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Facing crisis: how Ecuador's energy shortages threaten public health

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Ecuador is currently facing a severe energy crisis, driven by one of the most intense droughts in Latin America in recent decades. Reduced rainfall in the Andean basins has critically lowered hydroelectric power generation, triggering daily blackouts lasting up to 20 h across the country. This crisis has had profound consequences on public health and social wellbeing. Nighttime power outages have led to increased rates of crime, domestic accidents, and traffic-related injuries. Essential services—such as telecommunications, water supply, refrigeration, and healthcare—have been severely disrupted. Medications and vaccines requiring cold storage have been compromised, while patients dependent on electrically powered medical devices face life-threatening risks. The situation is further exacerbated by systemic deficiencies in infrastructure planning, underinvestment, and overreliance on an aging hydroelectric matrix. In this article, we examine the multifaceted health-related impacts of Ecuador's energy crisis, including its effects on citizens, infrastructure, patient care, and healthcare services. We call for urgent and coordinated action from national and local authorities to modernize the energy sector, integrate sustainable energy sources, and strengthen the resilience of healthcare systems. We believe that Ecuador's experience offers a critical lesson for other regions vulnerable to climate-induced infrastructure failures and public health emergencies.

Introduction

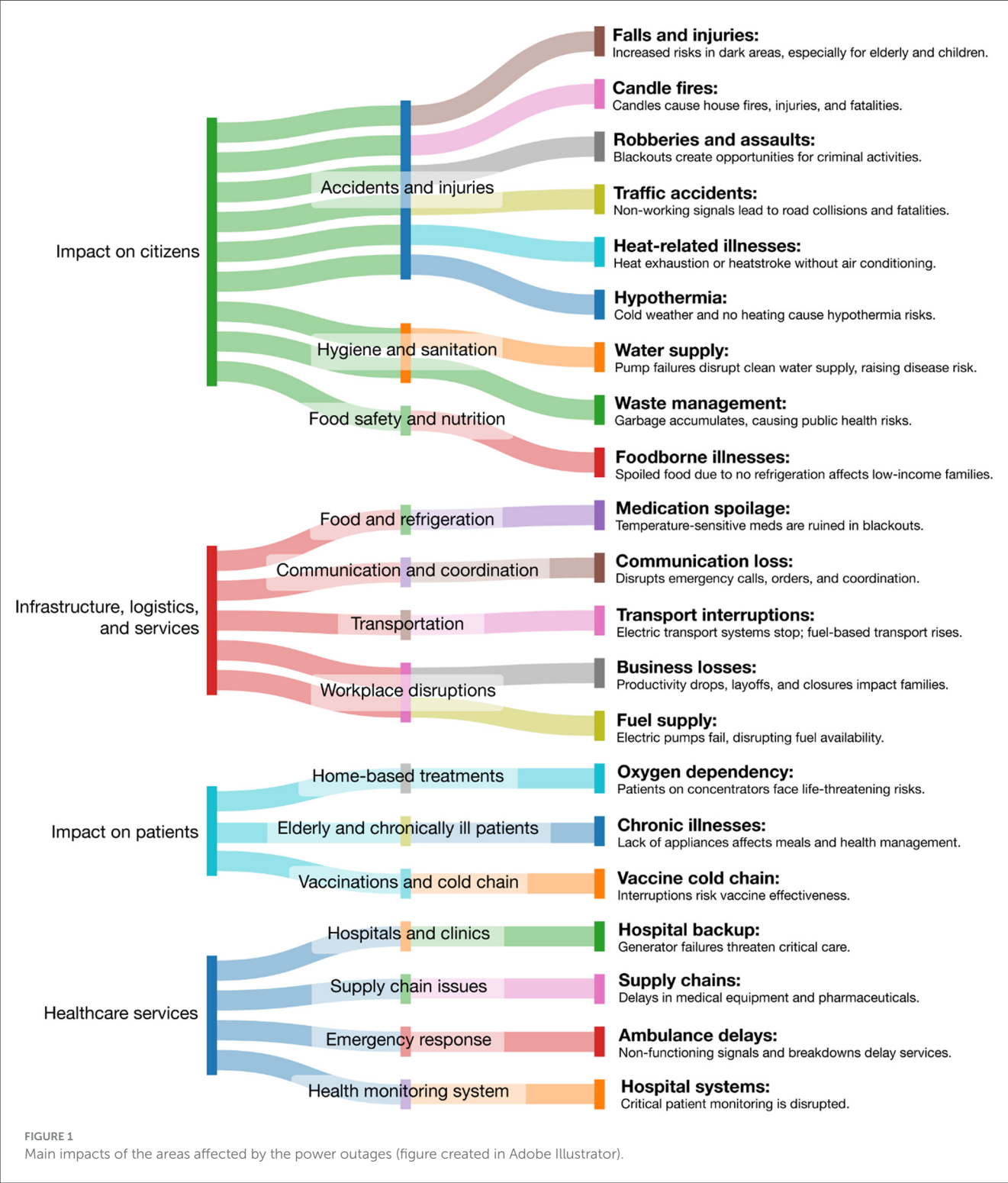
Latin America endured its hottest year on record, marked by extreme weather events such as hurricanes, floods, and prolonged droughts, the likes of which have not been seen in over 70 years (Martínez et al., 2017; Zhang et al., 2023). The Amazon, a critical biome for both regional and global climate regulation, faced historically low water levels. This disrupted river transport, caused mass die-offs of aquatic species, and jeopardized the livelihoods of over 500,000 people (Schröder, 2023). In particular, the Amazon River reached its lowest level in more than 120 years, largely due to a severe reduction in rainfall in the Andean basins that feed its tributaries. These hydrological changes have had a direct impact on populations living along riverbanks and in other drought-affected areas (Santos de Lima et al., 2024).

