport and so on. Hence, when we look at the impacts of infrastructure from the point of view of the Global South, it is evident that neither the risks nor the benefits are equally distributed (Simone 2004; Miguel, Taddei and Figueiredo 2021).

In so effectively crossing time and space, silica makes visible how toxicity connects different scales through production chains that entangle the poor breathing conditions and colonial geopolitics which mark our world. Considering how the production and circulation of silica is permeated by dynamics of exploitation that, among other things, culminate in irreversible disease, infrastructures appear as material arrangements that are not only based on entrenched inequalities and colonial logic but also actively contribute to their proliferation and intensification through processes that convert workers' bodies into the matter and energy of capitalist enterprises (Mbembe 2021).

Conclusion

Silica provides a powerful lens through which to capture the toxicity involved in the raw materials used to build infrastructures and maintain their operation. I have sought to highlight how such toxicity shapes and reconfigures bodies, underlining the unequal distribution of risks and benefits while also being a problem inseparable from inequalities and colonial logics that underlie industrial projects. More specifically, slow and chronic infrastructural violences unfold from an act as vital and mundane as breathing, rendering it a mechanism for producing asphyxiation that operates through everyday, lethal exposure. This turns lungs into deposits of toxic particles, compromising vitality and longevity.

In a time marked by the collapse of infrastructures and also by the need to modernize them (Ahmann and Kenner 2020), silica-saturated lungs make it clear that breathing is an unequally shared right (Mbembe 2020), despite being a vital necessity. In this sense, the elemental trails of silica allow us to perceive that developing infrastructures capable of addressing the challenges of today and creating breathable futures requires taking into account the dynamics of exploitation which ensure the comforts and benefits of some at the expense of the illness and precariousness of others.

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Cite as:

Ramos Boldrin, Juliana. 2025. "Silica Trails: Turned Soils, Dusty Lungs." *Roadsides* 13: 44–50. <https://doi.org/10.26034/roadsides-202501307>

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ISSN 2624-9081

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