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Lung Infections in Asian Countries: Epidemiological Burden, Determinants, and Post-COVID-19 Impact

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Abstract
Lung infections continue to represent a major cause of preventable morbidity and mortality across Asian countries, reflecting persistent inequities in environmental conditions, social determinants of health, and health system capacity. The region accounts for a disproportionate share of the global burden of pneumonia and tuberculosis, while recurrent viral respiratory outbreaks continue to challenge public health preparedness, health security, and system resilience. The COVID-19 pandemic has fundamentally altered the epidemiology of lung infections, resulting in long-term pulmonary sequelae, disruption of tuberculosis prevention and care services, and a marked increase in opportunistic fungal infections. This article synthesizes current evidence on the epidemiological burden of lung infections in Asia, examines key structural, environmental, and biological determinants, and critically evaluates the post-COVID-19 implications for respiratory health and health systems. In alignment with World Health Organization (WHO) strategies and the Sustainable Development Goals (SDGs), the article emphasizes the need for integrated respiratory care, strengthened disease surveillance and control programs, and multisectoral policy action to mitigate the long-term burden of lung infections in the region.

Keywords: Lung infections; Asia; tuberculosis; COVID-19; post-COVID respiratory disease; public health; SDGs

Introduction

Respiratory infections constitute one of the most significant global public health challenges and remain a central concern within the WHO Global Programme of Work and the Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being). Asian countries bear a disproportionate share of morbidity and mortality attributable to lung infections, driven by high population density, rapid and often unplanned urbanization, widespread ambient and household air pollution, and persistent socioeconomic inequalities that constrain access to quality healthcare (World Health Organization [WHO], 2023). Major lung infections including pneumonia, tuberculosis (TB), viral respiratory illnesses, and emerging fungal diseases continue to exert substantial pressure on health systems, undermine workforce productivity, and impose significant economic costs at household and national levels.

The COVID-19 pandemic marked a defining moment for respiratory health and health system resilience globally. In Asia, the pandemic exposed long-standing structural vulnerabilities while fundamentally reshaping the epidemiology of lung infections. Beyond acute infection, COVID-19 has been associated with persistent pulmonary dysfunction, immune dysregulation, and structural lung damage, increasing susceptibility to secondary bacterial, viral, and fungal infections (Nalbandian et al., 2021). Pandemic-related disruptions to essential health servicesparticularly TB prevention, diagnosis, and treatment have further intensified disease burden. Within this context, the present article provides a policy-relevant synthesis of lung infections in Asia, examining epidemiological trends, underlying determinants, and post-COVID-19 implications through a health systems and equity-oriented lens.

Epidemiology of Lung Infections in Asia

Pneumonia

Pneumonia remains a leading cause of morbidity and mortality across Asian countries, with a disproportionate impact on children under five years of age and older adults. South and Southeast Asia contribute substantially to global childhood pneumonia deaths, reflecting persistent gaps in early care-seeking, nutritional status, vaccination coverage, and primary healthcare access (UNICEF, 2022). While bacterial pathogens particularly *Streptococcus pneumonia* remain predominant, the epidemiological profile of pneumonia has evolved in the post-COVID-19 era. Viral pneumonia and post-viral respiratory complications now constitute an increasing share of hospital admissions, highlighting the need for strengthened surveillance and integrated respiratory care pathways (Troeger et al., 2018).

Tuberculosis

Tuberculosis remains a major public health priority in Asia, which accounts for nearly two-thirds of the global TB burden. Countries such as India, China, Indonesia, Pakistan, and the Philippines report the highest incidence and mortality rates worldwide (WHO, 2024). Despite the availability of effective treatment, TB control efforts continue to be undermined by delayed diagnosis, treatment interruptions, social stigma, and inequitable healthcare access. The growing prevalence of multidrug-resistant TB (MDR-TB) poses a significant threat to regional and global TB elimination targets, necessitating renewed investment in WHO End TB Strategy–aligned interventions (Dheda et al., 2017).

Viral Respiratory Infections

Asian countries have experienced recurrent outbreaks of viral respiratory infections, including SARS, MERS, influenza, and COVID-19. High population density, extensive population mobility, urban overcrowding, and close human–animal interactions increase vulnerability to the emergence and rapid spread of novel respiratory pathogens (Zhu et al., 2020). These outbreaks disproportionately affect older adults, individuals with chronic diseases, and socially vulnerable populations, placing sustained pressure on hospital capacity, intensive care services, and public health response systems.

Fungal and Opportunistic Lung Infections

Fungal and opportunistic lung infections have emerged as an increasingly important component of respiratory disease burden in Asia, particularly in the post-COVID-19 period. Infections such as aspergillosis and mucormycosis have been strongly associated with diabetes mellitus, corticosteroid exposure, prolonged hospitalization, and immune dysfunction (John et al., 2021). Climatic factors, including warm temperatures and high humidity, further contribute to environmental fungal proliferation. These trends underscore the growing complexity of lung infection epidemiology and the need for strengthened diagnostic capacity and clinical preparedness.