Beyond immediate environmental damage, these climatic disruptions have triggered secondary consequences—such as wildfires and water shortages—that are directly linked to public health risks (Brondizio et al., 2016; Smith et al., 2014; Ortiz-Prado et al., 2025). Ecuador exemplifies this vulnerability. The country is currently experiencing a severe energy crisis, characterized by frequent and prolonged power outages that have disrupted

daily life, inflicted economic and industrial losses, and adversely affected the health and wellbeing of its population (CNN, 2024).

This crisis stems from historical deficiencies in infrastructure planning, underinvestment in energy development, and poor maintenance of the national power grid. Ecuador’s energy matrix—dominated by aging thermoelectric facilities and an increasingly

overburdened hydroelectric system—is no longer capable of meeting the nation’s growing and chronically uncoordinated energy demand (Verdezoto et al., 2019). Approximately 69.1% of Ecuador’s electricity is generated through hydroelectric sources (Carvajal et al., 2019), a trend that has shaped national energy policy over the past 10–15 years. However, this strategy did not account



for the effects of prolonged droughts, which have significantly impaired hydroelectric output, especially during what is now considered the worst drought in over six decades (Carvajal et al., 2019; BBC, 2024).

The ongoing energy crisis is having a profound impact on public health in Ecuador. Highlighting these effects is essential for informing global strategies to build resilience against future climate-induced disruptions, which are likely to increase in frequency and severity (Norouzi and Fani, 2022; Vallejo, 2024; Zlakeviciute et al., 2024). The combination of climate-driven disruptions and systemic infrastructural deficiencies has led to prolonged power outages, lasting between 8 and 20 hours daily in some regions, as well as scheduled industrial outages lasting several days (La Hora, 2024). These blackouts have far-reaching consequences, introducing a range of public health challenges that disproportionately affect vulnerable populations.

This article explores the multifaceted health-related consequences of Ecuador's ongoing energy crisis, emphasizing its broad and intersecting effects across multiple sectors. First, it addresses the impact on the general population, highlighting increased risks of injuries and accidents, compromised hygiene and sanitation conditions, and growing concerns over food security and nutritional wellbeing. Second, it examines the repercussions for infrastructure, logistics, and essential services, including disruptions in food storage and refrigeration, breakdowns in communication and coordination systems, impediments to transportation, and interruptions in workplace productivity. Third, the analysis focuses on vulnerable patient populations, particularly those requiring home-based care, older adults, and individuals with chronic illnesses. It also considers the effects on immunization efforts and the maintenance of the vaccine cold chain. Lastly, the article evaluates the implications for healthcare service delivery, with attention to hospital and clinic functionality, medical supply chain continuity, emergency response capacity, and health monitoring systems. These interconnected dimensions are summarized visually in Figure 1, which illustrates the principal areas affected by the energy crisis and the specific consequences observed within each domain.

Impact on citizens' health and wellbeing

Ecuador's energy crisis has profoundly disrupted daily life, triggering a cascade of public health consequences. At the individual level, frequent power outages have increased the incidence of injuries and accidents, particularly among vulnerable populations such as the elderly and children (Casey et al., 2020). Reliance on candles has tragically caused house fires, resulting in injuries, fatalities, and property damage (PRIMICIAS, 2024a). The darkness emboldens criminal activity, increasing robberies and assaults, some of which have fatal outcomes (Tompson and Bowers, 2013). On the roads, non-functioning traffic signals have led to more frequent accidents, escalating injuries and deaths as reported elsewhere (Shaked, 2024). Moreover, extreme weather events—intensified by the energy crisis—have exacerbated the health burden: in hot regions, lack of access to cooling systems

has led to cases of heat exhaustion and heatstroke, whereas colder regions face increased risks of hypothermia (Gronlund et al., 2018; Patel et al., 2022; Seltenrich, 2015; Izquierdo-Condoy et al., 2023).

Beyond physical injuries, the energy crisis has had a substantial impact on hygiene, sanitation, and food safety. Hygiene and sanitation are severely impacted as water pumps fail without electricity, disrupting access to clean water and increasing the risk of waterborne diseases. Garbage collection services halt, leading to waste accumulation and further exacerbating health risks. Spoiled food due to refrigeration failures poses additional challenges, causing foodborne illnesses and financial strain, particularly for low-income families unable to replace spoiled goods (Associated Press, 2024).

Disruptions to infrastructure, logistics, and services

The ripple effects of the energy crisis on infrastructure and logistics create broader societal challenges. Refrigeration failures impact households and restaurants alike, threatening food security and causing economic instability. Communication services, including phone and internet, fail during blackouts, disrupting emergency calls and medication coordination with pharmacies. Public transportation systems, which depend on electricity for operation—including buses, and fuel pumps—are frequently paralyzed, leaving commuters stranded and delaying essential deliveries.

These disruptions extend into the workplace. Many businesses, particularly those reliant on digital technologies or cold chains, face decreased productivity, layoffs, and even permanent closure. This loss of economic activity not only worsens unemployment but also reduces access to health-related services, perpetuating a cycle of socio-economic hardship (Russel Bedford, 2024).

Impact on patients and healthcare services

For patients, the energy crisis presents life-threatening challenges. Individuals dependent on oxygen concentrators or other electric-powered medical devices are at immediate risk during prolonged outages (Mella, 2024). Refrigerated medications like insulin or hormone therapies often spoil, depriving patients of critical treatments. Home dialysis patients struggle as their machines become unusable, jeopardizing their health. Elderly and chronically ill individuals, many reliant on electric appliances for cooking or health management, are left without essential care (Molina, 2024). Vaccine efficacy is also compromised due to interruptions in cold chain storage, posing a broader public health risk.

Healthcare services themselves are not immune to the crisis. Although most hospitals have backup generators, many are poorly maintained and unreliable, risking disruption to critical care services. Smaller clinics and healthcare providers lack alternative power sources entirely, leading to canceled treatments and procedures. The medical supply chain, especially for temperature-sensitive pharmaceuticals and diagnostic reagents, is

increasingly strained, with delays and cost increases affecting access and availability.

Emergency response systems have also been compromised. Ambulance services are delayed by communication breakdowns and traffic congestion due to unlit roads. Hospital monitoring systems fail during blackouts, jeopardizing the care of critically ill patients (PRIMICIAS, 2024b). The situation is further compounded by the physical and emotional strain on healthcare workers, who must navigate these systemic limitations while continuing to provide essential services. The cumulative effect of these disruptions places a severe and escalating economic burden on the healthcare system, with implications for both immediate response capacity and long-term public health infrastructure.

Call to action

Ecuador's energy crisis is a stark illustration of the chronic failures in planning, investment, and governance that have long afflicted the country. Despite numerous warnings and predictable vulnerabilities, national leadership has consistently failed to implement proactive measures to prevent systemic collapse. The country's overreliance on aging infrastructure and hydroelectric systems has repeatedly exposed it to preventable crises, yet leadership responses have remained largely reactive and short-sighted.

This energy crisis magnifies the fragility of our public health systems and exposes the devastating consequences of neglect. Every blackout reveals not just infrastructural deficiencies, but also the failure of governance. Politicians must recognize that planning is not optional; it is their duty to anticipate and mitigate risks to ensure the safety and wellbeing of the population.

Immediate actions are needed to stabilize the national energy infrastructure, diversify the energy matrix through renewable sources, and strengthen healthcare systems to withstand future climate and infrastructure-related disruptions. Ecuador can no longer afford to lurch from one emergency to the next. This is a critical moment for decisive leadership—one that embraces accountability, evidence-based planning, and the needs of the population over political expediency. The time for delay and excuses has passed; what is urgently required now is commitment, coordination, and comprehensive reform to secure the country's future.

Conclusions

Ecuador's ongoing energy crisis underscores the deep vulnerabilities in its infrastructure and governance, with severe consequences for the health and wellbeing of its citizens. The country's over-reliance on aging energy systems, coupled with the unpredictable impacts of climate change, has resulted in a crisis that is more than just an economic issue it is a public health emergency. Prolonged power outages, disruptions in healthcare services, and the increasing vulnerability of marginalized

populations to environmental stressors highlight the urgent need for systemic change. Addressing this crisis requires immediate and coordinated action from both national and local governments. Long-term solutions must prioritize energy resilience through the modernization of existing infrastructure and the integration of sustainable, renewable energy sources. Simultaneously, the healthcare system must be fortified to remain functional and responsive during such disruptions, particularly in the face of increasingly frequent climate-related events.

Strategic investments in renewable energy technologies and comprehensive, forward-looking planning are essential to mitigating the impact of future crises. These efforts not only reduce strain on public health systems but also enhance national preparedness and safeguard population wellbeing. These experiences can serve as lessons for other regions of the world that, due to their own vulnerabilities, may face similar challenges in the future.

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EO-P: Writing – original draft, Writing – review & editing. AL-C: Writing – original draft, Writing – review & editing. IS-S: Writing – original draft. CS-S: Writing – review & editing. JV-G: Writing – original draft, Writing – review & editing. JI-C: Writing – review & editing, Writing – original draft.

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