Determinants of Lung Infections

The burden of lung infections in Asia is shaped by a multidimensional set of determinants operating across environmental, behavioral, nutritional, social, and health system domains. Air pollution remains one of the most critical and modifiable risk factors, with many Asian cities exceeding WHO air quality guidelines for particulate matter exposure. Chronic exposure to ambient air pollution contributes to airway inflammation, impaired immune defense, and increased susceptibility to acute and chronic lung infections (Landrigan et al., 2018).

Indoor air pollution from the continued use of biomass fuels for cooking and heating disproportionately affects rural and low-income households, particularly women and children. Tobacco useincluding smoking, smokeless tobacco, and second-hand smoke exposurefurther compromises respiratory health and amplifies infection risk. Malnutrition and micronutrient deficiencies weaken immune function, increasing disease severity and prolonging recovery, particularly among children and older adults.

Structural determinants, including poverty, overcrowded housing, and inadequate healthcare infrastructure, facilitate disease transmission and delay diagnosis and treatment. Limited access to quality primary care, diagnostics, and continuity of treatment remains a major barrier to achieving Universal Health Coverage (UHC) and reducing preventable respiratory mortality (Pai et al., 2016).

Post-COVID-19 Impact on Lung Infections

Long-Term Pulmonary Sequelae

A significant proportion of individuals recovering from COVID-19 experience persistent respiratory symptoms and functional impairment, collectively referred to as post-COVID or long COVID conditions (Nalbandian et al., 2021). Structural lung abnormalities such as pulmonary fibrosis and bronchiectasis compromise pulmonary defense mechanisms, increasing vulnerability to recurrent infections and long-term disability.

Disruption of Tuberculosis Services

The COVID-19 pandemic severely disrupted TB prevention and care services across Asia. Lockdowns, diversion of health resources, and reduced healthcare utilization resulted in delayed diagnosis, treatment interruptions, and increased community transmission (McQuaid et al., 2021). These disruptions threaten progress toward SDG TB elimination targets and raise concerns regarding rising drug resistance.

Surge in Opportunistic Infections

Post-COVID immune dysregulation, widespread corticosteroid use, and high prevalence of uncontrolled diabetes led to a surge in opportunistic fungal infections, particularly in South Asia. These infections were associated with high mortality, prolonged hospitalization, and substantial healthcare expenditure (Patel et al., 2021), highlighting gaps in post-COVID clinical governance and antimicrobial stewardship.

Public Health and Economic Implications

The sustained burden of lung infections has significant implications for public health systems, economic productivity, and social equity. Increased demand for respiratory care, diagnostics, and rehabilitation has strained healthcare systems, particularly in low- and middle-income Asian countries (Soriano et al., 2022). At the household level, productivity losses, income insecurity, and rising out-of-pocket healthcare costs have exacerbated health inequities and increased the risk of catastrophic health expenditure.

Prevention and Control Strategies

In alignment with WHO policy frameworks and the SDGs, reducing the burden of lung infections in Asia requires a comprehensive, multisectoral approach. Strengthening vaccination programs, revitalizing TB

control services, expanding molecular diagnostics, improving air quality, promoting clean cooking fuels, and ensuring rational use of antibiotics and corticosteroids are essential. The expansion of post-COVID respiratory clinics, pulmonary rehabilitation services, and integrated disease surveillance systems will enhance health system resilience and preparedness for future respiratory threats.

Conclusion

Lung infections remain a critical public health challenge across Asian countries, reflecting persistent inequities in environmental exposure, social conditions, and healthcare access. The COVID-19 pandemic has amplified these vulnerabilities, reshaping respiratory disease epidemiology through long-term pulmonary sequelae, disruption of essential TB services, and increased opportunistic infections. Addressing this burden requires sustained political commitment, health system strengthening aligned with Universal Health Coverage, and coordinated regional action consistent with WHO strategies and the Sustainable Development Goals. Such an approach is essential to reducing preventable morbidity and mortality while safeguarding population health and socioeconomic stability across Asia.

References

1. Dheda, K., et al. (2017). Multidrug-resistant tuberculosis. *The Lancet Respiratory Medicine, 5*(4), 291–360.
2. John, T. M., et al. (2021). COVID-19 and mucormycosis. *Journal of Fungi, 7*(4), 298.
3. Landrigan, P. J., et al. (2018). Pollution and health. *The Lancet, 391*(10119), 462–512.
4. McQuaid, C. F., et al. (2021). COVID-19 impact on TB. *The Lancet Respiratory Medicine, 9*(9), 964–974.
5. Nalbandian, A., et al. (2021). Post-acute COVID-19 syndrome. *Nature Medicine, 27*(4), 601–615.
6. Patel, A., et al. (2021). COVID-associated mucormycosis. *Emerging Infectious Diseases, 27*(9), 2349–2359.
7. Soriano, J. B., et al. (2022). Post-COVID condition. *The Lancet Infectious Diseases, 22*(4), e102–e107.
8. Troeger, C., et al. (2018). Lower respiratory infections. *The Lancet Infectious Diseases, 18*(11), 1191–1210.
9. UNICEF. (2022). *Pneumonia: The forgotten killer of children*.
10. World Health Organization. (2023). *Global report on air pollution and health*.
11. World Health Organization. (2024). *Global tuberculosis report 2024*.
12. Zhu, N., et al. (2020). Novel coronavirus pneumonia. *New England Journal of Medicine, 382*(8), 727–733.